PROJECT PERIODIC REPORT

Grant Agreement Number: 226604

Project Acronym: OPTICON

Project Title: Optical Infrared Co-ordination Network for Astronomy

Funding Scheme: Integrating Activity – Combination of Collaborative Project and Co-ordination and Support Action

Date of latest version of Annex I against which the assessment will be made:
9th November 2009

Periodic report: First (1st)

Period covered: 1st January 2009 to 31st December 2009

Name, title and organisation of the scientific representative of the project's coordinator:
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Declaration by the scientific representative of the project coordinator

I, as scientific representative of the coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;
- The project (tick as appropriate):
  - ☐ has fully achieved its objectives and technical goals for the period;
  - ☐ has achieved most of its objectives and technical goals for the period with relatively minor deviations;
  - ☐ has failed to achieve critical objectives and/or is not at all on schedule.
- The public website is up to date, if applicable.
- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 3.6) and if applicable with the certificate on financial statement.
- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator

Date

Signature of scientific representative of the Coordinator

3.1 Publishable Summary

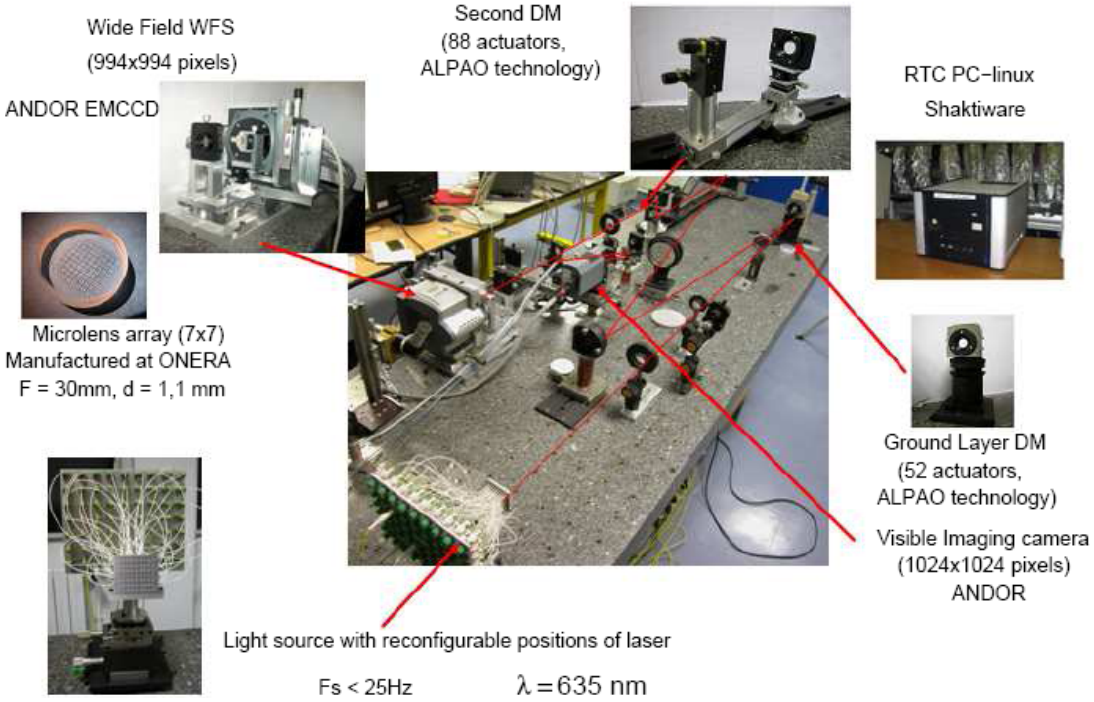
The OPTICON consortium, made up of exists to deliver a simple yet challenging set of strategic objectives.

- Structuring the European astronomical community by ensuring astronomers are able to carry out state of the art research on state of the art facilities.
- Developing European astronomy by allowing astronomical communities to develop scientific plans for their own future facilities.
- Strengthening European astronomy by delivering technology research and development to help ensure extant and future astronomical research facilities are state of the art.

Effort started on all activities in late 2009, following delivery of the funding from the EC in July 2009. The primary goal for all activities was to initiate activity, through 'kick-off' meetings of all involved participants, to devote effort to essential design and definition work, particularly to identify and initiate development of long lead-time items, to build active consortia, and get real work underway. This was achieved for all.

WP1: Adaptive Optics System

The main objective of this set of activities is to design and develop Laser Guide Star Adaptive Optics systems for existing large telescopes (Large Binocular Telescope, Very Large Telescope, William Herschel Telescope), to upgrade extent Adaptive Optics systems for a Solar telescope (GREGOR) and to upgrade the Very Large Telescope Planet Finder instrument (SPHERE) to maintain its competitiveness in the period 2010-2012. Some of the technical developments for this activity are illustrated below

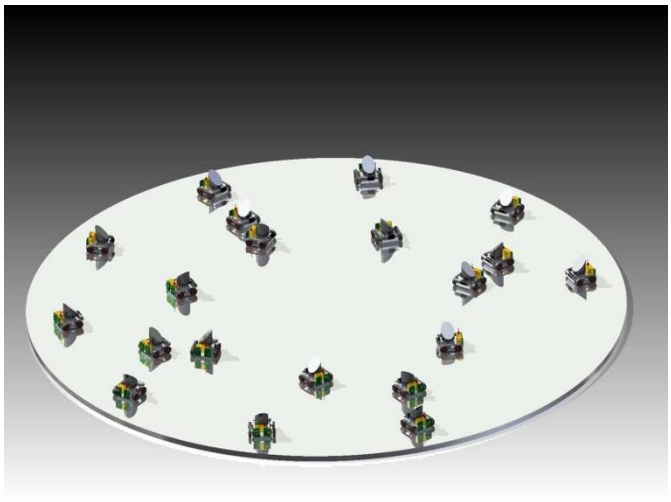


WP2: Laser Guide Star Adaptive Optics Detectors
The main objective is the development of a scaled-down Demonstrator for Laser Guide Star wavefront sensing, leading to a version for the European Extremely Large Telescope. Detailed technical specification has been developed, and a Call for Tender of the (industrial-supplied) fast detector has been placed.

WP3: Astrophotonics
The main objective is to carry out and co-ordinate research in the new field of Astrophotonics; this aims to bring to astronomy the benefit of photonic devices developed over many years by the telecommunication industry and to use photonic principles in the construction of the challenging instruments required for future generations of observatories. An international collaboration, largely industrially-financed, has been established. Several research partners are able to participate in that collaboration through Opticon support.

WP4: High Angular Resolution by Interferometry
The main objective is to build on the co-ordination of European activities in the demanding area of astronomical interferometry. It will continue to help develop and enhance the existing infrastructures and also develop plans for the future. A dedicated postdoctoral fellow has been employed, to lead the technical activities.

WP5: Smart Instrument Technologies
The main objective is to develop smart instrument technologies which can be used to meet astronomers' needs for wider fields of view, higher spectral and spatial resolutions and multi-object observations while fitting within demanding size, mass and engineering limits.
A particular development, of general applicability, but especially of relevance to future instruments on the Extremely Large Telescope, is micro-autonomous robots, by which an instrument can be made much smaller and lighter. An artist impression of a focal plane populated with micro-autonomous robots is illustrated below.



WP6: New Materials and Processes for Astronomical Instrumentation
The main objective is to identify and characterise new types of optically-active materials with possible astronomical applications, moving beyond glass and steel, to organic, photosensitive and polymer materials.
The research is divided into 4 sub-Work Packages.

- *WP 6.1 Management:* oversee, manage and assess the progresses of the WP. Report and disseminate the results.
- *WP 6.2 Novel Volume Phase Holographic Grating-based devices (VPHG):* Explore new areas of application of traditional Volume Phase Holographic Gratings to astronomical intrumentation.
- *WP 6.3 Photochromic and Photosensitive Materials and associated devices* . Explore the possible introduction of new basic materials in holographic applications to astronomical instrumentation.
- *WP 6.4 New mterials and processes for fabrication of reflective and refractive optics.* Explore the possibility to port new materials and processes into the fabrication of reflective and refractive optics for atronomy.

WP7: Transnational Access
The first year of the FP7 transnational access activity overlapped with the end of the FP6 contract, since telescope semesters begin in the Spring and Autumn, rather than follow calendar years. Thus the existing publicity for FP6, described extensively in earlier reports of the FP6 contract, remained in effect. The Web-pages describing the access programme which had been hosted at the IAC at La Laguna, Tenerife in the Canary Islands were transferred to a site hosted by the Isaac Newton Group based in La Palma, also in the Canaries. The site is at http://www.ing.iac.es/opticon/. These pages were updated as necessary. In addition the individual observatory websites each carried links directing non-national users who might qualify for OPTICON support to the OPTICON pages
As a first step towards a more European approach the solar telescope time was awarded by a single panel drawn from members of the EAST consortium (WP 12.3). This panel has also accepted the responsibility of allocating solar time to be awarded on the four solar telescopes in the Canaries as part of the international agreements connected with the La Palma and Tenerife observatories (The 'CCI International Time Programme').
Regular articles about the Trans-National Access programme appear in the newsletter of the European Astronomical Society.
The project scientist regularly promotes the Trans-National Access programme at international meetings, such as the Joint European Astronomical Society meetings (held at Hatfield UK in 2009. He and other members of the OPTICON team also promote the programme in individual seminars at specific astronomical institutes. In 2009 these included at talk in Sofia, Bulgaria by M. Dennefeld and in Tartu, Estonia by J. Davies. The main objective is to publicise and promote the availability of access to various users.

WP8: Management
The Management Board is responsible for making strategic decisions. Meetings are held so that WP leaders can provide overview presentations of their WP activities, status, and progress to the whole consortium. The Executive oversee the day-to-day implementation of the OPTICON programme.

WP9.1: Key Technology Network
The main objective is to focus on specific areas where value can be added by bringing together scientists and engineers from across Europe and from different sectors to exchange ideas and plans.

WP9.2: Software Standards
The main objective is to develop detailed software standards for an open, modular system for processing and analysis of astronomical data by end users.

WP10.1: Science Case for the European ELT
The main objective is to continue to develop and monitor the scientific case for the building of the 42m European Extremely Large telescope.

WP10.2: European Network for High Time Resolution Astrophysics (HTRA)
The main objective is to develop science cases and concepts for telescope and instrument design for the E-ELT in a specific area. In particular, it will concentrate on the science foundations of HTRA, and include the implications of E-ELT, detectors and the data aspects of HTRA.

WP11.1: Community Development
The main objective is to organise activities transferring knowledge from experienced astronomers familiar with forefront observatories to new users (young scientists, or scientists from the new member states). These activities will include technical schools and workshops organised in leading institutes or observatories and short term exchanges of engineers or scientists.

WP11.2: The European Interferometry Initiative
The main objective is to maximise community-wide involvement in the world's first common-user large telescope interferometer, ESO's VLTI, strengthening both scientific and technical involvement.

WP12.1: Telescope Directors' Forum
The main objective is to meet to develop actions of common interest to medium sized telescopes, both those in the Transnational Access network, and those currently of lesser international competitiveness.

WP12.2: Planning for a Viable Future
The main objective is to create a strategic plan for the future development of astronomy facilities. This includes proposing a reorganisation of our current mid-sized facilities to improve efficiency and cost effectiveness, to identify, develop, and implement complementary approaches to delivery of the resources to satisfy the increasing needs of the widening European astronomical research community OPTICON and AstroNet are collaborating in this process, and will establish a joint review.

WP12.3: The European Association for Solar Telescopes (EAST)
The main objective is to establish groups which will address key objectives towards plans for a large solar telescope to be included in the AstroNet Science Vision Roadmap. The group will also oversee the solar astronomy element of the OPTICN Transnational Access programme.

▪ 3.2 Project Objectives for the period

The OPTICON consortium exists to deliver a simple yet challenging set of strategic objectives.

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3.3 Work Progress and achievements during the period

WP1: Adaptive Optics Systems: seeing beyond atmospheric limits

1.1 Introduction

The objective of this first period was to kick-off all the activities. The WP 1.2 objective for the first year was to provide the Laser Guide Star upgrade design review for the William Herschel Telescope. WP 1.3's main objective was to develop optimized control algorithms for SPHERE instrument and to test them on an AO bench. WP 1.4 is developing the design of a multi laser based Ground Layer Adaptive Optics for the eight meter Large Binocular Telescope. During this first year the preliminary design review was expected to take place. WP 1.5 is pursuing the upgrade of the adaptive optics system for the solar telescope Gregor. The first year was dedicated to the definition of the technical specifications of the deformable mirror and the launch of the procurement. WP 1.6 is dedicated to the development of a powerful reliable and easily maintainable laser unit. The year's objective was to have two competitive preliminary design phases followed by a selection process to decide which company will be granted a contract for the final design, manufacture, Assembly Integration and Test of the Laser System. WP 1.7's main objective is to develop a light and affordable version of the SPARTA real time control platform. The first year was dedicated to the definition of the SPARTA-light specifications. WP 1.8 is dedicated to the development of optimal control algorithms for wide field adaptive optics. WP 1.9 objective is to be able to identify adaptive optics interaction matrices on sky in closed loop and to generate synthetic interaction matrices. The first year's aim was to analyze the knowledge in this field and to determine the mathematical expression of the direct problem.

1.2 Progress and achievements by Work Package

WP 1.1: Coordination

A kick-off meeting was organised before the official start of the FP7 OPTICON contract in September 2008 in combination with the last FP6-OPTICON-JRA1 meeting at ESO Garching. The first WP-1 general meeting took place in July at ESO. The participants reviewed their objectives and deliverables. Minutes of the meeting have been produced and are available on the website (see below). In general, the activities have started slowly due to the late signature of the contract and the even later transfer of the first payment. The kick-off meetings of all the Work Packages took nevertheless place before the first progress meeting in July. The status of each Work Package is provided in the next sections. A protected webpage has been created for the diffusion of all the reports and important information to all the partners. It is accessible on ESO website; the objectives are provided at the following webpage:
http://www.eso.org/sci/facilities/develop/ao/fp7/index.html.

A webpage with restricted access has also been created to allow an easy sharing of the reports and deliverables between the partners. It is also used to distribute the presentations from the progress meeting. The restricted webpage is accessible at the following link:

http://www.eso.org/sci/facilities/develop/ao/fp7/doc/index.html with the username: 0ptic0njral and the password: adaptiveoptics.

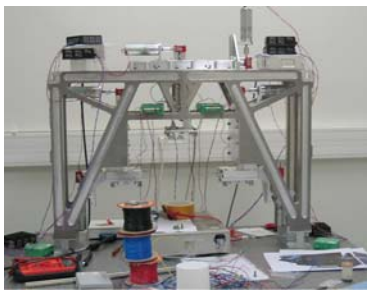
WP 1.2: Laser Guide Star Multi-Object Adaptive Optics system on William Herschel Telescope

This Work Package supports the upgrade of the CANARY Natural Guide Star Multi-Object AO (MOAO) demonstrator (Phase A) to a Laser Guide Star MOAO demonstrator (Phase B and beyond). We summarise the current status of the Phase A demonstrator and the work on the upgrade which has been conducted so far. We then summarise the plans for the coming year. The upgrade project is a collaboration between Observatoire de Paris LESIA, ONERA and LAM in France, UKATC and Durham University in the UK, and the Isaac Newton Group of Telescopes, which operates the 4.2m William Herschel Telescope (WHT) in La Palma. There are links with WP1.6 and WP1.8.

It should be noted that the funding for the French Work Packages at LAM, ONERA and LESIA has been delayed, thus full-time work in general has not been able to commence at these institutions. In fact, in most cases it was not scheduled to begin this year and there will not be a significant effect provided the delay is not further protracted.

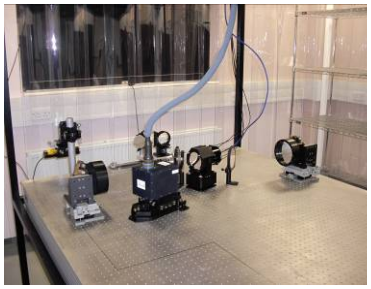
Phase A Status

CANARY phase A has entered its Assembly Integration Testing phase and is running 6-8 weeks behind its original schedule. This would have consumed the original schedule margin for a May 2010 on-sky run, but we have acted to restore the margin by delaying the run to the end of July 2010. This period provides very significantly better NGS asterisms and rescheduling on these grounds was already anticipated. We have furthermore delayed the Critical Design Review for the Phase B upgrade from December 2009 to March 2010 in order to focus all available effort on Phase A AIT (following Phase A FDR recommendations).
The Phase A subsystem status is illustrated in the following figures and their extended captions.



WP1.2 Figure 1: NGS TAS at LESIA undergoing mechanical testing. The subsystem is now complete and due for shipping to Durham for global AIT at the end of January 2009. This system moves the three NGS probes (which use Andor EMCCDs) independently around the derotated NGS pick off field at the input to CANARY. The three NGS WFS detectors are currently interfaced to the CANARY RTC for final acceptance testing.

WP1.2 Figure 2: The Phase A telescope simulator at UKATC. This unit provides the alignment, calibration and test (NGS) sources for CANARY as well as the turbulent phase screens. The subsystem generates an intermediate focus and pupil and feeds into the input of CANARY. It may be deployed at anytime, including periods when CANARY is on the WHT. The system is complete apart from small changes to screen motion control. It is due in Durham mid-January.



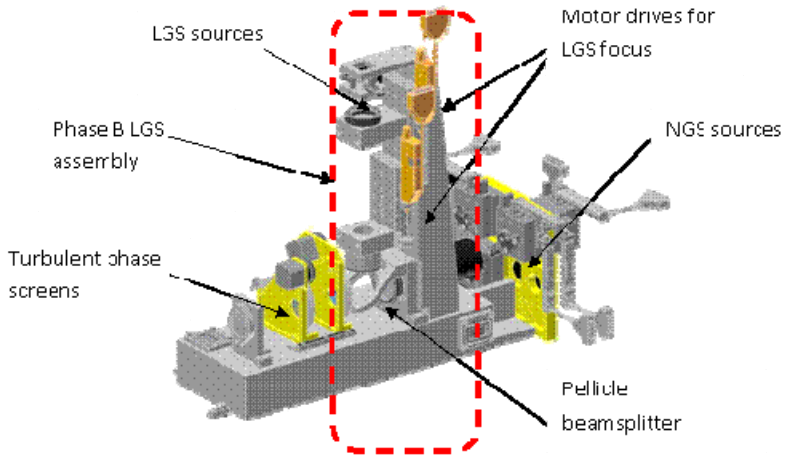
WP1.2 Figure 3: The new CANARY AIT lab in Durham, which has been refurbished with funding from Durham University. This includes a clean enclosure, temperature control and a separate electronics room and cable feeds. On the bench are the CANARY woofer DM (ex-ADONIS), the SPHERE-type tip-tilt mirror, and off-axis parabolic mirror relay. The system preparation is on schedule to receive the NGS TAS and telescope simulator in January.

The RTC has been procured from Shaktiware and pre-acceptance tests have been conducted at ONERA, Durham and now at LESIA. The latter phase will be extended to include full open-loop tomographic testing on the SESAME bench using the CANARY WFSs and RTCS. The WFSs are scheduled to move to Durham for the final-configuration AIT at the start of March (TBC). Basic open-loop single conjugating testing is being carried on in parallel at Durham using the truth sensor, which is also an Andor camera.

WP1.2 Figure 4: The new CANARY optical bench being positioned on its Kinematic mounts at the GHRIL Nasmyth platform of the 4.2 WHT. Preparatory work at the WHT also includes a new 2.5' field optical derotator, full temperature control for the optical and electronics enclosure, and the relocation of an internal dividing wall.

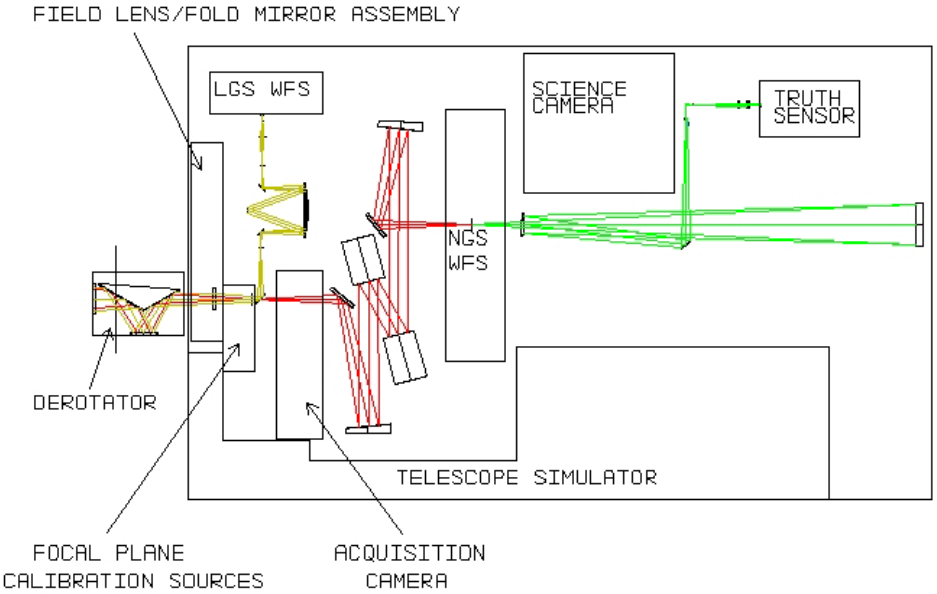
LGS Upgrade (Phase B) Progress

The telescope simulator phase B/C features have now been added to the design in preparation for q review in March 2010. The interface to the LGS assembly is provided by adding a Pellicle beam splitter, mounted on the lens mount on the turbulence emulator assembly. The LGS mount bracket attaches to the chassis, and fits over the simulator lens mount. The turbulence emulator assembly consists of a rectangular chassis which supports two lens mounts, ground and altitude turbulence emulators, and NGS input stages.



WP1.2 Figure 5: LGS assembly/Pellicle/Turbulence emulator assembly

The LGS assembly (shown in WP1.2 Figure 5) consists of four fibre/capillary sources clamped to a bracket. The separation of the sources can be varied radially by manually selecting different radial locations (in the range 2.6 mm – 7.8mm radius). The two optical elements are mounted on independent linear Z stages, with remotely controlled motor drives. The mass estimate for the assembly is 5.0 Kg.
Work is continuing on phase B CANARY optical design (WP1.2 Figure 6) in preparation for the phase B design review. We have conceptual designs for several methods for formatting the four LGS asterism onto the WFS detector including optical periscopes and various variable beam steering methods. These approaches will be analyzed during the March design review.



WP1.2 Figure 6: CANARY phase B optical design including LGS WFS

The upgrade to the GLAS laser system at the WHT is also progressing and we have tested the design concept for the laser launch system on-sky. Several companies have expressed an interest in providing a new laser for the CANARY system and the tender process for the laser(s) will begin in January 2010. All design work is being underpinned by the results of Monte Carlo simulations of system performance with the four LGS asterism. Initial results predict a reduction in image FWHM from 0.48 to 0.27 arcseconds for a nominal turbulence profile with the LGS at an altitude of 15km. The effect of optimising calibration techniques to improve this correction is currently under investigation.

WP 1.3: VLT Planet Finder Upgrade

Design of post focal wavefront sensors

Several activities have been performed in 2009 for WP 1.3, mainly related to the study of on-line phase diversity. It can be broken in two activities

- Analytical and simulation study of the on-line phase diversity algorithm.
- Correction of chromaticity with phase diversity: by its very principle, the phase diversity algorithm is chromatic.

These activities are described below.

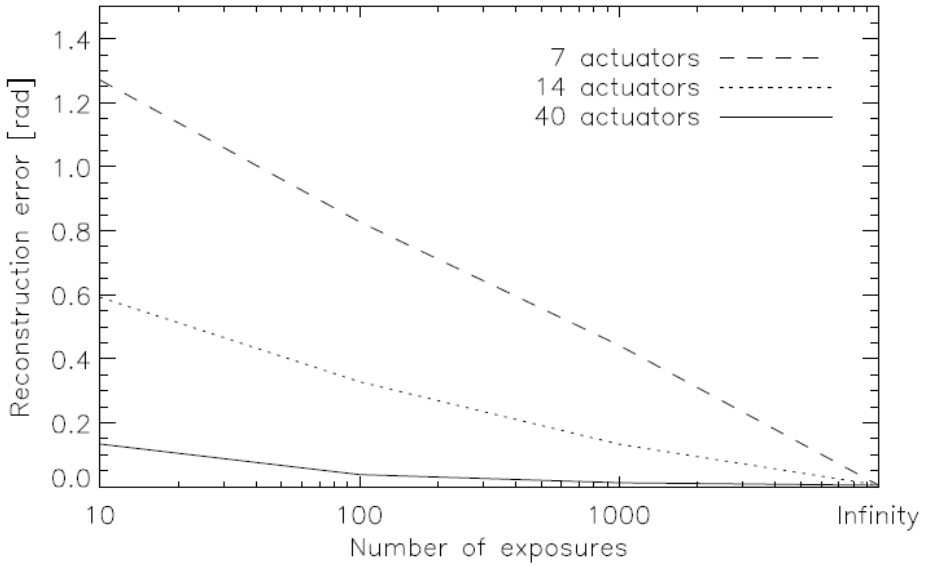
On-line AO long-exposure Phase Diversity for Extreme AO

The phase diversity technique is a useful tool to measure and pre-compensate for quasi-static aberrations, in particular non-common path aberrations, in an

adaptive optics corrected imaging system. We have recently proposed an extension of the phase diversity technique that uses long exposure adaptive optics corrected images for sensing quasi-static aberrations during the science observation, i.e. *on-line*, in particular for high-contrast imaging. This allows for a measurement and compensation of the not-so-static aberrations during the whole night, with a perfect insensitivity to Non-Common Path Aberration (NCPA). The principle of the method is that, for a sufficiently long exposure time, the residual turbulence is averaged into a convolutive component of the image and that phase diversity estimates the sole static aberrations of interest. The advantages of such a procedure, compared to the processing of short-exposure image pairs, are that the separation between static aberrations and turbulence-induced ones is performed by the long-exposure itself and not numerically, that only one image pair must be processed, that the estimation benefits from the high SNR of long-exposure images, and that only the static aberrations of interest have to be estimated. Long-exposure phase diversity can also be used as a phasing sensor for a segmented aperture telescope. Thus, it may be particularly useful for future planet finder projects such as EPICS on the European ELT.

For the SPHERE application, we are relying on the current differential tip-tilt sensor design. The idea is to monitor the evolution of the Non-Common Path Aberrations simultaneously with the science observation. These measurements will be applied to the AO system through the modification of the WFS reference slopes. This approach is rather similar to the GPI one but with a very simplified optomechanical implementation. The performance of this new concept (proposed by Mugnier et al. Opt. Exp. 2008 [1]) as been presented in an international conference in 2009 [2].

We present in WP1.3 Figure 1 the result of the expected performance for 3 cases of AO correction, depending on the exposure time.



WP1.3 Figure 1: Evolution of the reconstruction error with the exposure time (in number of independent turbulence realizations), for several levels of AO correction.

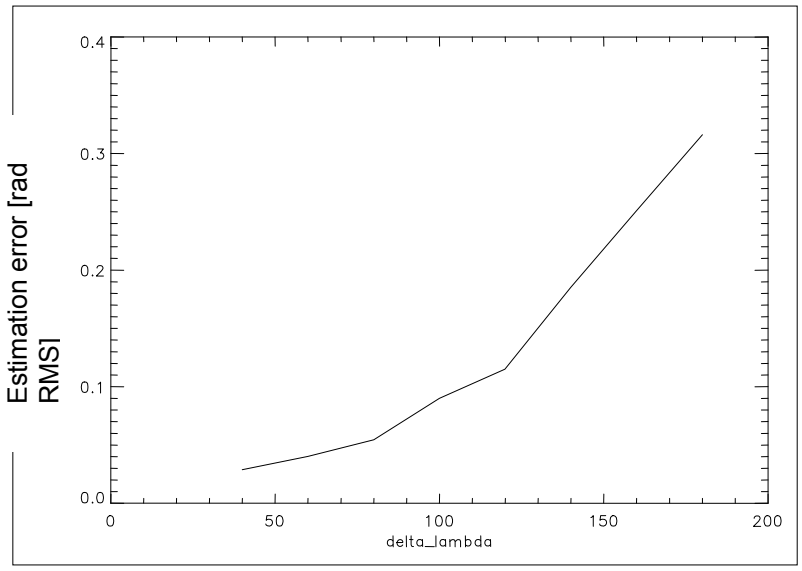
Wide band phase diversity

Classical phase diversity is a highly accurate focal plane sensor. It estimates the Zernike coefficients of the static aberrations from two focal-plane images, differing

from one known aberration. Phase diversity is based on a MAP minimisation of the monochromatic image formation model:

$$h = \left| TF\left(Pe^{i\frac{2\pi}{\lambda}\delta} \right) \right|^2$$

with h being the system PSF, λ the wavelength, and δ the OPD. Using phase diversity on wide spectral band images leads to a wavefront estimation error given in WP 1.3 Figure 2. The error (given in radians RMS) increases with the bandwidth, and reaches 100% for a bandwidth of less than 200nm.



$\Delta\lambda$ [nm]

WP1.3 Figure 2: Estimation error vs. band width. Imaging wavelength: 1.05µm. Static aberrations to estimate: 0.3 rad.

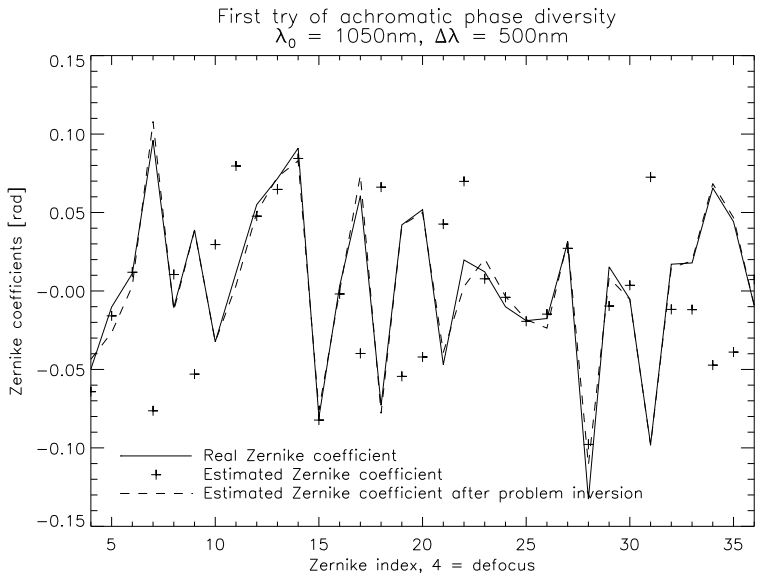
Simulation results show that the Zernike coefficients $\hat{a}_{\Delta\lambda}$ estimated by classical phase diversity on large band images can be empirically expressed with respect to real Zernike coefficients a following the linear relation:

$$\hat{a}_{\Delta\lambda} = \mathrm{M}a + b_{\Delta\lambda}$$

with M being an interaction matrix, and $b_{\Delta\lambda}$ a bias vector. Both of these quantities only depend on band width and simulation parameters, and can be easily calibrated in simulation. This relation allows one to unbias the classical phase diversity measurement, and therefore retrieve the correct Zernike coefficients a using a simple inversion :

$$\hat{a} = \mathrm{M}^{-1}\left(\hat{a}_{\Delta\lambda} - b_{\Delta\lambda}\right).$$

The use of classical phase diversity combined to the previous relation is called “Large Band Phase Diversity”. A first implementation of the large band phase diversity leads to the result shown on WP1.3 Figure 3. The true Zernike coefficients (solid line) are badly estimated with classical phase diversity (crosses), whereas the large-band phase diversity estimation (dashed line) gives a very accurate result.



WP1.3 Figure 3: First results of achromatic phase diversity. Imaging wavelength is 1050nm, band width is 500nm. Static aberrations to be estimated are 0.3 radians.

We have proposed a simple and yet efficient approach to compensate for the phase diversity chromaticity. Preliminary simulations have shown a very good performance and it has been presented in a conference [3].
It will be applied in 2 different scenarios:

- Off-line static phase diversity measurements. Accounting for filter bandwidth in order to gain a few nanometres on the final NCPA measurements. These few nanometres may be critical for the final purpose of the SPHERE instrument, the direct detection of extra-solar planets

- On-line dynamic phase diversity measurements. The idea here is to be able to use broadband filters in order to increase the number of photons and thus work on fainter stars.

Optimization of real time algorithms for the AO system

The activities will actually start in 2010. In 2009, a review of existing solutions already proposed for GPI, has been performed. It consist in a Fourier based solution coupled with a Linear Quadratic Gaussian (LQG) control. First, an analysis of wave front sensing and control through Fourier basis approach has been performed. Various methods for conversion of slopes towards the Fourier domain have been investigated and numerically compared. This analysis has been performed considering standard control approach (integrator).

In the meantime, we have considered the application of a full LQG approach to the global control of tip-tilt and DM for AO systems with a large number of degrees of freedom AO, such as SPHERE. Indeed, while LQG is already designed for tip tilt mirror control to benefit from turbulence and vibration estimation, prediction and optimal correction, extension of LQG to the global control of a tip tilt mirror and a deformable mirror could further improve performance. The major drawback of this approach is the increased complexity. We have thus reviewed the possible solutions to reduce LQG complexity, in particular through iterative solutions. Various solutions have been proposed in the literature. We have considered using preconditioned conjugate gradient methods [4]. This solution is however not performed in the Fourier domain (only preconditioners are computed in Fourier

space). This approach leads to a decrease of the LQG on-line complexity from O(n^2) down to O($n \log n$), with no significant off-line computations. Correia has also shown that no significant loss of performance is obtained in AO. Work is still ongoing.

Our goal is now to evaluate the interest of associating both Fourier domain computation and LQG simplification through iterative methods. Application of LQG control to SPHERE will be considered and performance evaluated. While performance improvement can already be expected thanks to turbulence and vibration optimal estimation and prediction, we can also expect some benefit from the aliasing reduction provided naturally by LQG [5], which should be achromatic compared to the pinhole approach and thus could improve the overall performance in wide-band.

Finally, estimation of system and exogenous parameters using AO loop (wind profile for instance) have also been identified for a detailed analysis. SPHERE AO analysis has shown that vibration and turbulence parameters can be identified on line to update the control parameters. A dedicated algorithm is already defined and numerically validated. These estimation procedures will be optimized. Wind profile estimation could also benefit from Fourier domain analysis as proposed by GPI.

Publications

Papers in 2009

[1] L. Mugnier, J.F. Sauvage, T. Fusco, A. Cornia, S. Dandy, "*On-Line Long-Exposure Phase Diversity: a powerful tool for Sensing Quasi-Static "*, *Aberrations of Extreme Adaptative Optics Imaging Systems,* Optics Express, **16** (22), 2008
[2] L. Mugnier, J.F. Sauvage, T. Fusco, A. Cornia, S. Dandy, "*On-Line Long-Exposure Phase Diversity: a powerful tool for Sensing Quasi-Static"* , *Aberrations of Extreme Adaptative Optics Imaging Systems,* AO4ELT 2009
[3] S. Dandy, Thierry Fusco, Jean-François Sauvage, « *Toward an optimized focal plane sensor", application to Sphere/Epics instrument,* Elbereth 2009
[4] C. Correia, J.-M. Conan, C. Kulcsár, H.-F. Raynaud, C. Petit, "Adapting optimal LQG methods to ELT-sized AO systems", AO4ELT, to be published, 2009
[5] Cyril Petit, Jean-Marc Conan, Caroline Kulcsár, and Henri-François Raynaud. "Linear quadratic gaussian control for adaptive optics and multiconjugate adaptive optics: experimental and numerical analysis ". *J. Opt. Soc. Am. A*, 26(6):1307-1325, 2009.

Papers in preparation for 2010

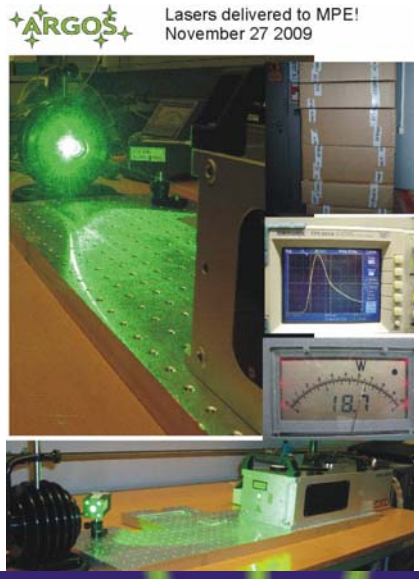
- S. Dandy, J.F Sauvage, T. Fusco, L. Mugnier, "*Optimized phase diversity sensor for wide band analysis on long-exposure AO corrected images: theory, simulations and experimental validations",* SPIE 2010
- S. Dandy, J.F. Sauvage, T. Fusco, in preparation "*Toward an optimized focal plane sensor, application to Sphere/Epics instrument"*
- S. Dandy, J.F Sauvage, T. Fusco, L. Mugnier, in preparation *"Experimental validation of the on-line long-exposure phase diversity concept"*

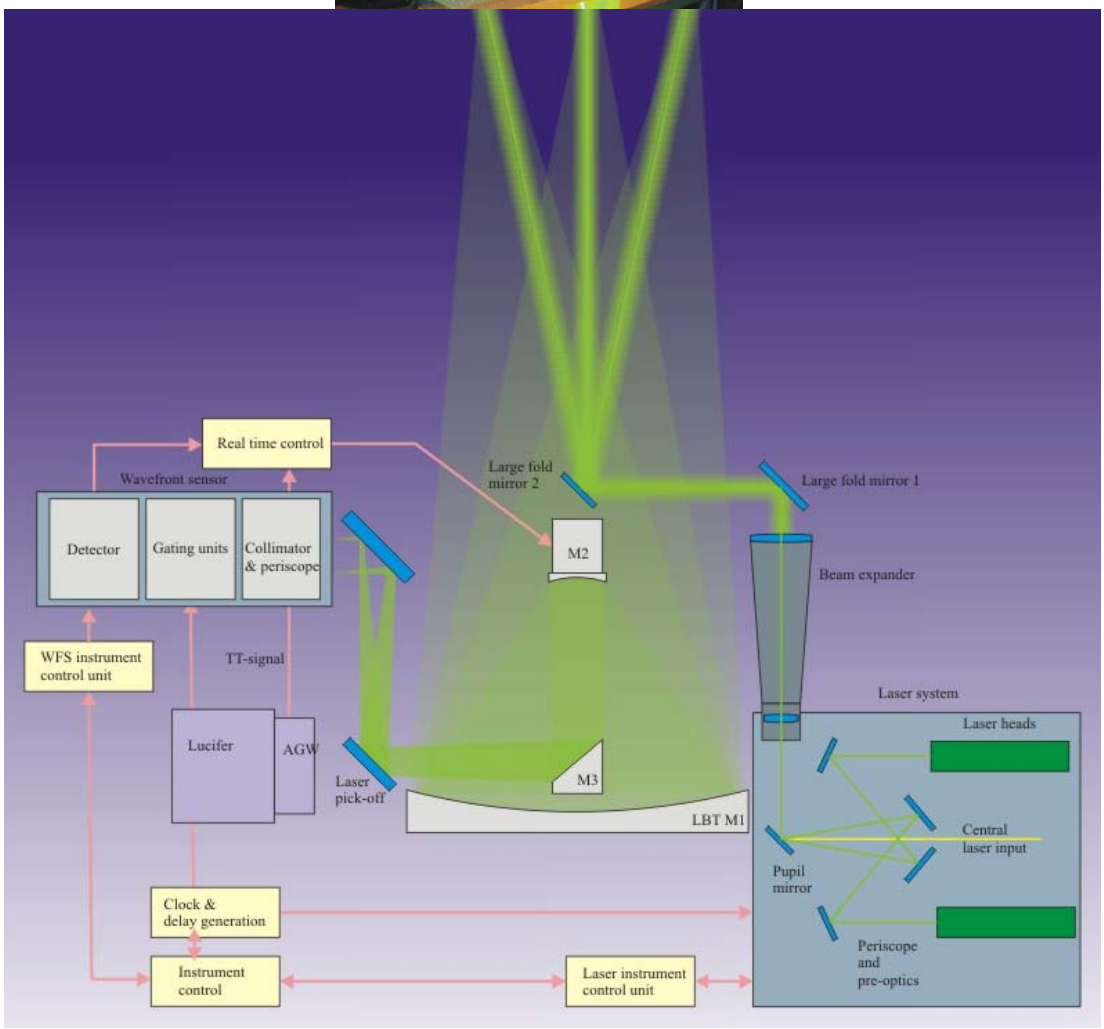
WP 1.4: ARGOS - Advanced Rayleigh Ground layer adaptive Optics System

The objective of this WP is to design the Laser Guide Star Facility for the LBT Ground Layer Adaptive Optics (GLAO) system. GLAO will enable wide field seeing improvement for imaging and spectroscopy at the LBT with the Near

Infrared LUCIFER instrument. The design also incorporates options for a later upgrade to on-axis diffraction limited or wide field modest Strehl for the single eyes and the LBT interferometric modes.

The tasks consist, beside the Work Package management, of the design of the Laser and Launch System, the Wavefront Sensor, the ARGOS calibration unit and the overall software.





WP1.4 Figure 1: ARGOS scheme

Status

During the past 12 months the team conducted the Preliminary Design Review. The Review was passed successfully. Since then the team is preparing for the Final Design Review. Long lead items like large optical elements, wavefront sensor detector and lasers have already been finalized and partially procured. For example in December the seven laser systems arrived at MPE Garching for acceptance testing. In August the detector system was delivered to Garching for testing. MPIA started the procurement of the wavefront sensor dichroic after the successful call for tender. Intensive studies on the calibration unit optics and light weight carbon fibre structure of the calibration swing arm have also been conducted at this institute. Finally the control concept for the system has been detailed and studied. OAA worked on the detailed WFS layout and dichroic specifications. ARGOS will have to deal with existing LBT infrastructure, which keeps the margin on changes smaller as for the first light instruments. Such constraints are considered carefully and impact mitigations are one of the major aspects in all design consideration for the ARGOS project.

Related Publications and Documents

- Kick-off meeting minutes (already provided to coordinator)
- Full set of PDR documentation (already provided to coordinator)
- Several ARGOS related presentations at the conference AO for ELTs in Paris(June)

Meetings in 2009

- 15/16.01.2009: ARGOS Kick-off Meeting in Tuscon, US
- 16/17.02.2009: ARGOS PDR in Garching, Germany
- 17.03.2009: ARGOS control meeting in Heidelberg, Germany
- 18/19.05.2009 : ARGOS progress meeting in Florence, Italy
- 9/10.11.2009: ARGOS progress meeting in Tuscon, US
- 25/26.11.2009: ARGOS tip tilt meeting in Florence, Italy

WP 1.5: Upgrade AO for GREGOR the New German 1.5 m Solar Telescope

In 2010 the Kiepenheuer-Institut für Sonnenphysik will start the operation of its new solar telescope GREGOR. GREGOR has an aperture of 1.5 m and has the potential to become the world's leading solar telescope until the end of the next decade when the new 4 m class telescopes (ATST and EST) appear.
In order to equip GREGOR with a competitive AO system KIS is working within WP1 to procure a high order deformable mirror.

Status:

The project officially started with a kickoff meeting on May 28, 2009. Here the project was discussed and the next steps were prepared. A phase of collecting information about deformable mirrors on the market followed. This included a visit at CILAS in Orleans Two WP1.5 members (Dirk Soltau, Thomas Berkefeld) participated in the progress meeting which took place in Garching on July 8th and 9th. Detailed specifications for the deformable mirror were elaborated. In parallel, the preparation for an optical testbed in order to test the mirror in Freiburg started in October. The final setup will depend on the mirror itself and will be determined after the order has been placed.

In October 2009 we sent out a call for tender to five companies (CILAS, ALPAO, Flexible Optics, TNO, Xinetics). Only two of them (CILAS and TNO) returned a bid. After evaluating the bids an order was placed to CILAS in mid of December 2009.

WP 1.6: Sodium Laser prototype for Adaptive Optics

In the framework of the development of second generation instruments for the VLT, ESO is designing new LGS AO systems making use of 4 LGSs. Availability and reliability is one of the key points of these new instruments, which will depend not totally but significantly on the developed Laser System. The ESO Laser System will be made of 4 independent Laser Units, each of them creating one LGS on the sky.

Using ESO simulation tools, the main requirements of the Laser Units have been derived. They are summarized here:

- Output power 20W
- Spectral format 18W in the Sodium D_{2a} line and 2W in D_{2b}
- Linewidth ≤ 50 MHz fwhm
- Polarization linear
- Beam quality ≤ 70 nm rms

Besides these optical requirements, very tough operational requirements have been set on reliability, maintainability, volume, power and cooling consumption showing the clear will of ESO to bring sodium laser technology to a more mature level.

The global strategy followed by ESO for the development and the procurement of these lasers is to rely on industry and to go through an international Call for Tender. However, to reduce the risk related to this development, it has been decided to split it in two phases: a competitive Preliminary Design phase, followed by a selection process to decide which company will be granted a contract for the Final Design, Manufacture Assembly Integration and Tests of the Laser System. This is the purpose of the work proposed in the framework of WP 1.6.

Status

In August 2008, a Call for Tender was issued for the Preliminary Design of the Laser System. The goal of this Preliminary Design was to deliver to ESO:

- A Preliminary Design Data Package, including not only the preliminary design of the laser system but also a development and management plan for the Manufacturing contract. This Data Package represents the technical and managerial proposal for this second contract.
- A firm fixed price proposal for the Final Design, Manufacture Assembly Integration and Tests of the Laser System.

37 companies were consulted worldwide, and 5 proposals were received from:

- FASORtronics (USA)
- Lockheed Martin Coherent Technology (USA)
- TOPTICA (Germany)
- SPIRIT (US Consortium)
- ARETE (USA)

First selection process

All the proposals were evaluated by a Technical Evaluation Board made of 14 members, 2 of them working at Keck Observatory. Two proposals were selected: FASORtronics and TOPTICA.

The FASORtronics concept was based on the Starfire Optical Range (SOR) laser. This is an excellent laser design that has been demonstrated at 50W output power for greater than 2000 hours on sky. It has also demonstrated the highest sodium coupling efficiency obtained so far on sky. While at SOR, this team demonstrated delivering one-of-a-kind lasers on time and in specs.

Nevertheless, the design proposed by FASORtronics contained risks. Technically new to the team was the industrial packaging and environmental loads to which the laser will be exposed, a risk only partially mitigated in the Preliminary Design phase. Additionally, the main drawback of this team was that it was a newly created spin-off, lacking the years of company experience, facilities, personnel and financial resources that an existing laser manufacturer could offer. This was an important drawback for the manufacturing contract. But there were many good reasons to believe that the FASORtronics team would build on their advantages and address their disadvantages in order to be able to deliver a final product on time and in specs. FASORtronics represented one of the best opportunities to obtain lasers for astronomy that meet ESO requirements.

TOPTICA's proposal strength lay in the Raman fibre amplifier technology demonstrated at ESO, the willingness of a demonstrated laser vendor, TOPTICA with MPBC, to develop a 589 nm laser product and the potential advantages of a fibre beam delivery. The TOPTICA laser concept has a small footprint and the fibre laser technologies require minimal maintenance having no moving parts. Therefore the laser concept proposed by TOPTICA was the best suited to remote operation at the observatories. In comparison to the other designs, this technology seemed to be also among the best opportunities to obtain lasers for astronomy that meet ESO requirements.

However two risk areas remained: high power 1178 nm fibre sources and Coherent Beam Combination (CBC). The ideal solution was a single ~32 W 1178 nm fibre source. Because of issues with back propagation and Stimulated Brillouin Scattering (SBS) there is a risk that this power level cannot be reached. This was why TOPTICA proposed to combine two fibre sources through CBC. This has been demonstrated by TOPTICA using two 4 W channels at 1178 nm: demonstration at higher power had still to be done. Both would be well addressed during the Preliminary Design phase.

The TOPTICA proposal should be supported through the Preliminary Design since the Raman fibre technology promises to have some advantages over the other designs and TOPTICA/MPBC offer an excellent opportunity to fabricate and commercialize a reliable laser product.

Preliminary Design Phase

Two contracts have been signed by ESO mid of March 2009: one with FASORtronics and one with TOPTICA. The TOPTICA contract was funded by FP7 JRA1 funds, while the FASORtronics one has been paid for by ESO.
The two contracts went smoothly during 2009. The activities of the two companies have been followed up very closely through regular progress meetings every two

months, and two interface meetings, one dedicated to mechanics the other one to software.

In Mid December 2009, Preliminary Design Reviews were organized with the two companies: TOPTICA on the 14th of December, and FASORtronics on the 15th.

FASORtronics preliminary design

The design proposed by FASORtronics is based on the sum-frequency concept of the SOR Laser, and the use of laser engines manufactured and delivered by JDSU. The optomechanical design of the SOR Laser has been completely modified to meet the ESO specifications regarding overall volume, reliability and maintainability. This means that even if the concept of the laser has been proven in the field, its practical implementation is completely new and will have to be debugged. The Preliminary Design proposed by FASORtronics is illustrated on WP1. 6 Figure 1.

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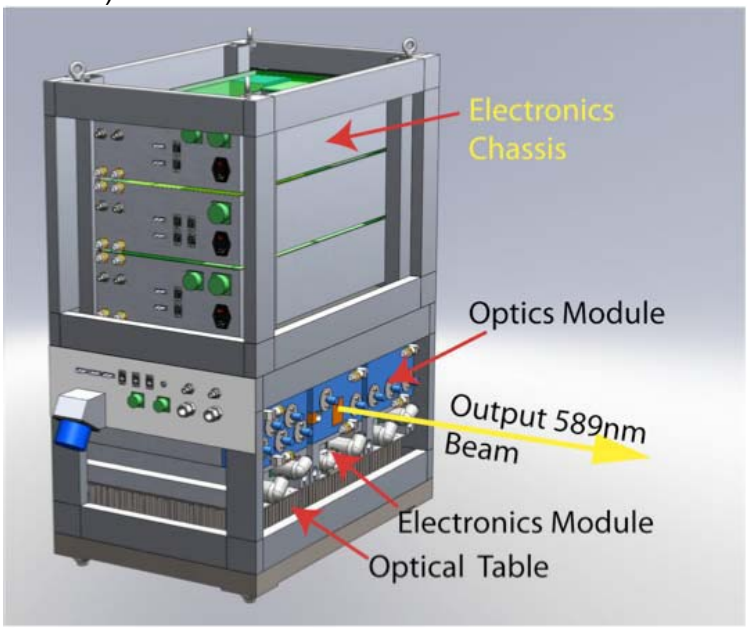
The Laser Unit is assembled in a single enclosure hosting the optical modules and the electronics chassis. In the lower part of the enclosure are the optical modules, sitting on top of the proximity electronics modules. These modules contain all the sensitive control electronics, as the servo loops in charge of the locking of the different cavities. In the upper part of the enclosure, the electronics chassis are containing all power supplies, mainly the ones of the pump diodes of the laser engines.

Connections to the main power supply, to the cooling supply and to the Local Area Networks (LANs) are located on the front of the enclosure.

The main features of each Laser Unit as designed are the following:

- Dimensions 0.6 m x 0.9 m x 1.2 m
- Weight 630 kg
- Electrical consumption 2.7 kW, to be dissipated through a coolant

Each Laser Unit needs to be accurately controlled in temperature, with an accuracy of ±0.5°C. An auxiliary chiller is required to reach this kind of accuracy. Its electrical consumption is in the range of 16 kW (the same single chiller is used for the 4 Laser Units).

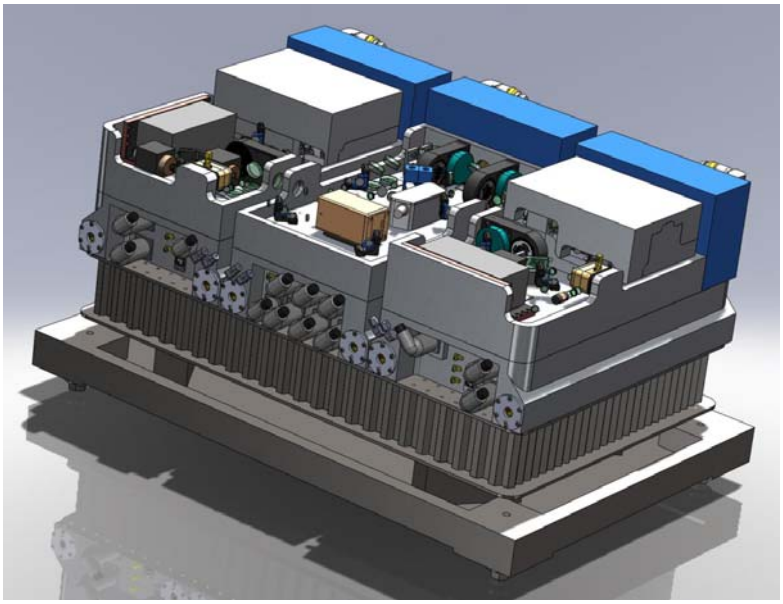


WP1. 6 Figure 1: Preliminary design of the FASORtronics laser

The Preliminary Design as proposed is fully compliant with ESO's Technical Specifications. It has to be noted that the laser as designed by FASORtronics is able to deliver up to 40W at the beginning of its life. This extra power is used to meet the required MTBF and to mitigate the ageing of the pump diodes used in the laser engines: after one year of operation, the output power will have decreased but will still be within the ESO specifications.

In WP1.6 Figure 2, the arrangement of the optical modules is presented. On the right of the figure is the 1319 nm laser module, the 1064 nm laser being on the other side and the Sum Frequency Generator in between. The blue boxes in the back control the distribution and the regulation of the coolant.

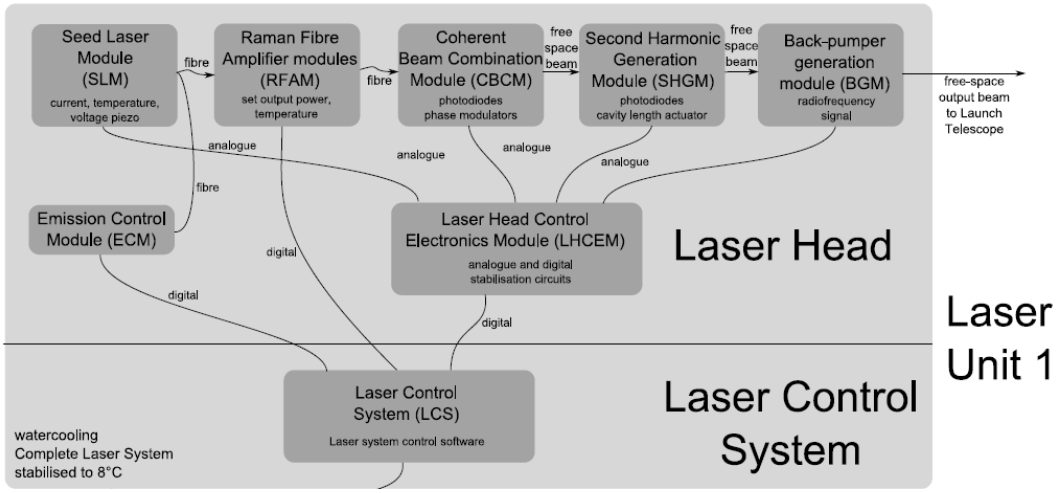
From a managerial point of view, the proposal of FASOrtronics is fully compliant with ESO requirements. However, its weak point is the small size of the company: FASORtronics is a start-up founded 18 months ago, with only 4 members. This company is lacking experience in industrialization and commerce. To mitigate the associated risks, FASORtronics is planning to team with a medium size engineering and manufacturing company; but there are no long term perspectives drawn for this relationships and long term support to ESO is not clearly secured. FASORtronics is also clearly fragile from a financial point of view.



WP1.6 Figure 2: Optical modules of the Laser Unit (FASORtronics)

TOPTICA preliminary design

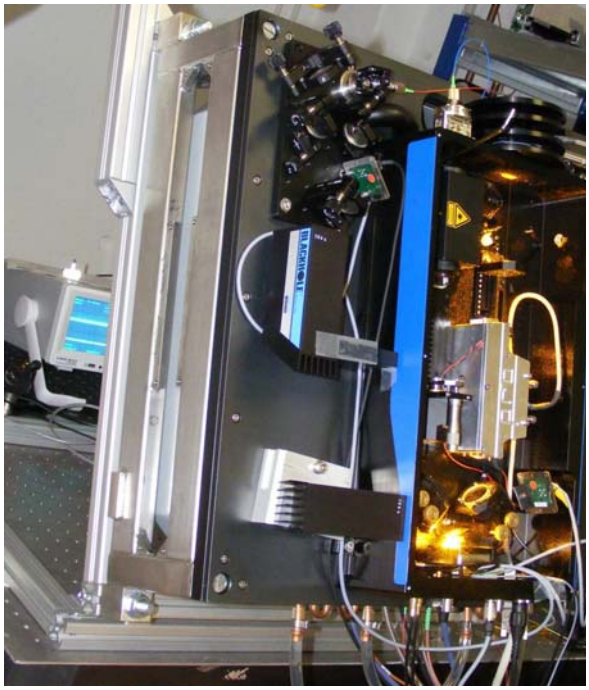
The design proposed by TOPTICA is based on the fibre laser technology (WP1.6 Figure 3).



WP1.6 Figure 3: TOPTICA Laser concept

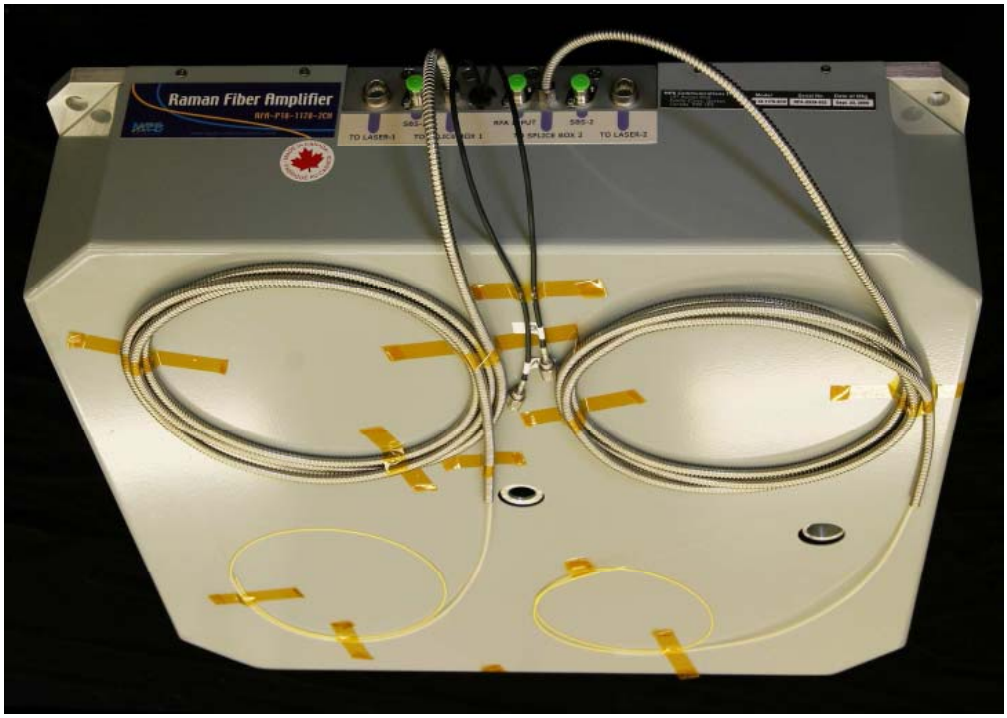
The baseline concept of this laser is following a MOPA scheme (Master Oscilllator / Power Amplifier) where the Master Oscillator is a fibred seed laser emitting some tens of mW at a very stable wavelength and with a very narrow linewidth. This laser is then split in two parts and further amplified by a Raman Amplifier Module, made of two arms. Each arm is pumped by an 1120 nm fibre laser. These two high power infrared (IR) beams are then recombined through a Coherent Beam Combination Module, also made in-fibre. The single IR beam produced in then frequency doubled in a Second Harmonic Generation (SHG) Module, and finally modulated by an Electro-Optics Modulator to produce the D_{2b} line. It is worth noting that most of the optical set-up of this laser is all in-fibre starting from the seed laser up to the input of the SHG Module. Even the pump laser is fibre coupled to the Raman Amplifier. This makes the TOPTICA laser very robust against environmental changes like temperature or gravity.

During the Preliminary Design Phase, TOPTICA and its industrial partner MPBC (Canada) developed a full scale prototype to demonstrate the feasibility of the proposed concept and to reduce all risks as much as possible. This prototype demonstrated more than 30 W output power, linearly polarized, with a very narrow linewidth (less than 2 MHz) and an optical quality better than 30 nm rms. Some preliminary environmental tests have also been conducted: the prototype demonstrated a very stable behavior vs temperature and gravity vector variations (0 to 90 degrees).



WP1.6 Figure 4: Tilt test of the prototype of the TOPTICA fiber laser

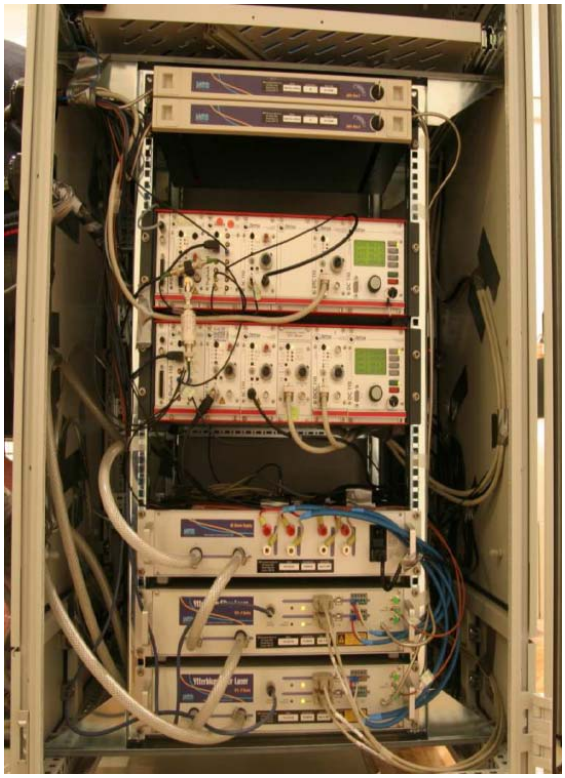
WP1.6 Figure 4 is an illustration of the test of the prototype vs gravity. On the left, a picture of the TOPTICA Laser Head is presented, for a tilt angle of 90 degrees. The opened blue box contains the SHG Module as well as the EOM providing the D_{2b} line. This module is bolted on an interface plate assembled on a steel frame. The Raman Amplifier Module is bolted below the interface plate; this module also contains the Coherent Beam Combiner (see WP1 Figure 15). On the right of the WP1.6 Figure 4, a power meter shows that even at 90 degrees, the laser prototype is still emitting a 23.2 W optical power. Extensive FEM analyses have also been performed, showing a fairly good behaviour of the TOPTICA laser vs temperature and gravity.



WP1.6 Figure 5: Prototype of the Raman Amplifier Module developed by MPBC. This module also contains the Coherent Beam Combiner. The two stainless flexible pipes at the input of this module contain monomode fibers each of them connected (splicing) to one 1120 nm pump laser.

The global dimensions of the Laser head are 0.5 m x 0.5 m x 0.3 m for a total weight of 66kg. The two 1120 nm pump lasers and the control electronics are located in an electronics cabinet that can be located a few tens of meters away from the Laser Head (see WP1.6 Figure 6). The dimensions of this cabinet are 0.8 m x 0.7 m x 1.2 m for a total weight of roughly 200 kg. The electrical consumption of the each Laser Unit is 1.3 kW, whose main part has to be dissipated through a coolant.

The Preliminary Design proposed by TOPTICA is fully compliant with the ESO Technical Specifications as well as with the ESO SoW.



WP1.6 Figure 6: Prototype of the electronics cabinet. The lower three racks are the two 1120 nm pump lasers with their power supply. The two middle racks contain the control electronics of the laser (local servo controls) and the two upper racks are splicing boxes.

WP 1.7: European Real Time Platform for AO

The European Real Time Platform for AO (WP1.7) is an initiative led by ESO in collaboration with University of Durham and ONERA, aiming at procuring software modules from industry for joint use in both in the Real-Time Computer (RTC) for CANARY and in SPARTA Light, in this order of priority. The focus of the activity is to provide modularised components designed and developed around specific interfaces that are SPARTA-Light friendly (not necessarily compliant) within an IPR setup to allow the maximum reuse within the community of the results by making the source code available for free non-commercial re-use by the CANARY and SPARTA-light user base.

Activities

This year, initial investigations on L-GPL license (Lesser GNU Public License) have been done as well as the procurement of development PC at ESO shared with other SPARTA Light projects. The SPARTA Light specifications are now currently being prepared from which WP1.7 interface specifications will be derived and made independent.

Issues

- Delay in Phase A of CANARY. This WP1.7 depends on the successfully closure of CANARY Phase A. Since the selected contractor (Shaktiware) for this WP1.7 is the same that is engaged in the CANARY Phase A contract, that must finish before this WP can start. Expected end date for CANARY work: February 2010.

- Delay in Phase B/C Review of CANARY, delayed from December 2009 to April 2010. Specifications for the outsourced contract can be released only after the review.
- One important partner (ONERA) received the EU funding late 2009 which makes allocating resources to work on this WP difficult.
- Algorithm specifications late, expected end of January.
- Final interface definition depends on previous deliverables.

WP 1.8: Optimal Control algorithms for wide field adaptive optics

Several activities were initiated in 2009:

- A kick-off meeting was held in April and interactions with WP1.2 partners CfAI Durham, Meudon Observatory) have been initiated (see minutes M-KO-WP1.8 v1);

- Optimal control theoretical developments: extension of LQG approach to woofer-tweeter and large degrees of freedom (see details in Section 2.1);

- End-to-end simulation tools: handling of LGS specificities, mixing of LGS and NGS WFS (see details in Section 2.2);

- Experimental validation: Wide Field AO (WFAO) LQG validation on HOMER bench (see details in Section 2.3).

Below is a brief summary of the technical achievements.

Optimal LQG control theoretical developments

CANARY being a pathfinder towards the EAGLE instrument and control issues being a key issue, it is important to propose control solutions that are not only efficient for CANARY but are also extendable to the EAGLE framework.
Our best candidate for control strategy is currently LQG control. We have already proven that LQG optimal control is very efficient in WFAO with NGS WFS (see above). We have also shown that MOAO open loop configuration, as well as the mixing of NGS and LGS (at least if sampling frequencies are all equal), can be integrated without changing the control structure. The important issues then yet to be addressed are:

- Extension of LQG to multi-rate wavefront sensing (different exposure time / sampling frequency);

- Extension of LQG to woofer-tweeter configurations (Phase C of CANARY, and EAGLE);

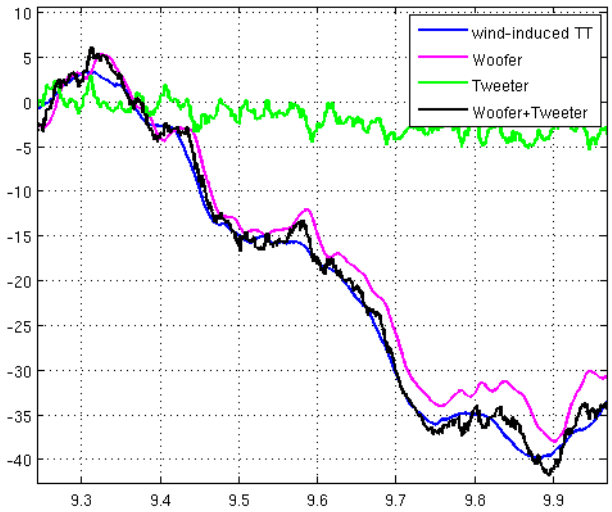
- Extension of LQG control to Large Degrees of Freedom (LDoF) (a key aspect in E-ELT application);

- Turbulence / system identification procedure for LQG control and related performance robustness studies (important for robust on-sky operation).

The first and last points will be addressed in 2010. We however have prepared the theoretical basis for the other two items: the woofer-tweeter case has also been demonstrated in a simple case of tip-tilt control with a slow DM with large stroke associated to a fast DM with small stroke (see WP 1.8 Figure 1); a preliminary analysis of LDoF in LQG has been performed in the SCAO case: it has been

shown that sparse approximations and preconditioned conjugate gradient strategies already used in other control policies can be applied successfully in the LQG framework. Articles are in preparation on these subjects.

These preliminary results comfort us in the choice of the LQG control approach that remains the baseline in the further developments to come.



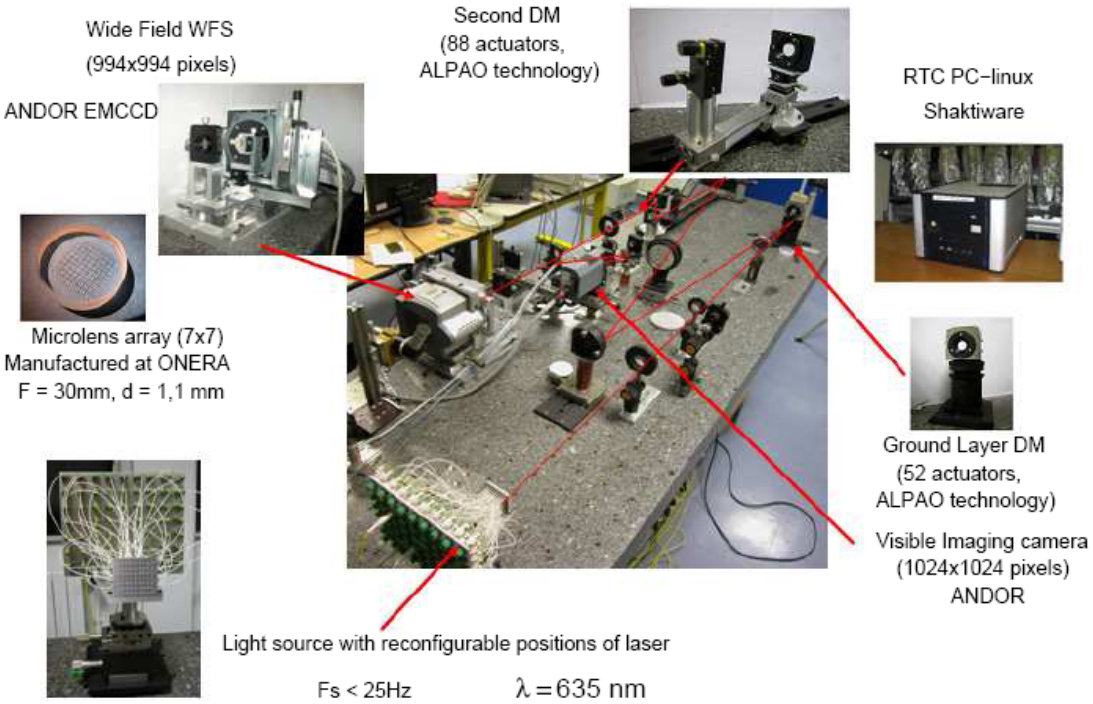
WP1.8 Figure 1**:** Example of tilt control with woofer-tweeter configuration (*Carlos Correia et al.*).

End-to-End Modelling

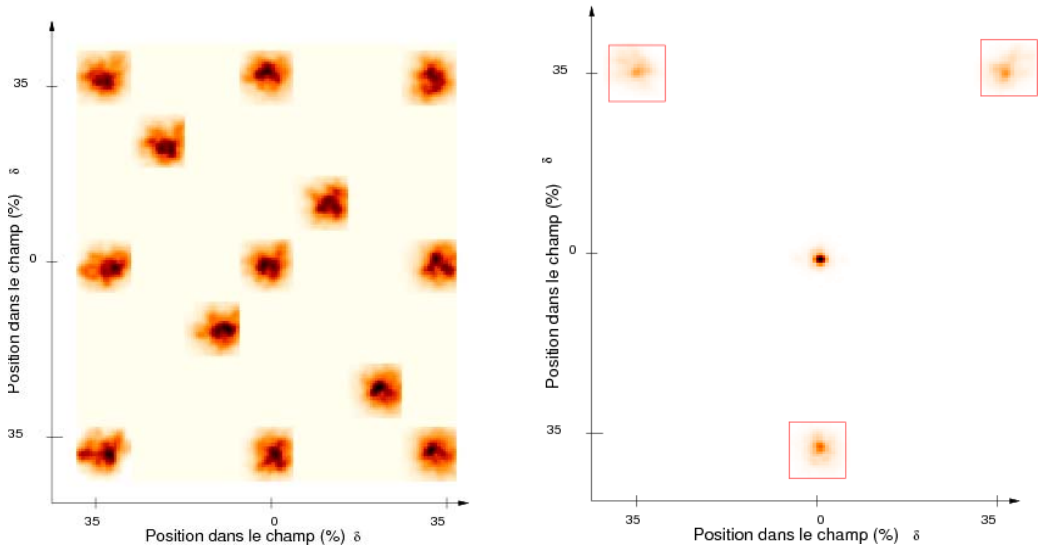
In 2009 we have developed, mainly with the support of FP7 ELT preparatory phase and of ESO Phase A studies, a wide range of simulation tools. In particular we are now able to perform end-to-end simulations for reasonable size systems with a mixing of LGS and NGS WFS channels and that account for LGS specificities: spherical waves, insensitivity to tip-tilt and potentially defocus, noise signature induced by spot elongation, etc These simulations are performed in a static mode at present.. These tools are applicable in the CANARY configuration for WP1.8 simulations, with some adaptations: account of temporal aspects, implementation of full system LQG control and possibly of other suboptimal approaches . Resolving these issues will constitute a major objective in 2010.

Experimental validations

An important aspect all along the project is to perform experimental validations of the control strategies that are developed. In 2009 we have validated LQG control, in various WFAO configurations with NGS WFS, on the laboratory bench HOMER available at ONERA (see WP1.8 Figures 2 and 3). Note especially the validation in the TAO mode which is relatively similar to CANARY MOAO but in a closed-loop configuration.



WP1. 8 Figure 2: HOMER bench and its main components.



WP1.8 Figure 3: Performance without correction (SR = 7%) and with TAO LQG control optimized in the central direction (on-axis SR = 55%) when using the 3 other stars for WFS. For comparison the ideal case of SCAO (not shown here) with WFS on the central star gives on-axis SR = 60%. Internal SR is 60% (*Anne Costille et al.*).

Conclusion

We have made good progress both at the theoretical level (LQG application to MOAO configuration, theoretical developments of multi-rate…), and with the first experimental validation of WFAO optimal control on HOMER bench. It is now important to pursue the multi-rate analysis since it may impact the real time control specification, and to launch identification and robustness studies that are essential

to prepare on-sky testing. The theoretical work will have to be supported by numerical simulations in CANARY configuration. A close collaboration with WP1.2 and WP1.7 is required in view of the future CANARY validations.

WP 1.9: Calibration, control and operation of an adaptive telescope with LGS

This WP contains two tasks:

- Identification of AO Interaction Matrix when in closed-loop and on-sky.
- ASSIST alignment/Synthetic Interaction Matrix

The use of a Deformable Secondary Mirror (DSM) in the Adaptive Optics Facility (AOF) will make it impossible to calibrate the Interaction Matrix using an internal reference source. The baseline strategy for AOF today is to make use of a so-called Pseudo-Synthetic Interaction Matrix, which will be computed from simulations using a global model of the AOF (see Task 2) and refreshed in closed loop and on-sky made possible by identification methods.

Status of task 1

Clementine Bechet has started to work on this topic at ESO in September 09. Her work is related to the update of the IM.. There are two main sources of errors on the knowledge of the IM: one comes from the model errors when generating the Synthetic IM, the other one is due to the evolution of the matching between the DSM and the WFS during the observation (gravity, temperature). The first one is static, while the second one is slowly evolving and is linked to the relative translation (X-Y) and rotation of the DSM w.r.t the WFSs. From previous analyses, it seems that identifying the relative translation/rotation between the DSM and the WFSs is easier (better signal to noise ratio) that identifying the global IM.
A detailed description of the work to be performed is:

1) To review what has been done up to now in the open literature, and select the best approach to follow in our case.
2) To establish the general equations describing the direct problem, through discussions and based on the outcome of the bibliography review. Equations have to be given for the very general case.
3) To invert formally the direct problem, and to evaluate limitations and performance from equations if possible.
4) To simulate numerically the efficiency and the limitations of the identification method, using for example OCTOPUS.
5) To propose practical algorithms to be implemented in the AOF clusters in view of the IM identification.
For the last three points, identification of the relative translations/rotation will be considered first. The use of 4 WFSs will be considered, but for a first step NGSs might be considered instead of LGSs. The step required to go to LGSs operation should be identified.

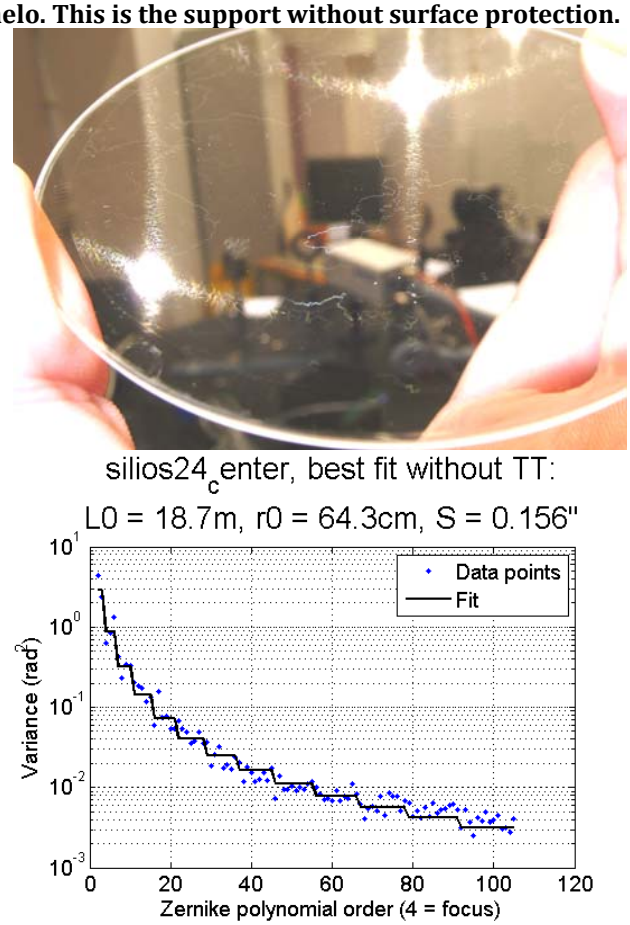
Objectives 1) and 2) have been successfully completed in 2009.

Status of task 2

ASSIST is the test facility for both the DSM as well as the two AO systems GALACSI and GRAAL. The ASSIST falls fully under the responsibility of NOVA. It has passed its Final Design Review and is currently in its Manufacturing Phase. All optics have been ordered (see the main optical element AM1 being polished at AMOS in WP1.9 Figure 1 -left, as well as the first mechanical components, like the

AM1 support structure shown in Figure 1-right. The Phase screens reproducing the atmospheric turbulence have been manufactured by SILIOS, tested and accepted at ESO (see WP1.9 Figure 2).

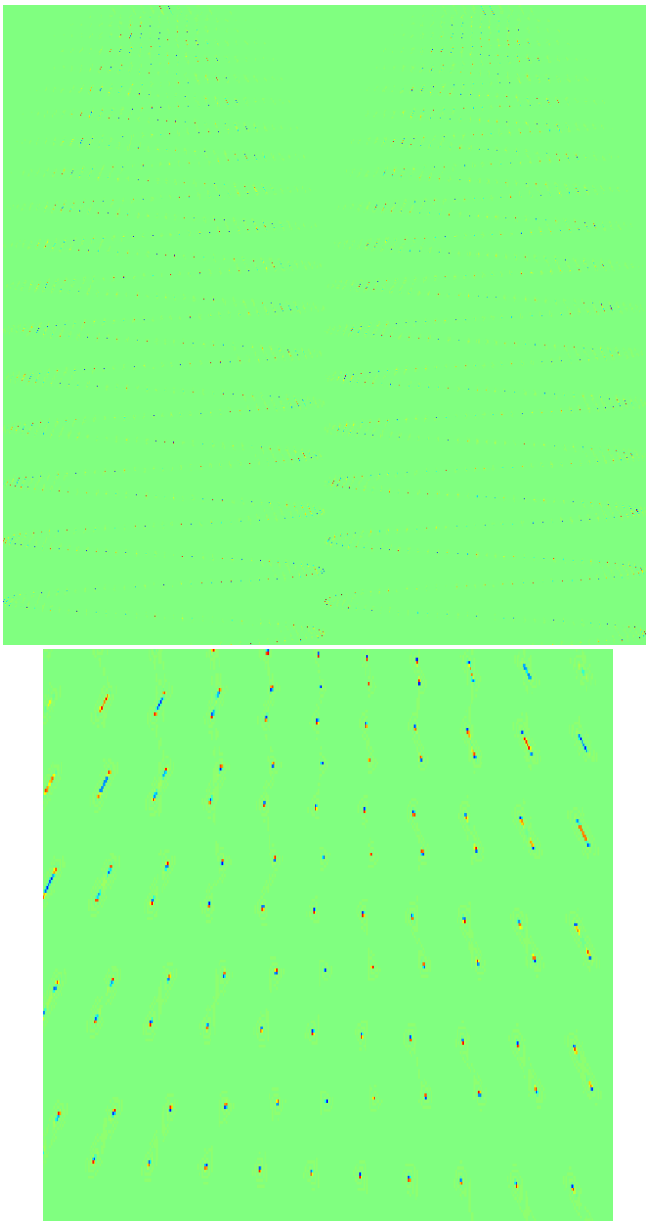
WP1.9 Figure 1: Left: AM1 under test at AMOS, the manufacturer of AM1. Shown is AM1 after its spherical lapping. In its final shape, AM1 will be an 1.7-meter aspherical mirror with a standard aluminum coating. Right: the support for AM1, manufactured at Boessenkool, Almelo. This is the support without surface protection.



WP1.9 Figure 2: Left: Phase Screen imprinted with aberrations map (pattern visible on the surface of the Screen). Right: Testing of the Phase Screens: Measured turbulence spectrum vs. theoretical fit.

The computation of a synthetic Interaction Matrix requires the knowledge of the DSM Influence Function, of the WFS model, and of all perturbations in between the two. A first Interaction Matrix was built using the FEA model of the DSM IFs, a geometric model of 40x40 Shack-Hartmann WFS, and simple perturbations as

rotation and translation between the DSM and the WFS (see WP1.9 Figure 3). Those Interaction Matrices will be used as input to the Identification Method (see Task 1) in order to retrieve “blindly” the perturbations.



WP1.9 Figure 3: Synthetic Interaction Matrix. Left: whole Matrix (1170 actuators on the vertical axis vs. 2*1240 x and y sub-apertures slopes). Right: Zoom in the IM.

Task 3: IM on turbulence Calibration

No activities to report.

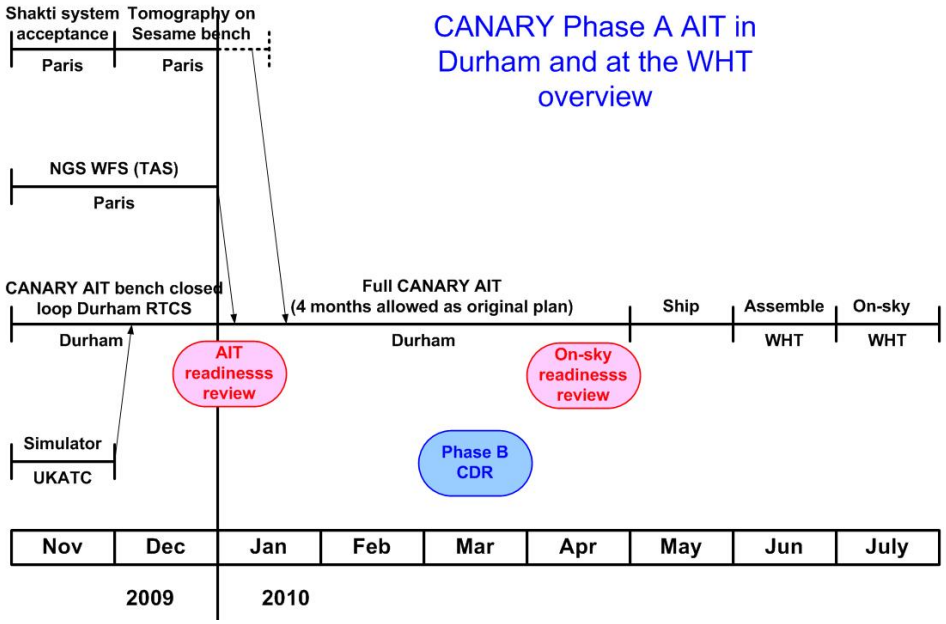
Task 4: Operation and control

No activities to report.

1.3 Plan for the next reporting Period (including deviations from the original plan)

WP 1.2: Laser Guide Star Multi-Object Adaptive Optics system on William Herschel Telescope

The updated Phase A schedule is shown below.



CANARY phase A revised schedule

The updated milestones and intermediate deliverables for the LGS upgrade (2010-2012) are as follows:

- **Upgrade Design Review – March 2010**
- **Upgrade Review Report – June 2010**
- **Upgrade Purchase and Assemble – from May 2010**
- **Integrate with RTC in Durham – October 2010**
- **Upgrade AIT, Durham – January 2011**
- **Final Design and initial AIT results – January 2011**
- **Final Design and AIT report – June 2011**
- **upgraded systems on-sky – May and September 2011**
- **Analysis of on-sky results – January 2012**
- **Upgrade on-sky report – June 2012**

WP 1.3: VLT Planet Finder Upgrade

In 2010, we will validate experimentally the concept on our AO test bench and to continue the detailed analysis of the expected performance for SPHERE.

WP 1.4: ARGOS - Advanced Rayleigh Ground layer adaptive Optics System

In 2010 we will conclude the design phase with the Final Design Review in March 2010 (final delivery 1.4.1).

WP 1.5: Upgrade AO for GREGOR the New German 1.5 m Solar Telescope

Early 2010 there will be the kickoff meeting of the deformable mirror design and manufacturing will be organised. KIS will accompany this process and we will hold progress meetings in 2010. Delivery is expected in November 2010.

WP 1.6: Sodium Laser prototype for Adaptive Optics

The two designs proposed by the companies are fairly different but are both compliant with ESO requirements. A very good job has been done by the two companies which have demonstrated an equivalent enthusiasm and commitment to fulfil ESO requirements.

Financial proposals have been received beginning of 2010 for the Final Design, Manufacture Assembly Integration and Tests of the Laser System. ESO will then select one company for this second contract. This should be happening beginning of February, and if everything is going well the procurement contract should be signed in March 2010.

WP 1.7: European Real Time Platform for AO

- Finalise L-GPL setup for the WP1.7 results and outsourced contract
- CANARY Phase B/C specifications
- Algorithm specifications
- Interface specifications
- Contract award and kick-off
- Development of modules

WP 1.8: Optimal Control algorithms for wide field adaptive optics

The activities planned for 2010 can be summarized as follows:

Optimal Control theoretical developments:

- links between different control laws (LQG, POLC, FrIM-IMC): how do they compare, what is the behavior in low/high SNR, effects of high frequency modes;
- multi-rate WFS: optimal solution and possible strategies of simple and sub-optimal controls;
- turbulence/system identification: identification of dynamical models that are relevant for control performance, possible use of Kalman filter outputs for model identification;
- robustness study: determination of critical parameters that influence performance, performance sensitivity with respect to their variation;

End to End simulations:

- Tool development (optimal and suboptimal control, multi-rate…);
- CANARY simulation with the selected control policy;
- Experimental validations of the selected control policy;

- Participation in the RTC specification activity of WP1.7: establish specific needs for optimal control, especially for real time aspects.

WP 1.9: Calibration, control and operation of an adaptive telescope with LGS

In 2010, we are planning the following activities:

Task 1: Completion of the study on Identification of AO Interaction Matrix in closed-loop and on-sky. Publication of a paper at the SPIE conference in San Diego.

Task 2: Receipt of ASSIST optics and beginning of integration. Building of a more complete synthetic IM using stiffness modes of the DSM, a diffractive model of the WFS, and higher order aberrations (pupil distortion…)

Task 3: Building of a simple closed loop AO system model in order to simulate the calibration of IM on turbulence.

Task 4: Update of the Operation and Control strategies documents in view of the AOF review.

WP2: Laser Guide Star Adaptive Optics Detectors

2.1 Introduction

The main objective of this WP is the development of a Scaled-Down Demonstrator for Laser Guide Star wavefront sensing (Laser Guide Star Detector = LGSD) on European telescopes leading to a version for the European Extremely Large Telescope (EELT). More than just a development chip, this Demonstrator should be useable for wavefront sensing on the EELT with natural guide stars (NGS).

The requirements for the final device (LGSD) are challenging as they combine several properties that were never simultaneously possible on a single detector up to now. These requirements are:

- Large number of pixels of 1680 x 1680
- Large pixels of 24-50 microns
- High frame rate of 700 Hz
- Low Read-Out Noise of < 3 electrons (goal < 1 electron)

The Demonstrator (the Natural Guide Star Detector = NGSD) is a cut down version of the final device with similar performance and characteristics except it will have the following parameters:

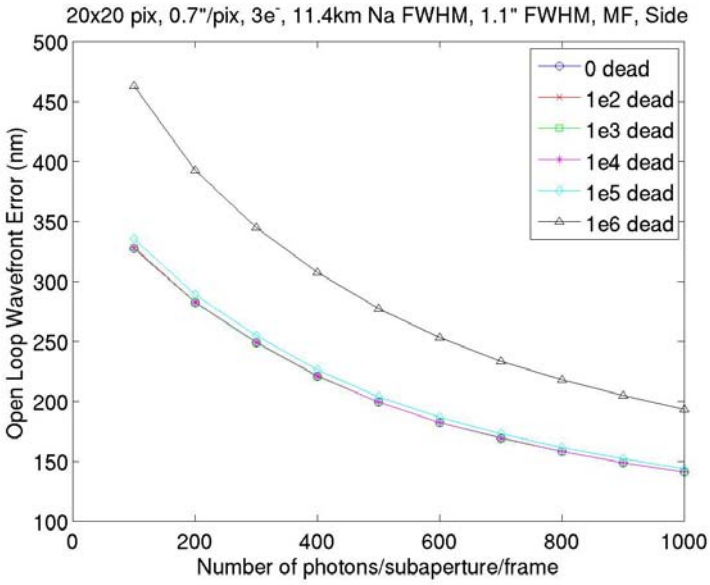
- Smaller format size of > 672 x 672 pixels (so as to be usable for NGS applications)
- Read-Out Noise < 4 electrons
- Relaxed image lag (5 % instead of 2 %)
- Manufacturers standard package (simple packaging to keep costs down)
- No Peltier cooler

2.2 Progress and achievements by Work Package

The NGSD development is continuing on from previous work that ESO has been undertaking for the past 3 years, starting with feasibility studies in 2007 and followed by Technology Demonstrator (TD) contracts (for one year duration) placed at 3 companies in 2008. Both phases were partially funded by the FP6 ELT Design Study programme of the European Community.

The goal of the TD phase was to mitigate major pixel design risks. Arrays of pixels of several different design variants were designed, manufactured and tested in order to find the best solution which was capable of meeting the performance requirements.

The first year of WP2 activitiy was used to prepare for the CfT, and in particular to define and justify the requirements for the LGSD and NGSD. Whenever possible, simulations were performed to define (and relax) the requirement appropriate to the application of WF sensing on the EELT. One example (figure below) is the determination of the maximum allowed number of dead pixels.



A kick-off meeting of WP2 was held in Marseille (France), hosted by the Laboratoire d'Astrophysique de Marseille, the 16th and 17th of June 2009 with the following agenda. There were 22 participants to the meeting, including the OPTICON Coordinator and the project scientist.

2.3 Deviations from original plan and plans for the next reporting Period

The manufacturing of the TD turned out to be more difficult than anticipated, generating schedule delays, and impacting the NGSD development as follows:

- Late launch of the Call for Tender (CfT). Indeed it was important to wait for the end of the TD phase before finalizing the requirements document (document number E-SPE-ESO-270-0502 ISSUE 2.0, publicly available) and launching the CfT for the NGSD phase. The CfT was thus launched in December instead of June 2009 as originally planned.
- Modification of the Statement of Work (SOW, document number E-SOW-ESO-270-0503 Issue 1, restricted to ESO). Taking into consideration the outcome of the TD phase, the NGSD phase SOW was modified by introducing a Technology Validation Prototype (TVP) period before the main development of the NGSD, in order to allow the manufacturer to retire remaining pixel design risks.

The revised schedule for the development of the NGSD is detailed in the following table.

(Start) date	Project Month	Duration (month)	Description
December '09	12	-	Successful issue of the CfT.
End of February '10	14	-	Replies to CfT.
March '10	15	2	Evaluation of the proposals and recommendation of one company to

			the ESO Finance Committee.
May ‘10	17	-	ESO Finance Committee approval.
June ‘10	18	-	Contract start / KO meeting of the three phases of work of total duration of 29 months.
June ‘10	18	9	Phase 1: Technology Validation Prototype: perform further iteration of the pixel design.
April ‘11	28	7	Phase 2: NGSD design (pending success of the TVP phase).
December ‘11	35	11	Phase 3: Manufacture and Test the NGSD (pending go-ahead after design phase).
October ‘12	46	-	Contract end

WP3: Astrophotonics

3.1 Introduction

The purpose of work package 3 is to carry out and coordinate research in the new field of Astrophotonics. This aims to bring to astronomy the benefit of photonic devices developed over many years by the telecommunication industry and to use photonic principles in the construction of the challenging instruments required for future generations of observatories. The activity has been started and the programme redefined in view of the changes in resources. Significant progress has been made on associated programmes which are co-ordinated via WP3.

3.2 Progress and achievements by Work Package

A three-day kickoff meeting was held in early September at which the workplan was reviewed and rescoped to take account of the resources actually available. The state-of-the-art was also reviewed resulting in several documents which are available at the website:
http://star-www.dur.ac.uk/~jra/Astrophotonica/APE-home.html

The coordinator visited the Australian partners in Nov/Dec 2009 where he worked on WP3.1.1, reviewed astrophotonics work in Sydney and attended the inauguration of the ASPIC partnership between AIP, AAO and the University of Sydney. Progress has been made on WP3.1.1 and WP3.1.2 with document drafts shortly to be released. These relate to the formulation of scientific requirements and reviews of applicable technology. Background information is included in the KOM documentation.

Staff to work on the WP have have been appointed at AAO, UDUR and will be appointed at CNRS shortly. The Astrophotonica Europa partnership, whose activities are supported by WP3, has submitted a Marie Curie Initial Training Network application including the WP Co-Is and several photonic SMEs. Staff on synergistic programmes have also been appointed or reassigned including at InnoFSpec (Roger Haynes, William Rambold) and Heriot Watt University near Edinburgh (Robert Thomson was awarded an STFC advanced fellowship working on astrophotonic applications of Ultrafast Laser inscription).

A number of advances have been made in associated programmes in Sydney and at Heriot Watt University. These relate to the capacity of photonic lanterns and the fibre-based and waveguide technologies required to implement them. These are key components of multiplexed astronomical spectroscopy. An additional task that has been identified is to provide a code of conduct for Intellectual Property.

The ASPIC partnership between AIP, AAO and USyd was formed. InnoFSpec was completed in Potsdam and will be formally inaugurated immediately after the first progress meeting,

Publications: Allington-Smith and Bland-Hawthorn 2010 MNRAS in press (also2009arXiv0910.4361A). Before the WP3 began, a notable set of contributions was made by WP3 members in a special focus edition of Optics Express on

"Astrophotonics". The AAO/Sydney group continue to publish on OH-suppression via Bragg grating inscription on fibres and photonic spectrographs (with UDUR).

3.3 Deviations from original plan and plans for the next reporting Period

A redefinition of WP3.1 is available in the document APE-WP-01 which can be accessed from the website given above. This is to be formally adopted at the first progress meeting. This represents a change to the originally-proposed work plan necessitated by a reduction in funding relative to the original proposal. Both the reduction in resources and the re-planning needed has slowed progress relative to our initial intentions.

The next progress meeting is scheduled for 22-23 April 2010 at AIP.

We have applied to give several papers at the forthcoming SPIE conference in San Diego on Astronomical Technology.

WP4: High Angular Resolution by Interferometry: Enhancing the scientific output and reaching the fundamental limits

4.1 Introduction

WP4 is intended to build on the co-ordination of European activities in the demanding area of astronomical interferometry. It will continue to help develop and enhance the existing infrastructures, notably the ESO VLTI and also develop plans for the future. The activity is subdivided into three work packages as follows:

- WP4.0: Coordination and Management. WP Leader: Denis Mourard.
- WP4.1: Enhancing the scientific output of Interferometry. WP Leader: Pierre Kervella.
- WP4.2: Contribution to the development of an optimum co-phaser for the VLTI. WP Leader: Françoise Delplancke.

4.2 Progress and achievements by Work Package

WP4.0: Coordination and Management

Due to the late arrival of information about the official start of OPTICON-FP7 and difficulties to get detailed information about the exact funding of the WP4 activities, the year 2009 has mainly been dedicated to the organization of the consortium with the various partners and to starting the activities.

A website has been created with the help of the European Initiative for Interferometry (WP11.2)
https://sites.google.com/a/european-interferometry.eu/home/home
and a dedicated page has been opened for WP4
https://sites.google.com/a/european-interferometry.eu/home/joint-research

We have worked on the budget distribution in order to have a clear understanding of the situation at the beginning of the programme. A breakdown has been established and validated by all the partners. This is our basis for WP4 management.
Finally we have started the organization of the WP4 1st year meeting that will be held around May 2010.

WP4.1: Enhancing the scientific output of Interferometry

As scheduled in the original planning, CNRS organized the first post-doc announcement for WP4.1.1. It will be distributed shortly for work starting in summer 2010. The text of the announcement is presented below:

WP4.1.1 Post-doc announcement: Atmospheric properties for optical interferometry

Applications are invited for a post-doctoral position at Paris Observatory (Meudon, France) in the framework of the European Commission's 7th Framework Program meOPTICON. The candidate is expected to take an active part in the evaluation of the Paranal atmospheric parameters for high precision fringe tracking for optical/infrared interferometry.

The first generation instrumentation of the Very Large Telescope Interferometer (VLTI) has shown that the atmosphere above Paranal observatory has original properties with respect to high angular resolution observations. The goal of this post-doctoral fellowship is to assemble an exhaustive picture of the current status of the atmospheric turbulence at Paranal, specifically on the properties of interest for interferometry (piston spectrum, turbulence structure, external scale,...). The foreseen work will first include a synthesis of the different measurements already available in the scientific literature and ESO technical reports, and the re-analysis of archive data (VINCI, MIDI, AMBER, FINITO, seeing monitor,…) from the point-of-view of atmosphere characterization. In addition, a series of dedicated technical measurements with the available instrumentation and the Auxiliary Telescopes will be obtained at Paranal. This work is of fundamental importance for the second-generation instrumentation of the VLTI, in particular the GRAVITY and MATISSE beam combiners currently in the design phase.

The selected post-doc will be encouraged to conduct an active research of her/his choice in parallel to this work. This post-doc will be based at Paris Observatory in Meudon (GRAVITY fringe tracker team, supervisor: Guy Perrin), with foreseen stays in Nice (MATISSE team, contact: Bruno Lopez) and at ESO (Garching and Paranal, contact: Françoise Delplancke). Candidates should have a PhD in astronomy or in a related field and more specifically to have experience in one or more of the following fields: high angular resolution instrumentation, optical sciences at the diffraction limit, instrument testing, interferometric data reduction. The candidate should have his/her PhD since less than 2 years at the time of his/her appointment, and should not be a former student of the LESIA laboratory. He/She will join a team heavily involved in high angular resolution instruments (adaptive optics and interferometers) and their astronomical applications and is welcome to have her or his own astrophysical program in this context. The appointment is for one year, renewable for one additional year. The raw monthly stipend of 2500€ includes health insurance (net salary 2040€/month). Interested candidates should submit a CV, a list of publications and a brief description of research interests together with two reference letters. Applications and reference letters should be addressed by email to Pierre Kervella (pierre.kervella@obspm.fr) and Denis Mourard (denis.mourard@obs-azur.fr). The review of applications will begin on 1st April 2010 and will continue until the position is filled, for a starting date in Summer or Autumn 2010.

Concerning WP4.1.2 and 4.1.3, activities have been done in collaboration between partners and ESO in the framework of PRIMA implementation.

WP4.1.2 Assessment of the VLTI behavior for MIDI and AMBER operations with PRIMA

MPIA PhD student Andre Mueller has worked at ESO in Garching since March 2009 with Francoise Delplancke and Gerard van Belle to explore and develop MIDI operation with PRIMA. First on-axis K-band fringe tracking with PRIMA plus MIDI observing tests have been done in the framework of PRIMA commissioning and were very successful. This work will continue in 2010 and we are currently negotiating whether Andre Mueller will stay another year at ESO or will continue from Heidelberg. The related post-doc position is supposed to be based in Leiden.

WP4.1.3 Preparing the VLTI for its second generation instrumentation.

At the end of 2008, two people from MPIA (S. Hippler and F. Hormuth) were at Paranal for dedicated VLTI tunnel measurements in the framework of preparing

the GRAVITY instrument. A corresponding report about the test results was prepared in 2009 and sent to ESO.

WP4.2: Contribution to the development of an optimum co-phaser for the VLTI

Different actions have been organized in 2009

WP4.2.2 Assessment of the VLTI behavior for MIDI and AMBER operations with PRIMA

In addition to work related to WP4.1.2, Nuno Gomes, a student of Dr. Paulo Garcia, worked on the PRIMA+AMBER mode. He developed software to simulate image reconstruction using squared visibilities and absolute phase (in comparison with closure phase for AMBER alone). He also started to work on specifying how to use AMBER with PRIMA, participated to 2 commissioning runs and wrote a user manual of PRIMA as a fringe tracker which is now used when commissioning PRIMA.

WP4.3.1 FINITO and PRIMA commissioning data analysis

Dr. Christian Schmid, Dr. Serge Menardi and Johannes Sahlmann have collected considerable amounts of data with PRIMA as a fringe tracker during the 9 commissioning runs and analysed these data. This led to a refereed paper published in Astronomy & Astrophysics (A&A 507 3 (2009) 1739-1757). A commissioning report is in preparation and several presentations are planned for the SPIE meeting (Astronomical Telescopes and Instrumentation) in San Diego (June 27 to July 2, 2010). The behaviour of the fringe sensor unit and its sensitivity to various factors (tip-tilt, polarisation, background calibration...) is now better understood and led to several improvements of its operation and calibration. This effort will be maintained during 2010 and 2011. The experience obtained will be applied to the specifications of the next generation of fringe sensor units.

WP4.3.2 Development of fringe detection and tracking algorithm

ESO has launched, in collaboration with the community, three parallel feasibility studies for the next generation fringe tracker for the VLTI. The three consortia of european insitutes and industry who have risen to the challenge have invested significant manpower in these studies. They are investigating three different concepts and providing comprehensive data to compare these concepts quantitatively and qualitatively. The three studies passed their mid-term reviews in 2009 and the final reviews will be held in the second quarter of 2010. The three concepts will also be presented at the SPIE conference in San Diego.

4.3 Deviations from original plan and plans for the next reporting Period

The post-doc recruited for WP4.1 will start in the summer of 2010

The recruitment of a post-doc student for WP 4.2 to help in the analysis of fringe tracking data and the writing of the specification for a new generation fringe tracker will start in Q2 of 2010.

WP5: Smart Instrument Technologies

5.1 Introduction

The objective of WP5 is to develop smart instrument devices which can be used to meet astronome'rs needs for wider fields of view, higher spectral and spatial resolutions and multi-object observations while fitting within demanding size, mass and engineering limits. The objective identified for this reporting period is to produce a project plan, a Smart Instrument Architecture and to have a Smart Technology Device Specification.

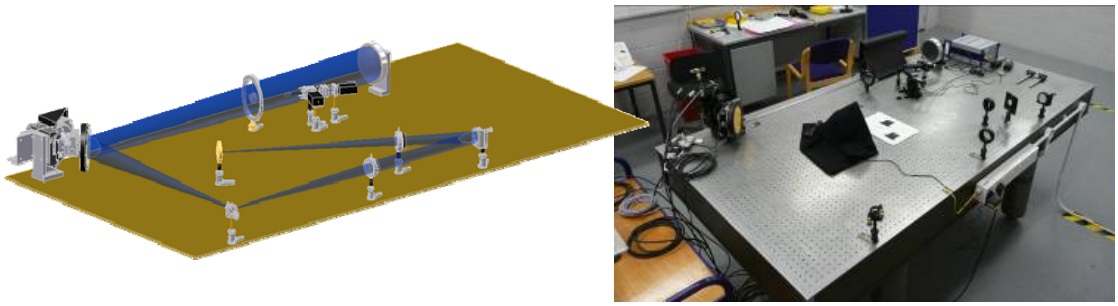
5.2 Progress and achievements by Work Package

WP 5.1: Management and System Analysis

Our principal initiative in this reporting period was holding a Kick off meeting leading to the development of the ideas for a practical application of the objectives. The meeting provided the consortium members with an understanding of how the particular expertise of the group could be applied to meet the challenges of the work programme.

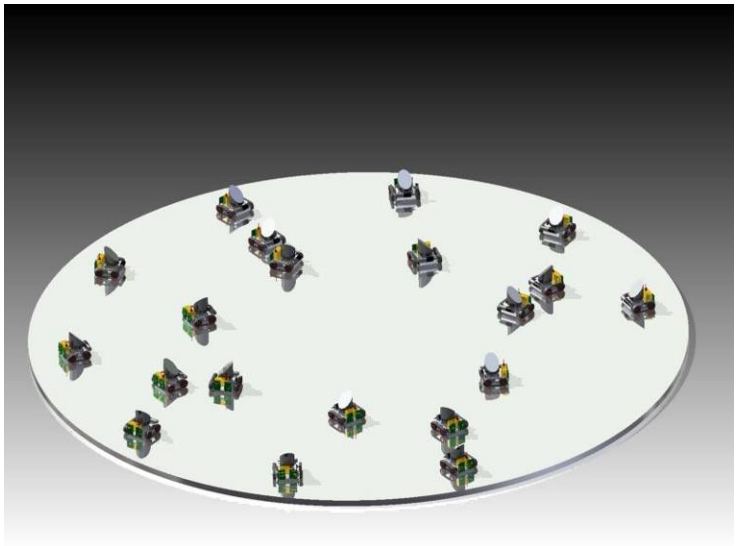
WP5.2: Optical components with extreme Aspheric surfaces and WP5.3 Smart Micro Actuation Devices

The outcome of our kick off meeting is that we will address the system architecture of a multi-object spectrograph, incorporating a robotic pick off sub-system, variable curvature mirrors and an active compensation system. We re-considered the scope of the tasks achievable as we are able to take advantage of the outcomes of a work package in the FP7 ELT preparation phase programme on the EAGLE metrology system. As a result the tip-tilt beam alignment system shown in Figure 1 can be re-used..



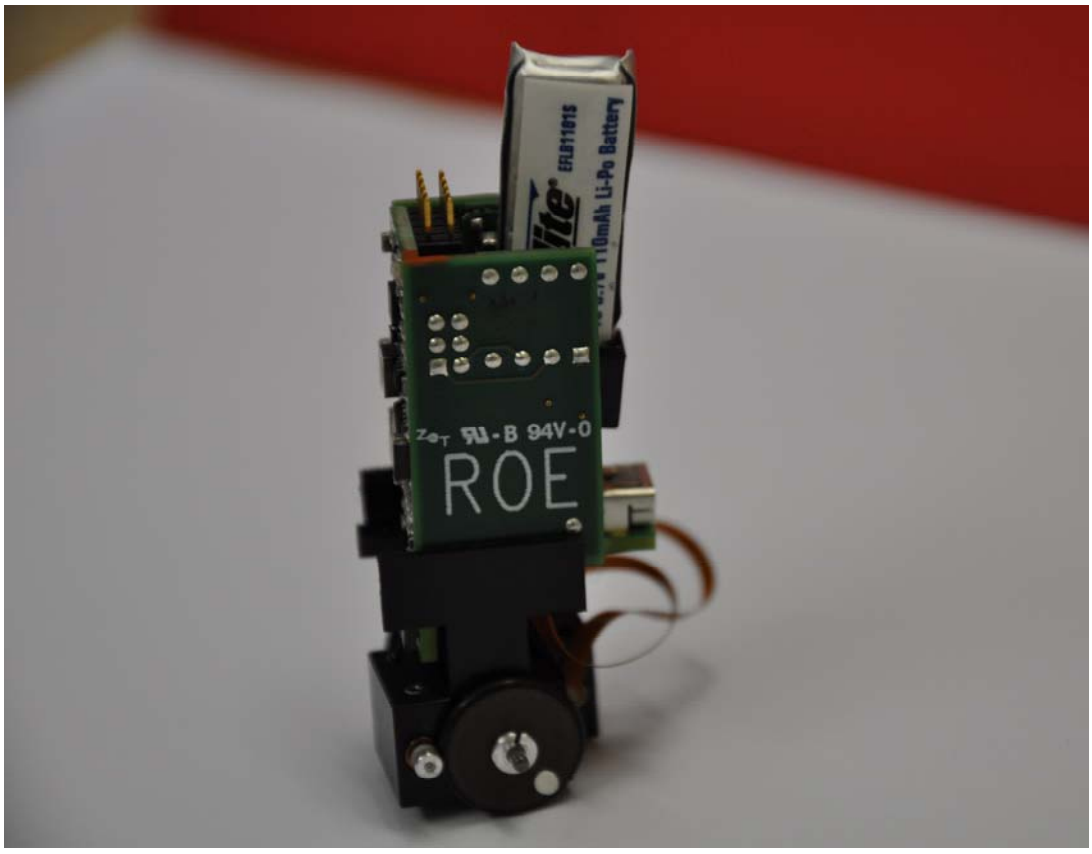
WP5.2 Figure 1: Optical bench layout for EAGLE/FP7 Prep Phase WP 09000

We plan to replace the X-Y positioner with micro-autonomous robots for the placement of the pick-off mirrors. By making use of micro-autonomous robots, the instrument can be made much smaller and lighter. An artist impression of a focal plane populated with micro-autonomous robots is illustrated in Figure 2.



WP 5.2 Figure 2: Artist's impression of focal plane populated with micro-autonomous robots

A picture of the first Micro-Autonomous robot is shown in Figure 3. It is a footprint of about 25 x 25 mm and is about 55 mm high. The coarse positioning accuracy is in the order of 1 mm. We believe that the fine positioning stage, which will be part of the mirror assembly and also includes the directional rotation stage, will be capable of achieving a positional accuracy of 35 μm and a direction accuracy of 1 mrad.



WP5.2 Figure 3: Micro-Autonomous Robot

5.3 Deviations from original plan and plans for the next reporting Period

Access to our systems engineering support has been constrained and we consider it an imperative to carry out this work before engaging on further developments. As our systems engineering is a single resource within the project we have had to delay, but do not expect the constraint to have a negative impact on progress as we will be able to carry out the work prior to our next meeting.

The effect of the delayed input is to move the Smart Instrument Architecture objective by 6 months. However as we have identified an opportunity of co-operation with an existing programme we do not anticipate a significant delay to the Smart Instrument Device Specification objective. We believe the project will be back on track for the March 2010 meeting.

Our next milestone meeting is in March 2010 (at CSEM Neuchatel) where we will finalise our systems design to enable the next phase of development work to begin at the four partner laboratories.

WP6: New Materials and Processes for Astronomical Instrumentation

6.1 Introduction

Identification of new technologies and new materials with potential astronomical applications is a very major continuing requirement in astronomy. This WP focuses on new types of optically-active materials with possible astronomical applications, moving beyond glass and steel, to organic, photosensitive and polymer materials. The objective is both to identify and characterise those new materials with the most practical promise, and also to prove the viability of laboratory and industrial scale processes which are essential to turn their promise into practical technologies.

The research is divided into 4 sub-Work Packages.

- *WP 6.1 Management:* oversee, manage and assess the progresses of the WP. Report and disseminate the results.
- *WP 6.2 Novel Volume Phase Holographic Grating-based devices (VPHG):* Explore new areas of application of traditional Volume Phase Holographic Gratings to astronomical intrumentation.
- *WP 6.3 Photochromic and Photosensitive Materials and associated devices* . Explore the possible introduction of new basic materials in holographic applications to astronomical instrumentation.
- *WP 6.4 New mterials and processes for fabrication of reflective and refractive optics.* Explore the possibility to port new materials and processes into the fabrication of reflective and refractive optics for atronomy.

6.2 Progress and achievements by Work Package

WP 6.1: Management

During the reporting year the activity of this WP has been mainly devoted to the set-up of the activity and the follow up of the final phases of contract approval.

WP 6.2: Novel VPHGs

Activity in this sub-work package has not started yet. The goal of this S-WP is to define together with an identified industrial partner a set of novel applications to astronomical instrumentation of the traditional DCG-based VPHG manufacturing Technique.

Exploration of some desirable configurations has been completed earlier in the reporting year and identified the following as promising:

- Slanted Fringes Devices.
- Multi-Order Devices and Echelles
- Piled Devices

The next step needed is a comparison of the above templates with the manufacturing capabilities of the Industry. This has been made difficult by the delay in the arrival of the EC financial contribution and the unavailability of the sole European VPHG manufacturer

Partners overseas have been contacted and the activity will be properly kicked-off during the next reporting period.

WP 6.3 Photochromic and Photosensitive Materials

During the year the research activity focused on the use of photochromic thin films as active substrates for Computer Generated Holograms (CGHs) to be used in interferometric tests of aspheric lenses or mirrors. This activity, described here, can be considered common to WP 6.3 and WP 6.4.

The evaluation of the quality of these elements is an important task, indeed, the interferometric test of an aspheric wavefront needs a non standard reference surface, that can conveniently be a Computer-Generated Hologram (CGH). These devices are usually binary intensity gratings, able to reproduce custom wavefronts. The self-developing and the rewritability of the photochromic substrates are undoubted advantages for this application.

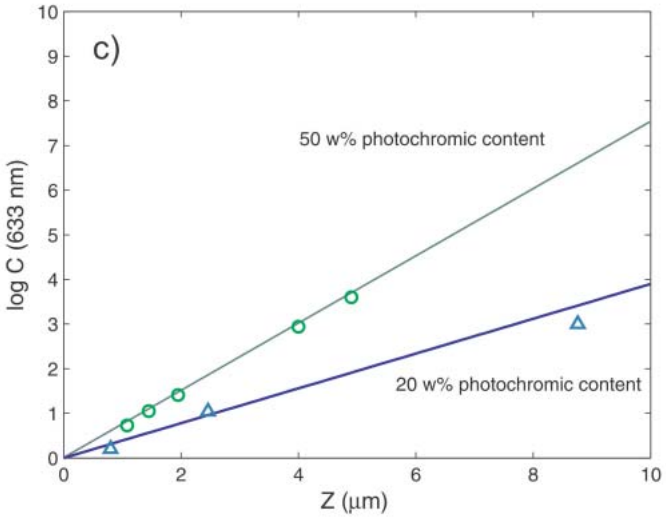
In this context, we considered photochromic polyurethane system where the dithienylethene plays the role of a monomer. Indeed, a suitable dithienylethenic alcohol derivative has been synthesized and polymers with a photochromic content up to 50% w/w can be obtained. Specifically, the 1,2 bis-(2-methyl 4-(p-hydroxymethylphenyl)-3-thienyl) perfluorocyclopenthene (λmax = 590 nm, □ = 31.10 ± 0.05 · 106 $M^{-1}m^{-1}$ in $CHCl_3$) was polymerized with 4,4'-diisocyanatedicyclohexylmethane (H12MDI) for its good resistance under UV irradiation. Small amounts of polycaprolactone diole and triol (crosslinker) were added in order to provide suitable mechanical properties of the films

The solution has been made into films by casting (spin coating or control coater techniques, assisted by doctor blade) in a laminar flux hood. Then the polymerization was completed at 130◦C for about one hour.

The important parameters for the application as CGH is the contrast between the transparent (colorless) and opaque (colored) areas at the laser wavelength used in the interferometer and it is defined as:

$$C(\lambda) = \frac{T_{colorless}(\lambda)}{T_{colored}(\lambda)}$$

The contrast is a function of the wavelength and it is driven by the transmittance (degree of absorption) of the coloured form and hence it depends on the concentration of the photochromic moiety, but also on the thickness of the film:

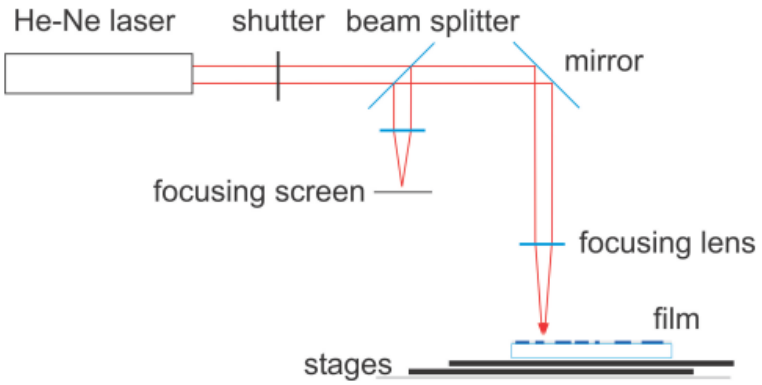


WP6.3 Figure 1

It is apparent from WP6 Figure 1 that contrasts of the order of 10^4 can be easily achieved with a photochromic content of 50%, making the films suitable for the application proposed.

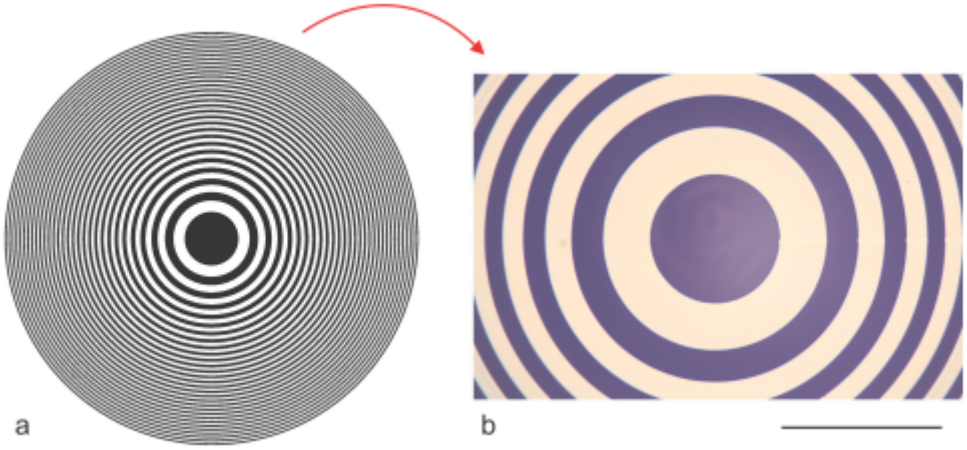
The calculation of the CGH pattern is a crucial step, indeed the whole optical system used to make the measurement must be raytraced. The CGH is usually described with a Zernike phase function, able to reproduce the ideal aspheric wavefront. The continuous phase function is then approximated in a binary or grayscale mode, in order to transfer the pattern on the substrate.

In order to transfer a Computer Generated Holograms pattern on photochromic films, a simple custom writing tool, named AratroV2 was developed (WP6.3 Figure 2). Basically it is a laser plotter: the He-Ne laser (with a nominal power of 3 mW) is focused on the film by a single aspheric lens, making a minimum spot size of 4 µm. The spot diameter is tuned by a simple focusing system. Finally, custom software controls the whole mechanical and optical system (stages and optical shutter). In this configuration the plotter makes it possible to transfer rotationally symmetric patterns. In the writing phase it is fundamental to achieve sharp edges of the transferred patterns.



WP6.3 Figure 2 Schematic diagram of the AratroV2 writing tool

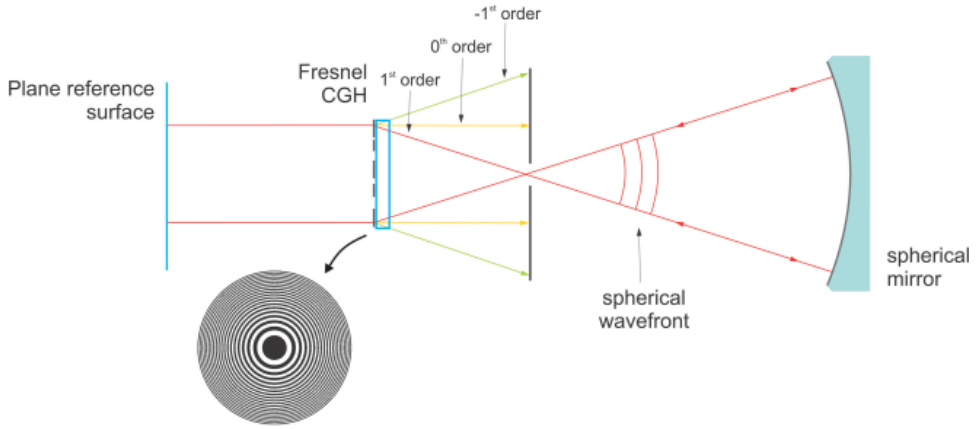
After the optimization, the result is a good quality profile of the pattern, in terms of contrast and sharpness of the edge:



WP6.3 Figure 3

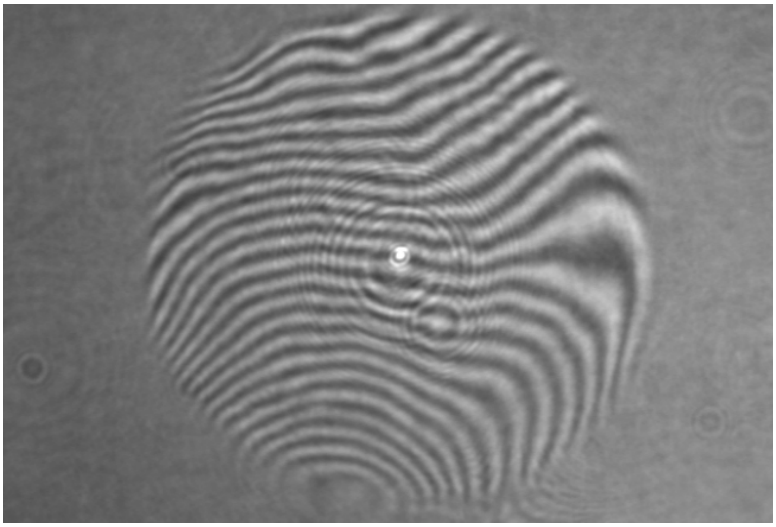
Fresnel patterns with different focal lengths have been written to prove the new technology. Based on these elements, an interferometric test has been set up (WP6.3 Figure 4). In this case, the CGH is the optical element under test that will be compared with a reference spherical surface.

A plane wavefront from a Fizeau interferometer is used as reference wavefront; the CGH generates an aberrated converging spherical wavefront in the first diffracting order which is then reflected by a reference spherical mirror; the centre of curvature of this mirror is put in 5the focus of the first order beam generated by the hologram. In this way the light travels back along the same direction and it is diffracted by the CGH, making interference with the reference plane wavefront. Interference fringes are the difference between the plane reference wavefront and the plane wavefront generated by the CGH in double pass. .



WP6.3 Figure 4 interferometric test set-up

WP6.3 Figure 5 shows the resulting interference fringes detected by the interferometer:



WP6.3 Figure 5 interference fringes detected by the interferometer:

The presence of the fringes pattern indicates that the wavefront generated by the CGH is similar to that of the reference surface. The fact that the fringes are not straight is a consequence of the surface of the photochromic film which is not of high quality.

At this point the CGH can be erased by using UV light and a new pattern can be written according to new interferometric tests on different optical elements. We demonstrated that the photochromic polyurethanes are good substrates for making rewritable CGHs. The quality has to be improved in order to make them competitive with the actual technologies (chrome on glass).

WP 6.4 New Materials And Processes

This Sub-WP is mainly divided into two areas: The use of Polymeric Materials and the use of Composite Materials in manufacturing optical components for astronomical instrumentation.

The activity on polymeric materials, requiring close contact with industry, has been delayed due to delays in incoming funds but it is going to start soon.

Dealing with polymeric materials involves materials generally characterized by poor mechanical properties. It becomes than necessary to set up an active mechanism able to correct the shape of the optical surface.

As a first benchmark it has been decided to study a flat mirror with a size of the order of 100-400 cm^2. Detailed research on candidates for making the substrate will be performed using some mechanical and thermal-representative prototypes. Then flat substrates of the selected materials will be fully characterized, coated with a reflective layer and the mechanical activation will be designed. This activity will involve different companies, i.e. ADS International, Intercast Europe.

An equivalent activity in the area of activated composites materials (smart materials) have been already started, being mostly based in partner's own laboratories.

Here as well a benchmark, this time a spherical mirror with variable curvature radius, has been selected for this step. Piezo-Ceramics and Smart Memory Alloys activated Composites have been identified as promising for this application. As an example we report below the results for the first prototype of SMA-actuated spherical deformable mirror

Figure 4.9: Example of variation of focus position during the activation of a SMA deformable mirror.

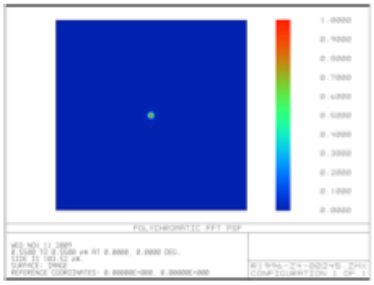


Figure 4.10: Starting p.s.f.

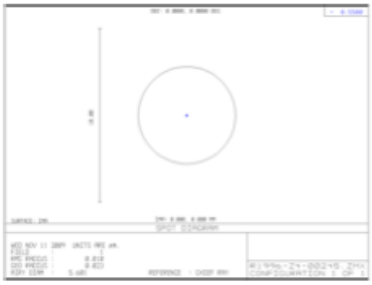


Figure 4.11: Starting focused spot

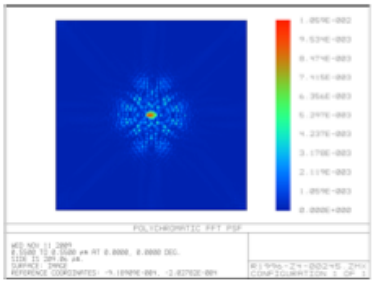


Figure 4.12: Example of Deformed p.s.f.

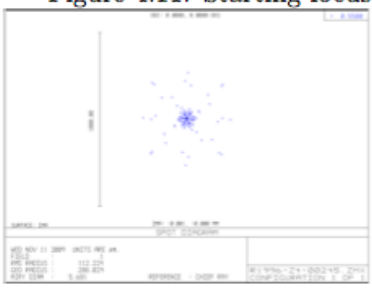
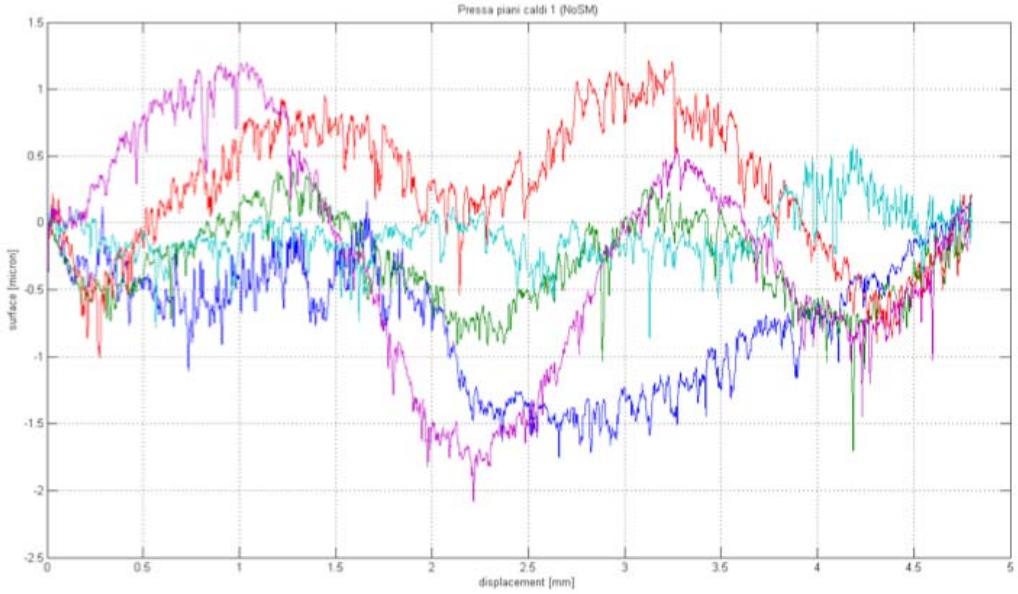


Figure 4.13: Example Deformed focused spot

Work has been done in the reporting year in the technique to produce CFRP replicated mirrors. These indeed look as the most promising innovative optical surface to be coupled with the aforementioned smart actuators.

Specimens have been obtained in the laboratory and the rugosity tested with promising results.



WP6.4 Figure 2

6.3 Deviations from original plan and plans for the next reporting Period

The delay in the transfer of the financial contribution from the EC has affected the activity of WP6 mainly in the area where industrial contracts had to be placed. As discussed in details in the subsections, above some activities could not be kicked-off and will start during the next reporting year.

WP6 was supposed to close the activity of exploration of the art and definition of the research plan at the date of the present report. As described in the above pages this milestone can be considered only partially achieved since no industrial contract could be placed in the reporting period.

We expect a delay of 4-6 months in achieving the first milestone. This delay will not affect the overall schedule and will be recovered during the next or at most the next 2 reporting periods.

WP7: Transnational Access

Publicising the availability of access

The first year of the FP7 transnational access activity overlapped with the end of the FP6 contract, since telescope semesters begin in the Spring and Autumn, rather than follow calendar years. Thus the existing publicity for FP6, described extensively in earlier reports of the FP6 contract, remained in effect. The Web-pages describing the access programme which had been hosted at the IAC at La Laguna, Tenerife in the Canary Islands were transferred to a site hosted by the Isaac Newton Group based in La Palma, also in the Canaries. The site is at http://www.ing.iac.es/opticon/. These pages were updated as necessary. In addition the individual observatory websites each carried links directing non-national users who might qualify for OPTICON support to the OPTICON pages

Regular articles about the Trans-National Access programme appear in the newsletter of the European Astronomical Society.

The project scientist regularly promotes the Trans-National Access programme at international meetings, such as the Joint European Astronomical Society meetings (held at Hatfield UK in 2009. He and other members of the OPTICON team also promote the programme in individual seminars at specific astronomical institutes. In 2009 these included at talk in Sofia, Bulgaria by M. Dennefeld and in Tartu, Estonia by J. Davies.

Selection procedures

In the first year of FP7 we continued the protocol of the FP6 contract by having the allocations for night-time telescopes done by existing national telescope time allocation committees. The precise procedures vary slightly from committee to committee. All meet the usual standards for scientific peer review, i.e. independence, rigour and the provision of feedback to successful and unsuccessful applicants. This process will be replaced by a new OPTICON TAC from 2010B (see WP 12.1)

As a first step towards a more European approach the solar telescope time was awarded by a single panel drawn from members of the EAST consortium (WP 12.3). This panel has also accepted the responsibility of allocating solar time to be awarded on the four solar telescopes in the Canaries as part of the international agreements connected with the La Palma and Tenerife observatories (The 'CCI International Time Programme'). The EAST TAC allocated 7 OPTICON days for the VTT. The awarded campaign was led by Michel Sobotka (1), together with Jan Jurcak (1), Nazaret Bello Gonzalez (2), and Hashem Hamedivafa (3)
.
[(1: Astronomical Institute, Academy of Science of the Czech Republic, Ondreejov, Czech Republic), (2: Kiepenheuer Institut or Solar Physics, Freiburg, Germany), (3: Imam Khomeini International University, Quazvin, Iran)].

The campaign took place at the VTT from July 10th until July 20th (10 days). It was extended by 3 days from the CCI/ITP quota.

Projects were allocated on almost all of the facilities in the programme. The topics covered by these projects included studies of prominences on our Sun, extrasolar

planets, young stars, variable stars, dwarf galaxies and galactic winds. The main exception to the generally high demand for access was to the telescopes of the European Southern Observatory for which may EU countries already have access via their membership of ESO. Since OPTICON has a policy not to support projects which have other sources of access to our facilities this greatly limits the pool of potential users to the ESO telescopes. Attempts to attract non-traditional users to the ESO telescopes will continue.

WP8: Management

This activity is described in section 5.

WP9: Europe of the Future: Technologies

9.1 Introduction

This Work Package comprises two independent activities. WP9.1 is the Key Technology Network. This network is intended to focus on specific areas where value can be added by bringing together scientists and engineers from across Europe and from different sectors (academic, agency and industrial) to exchange ideas and plans. The topics have been chosen on the basis of the road-mapping work done as part OPTICON during its FP6 contract. The plan is to hold a series of Key Technology Workshops on the following topics (listed in proposed date order):

- Position Sensing
- Technology for Polarimetry
- Real-time Computing
- Deformable Mirrors

The WP leaders will then carry out an update to the existing technology roadmap developed using input from these workshops as well as organising a specific roadmap workshop or series of workshops.

WP9.2 (Software Standards) will continue the work to define standards for an open, modular system for processing and analysis of astronomical data by end users started during the OPTICON FP6 programme. The membership list of the network was slightly revised, to include participation by the Euro-Virtual Observatory community. Close interaction with the North American community through US-VAO ensures that a common set of open standards will be developed and backed by prototype implementations.

9.2 Progress and achievements by Work Package

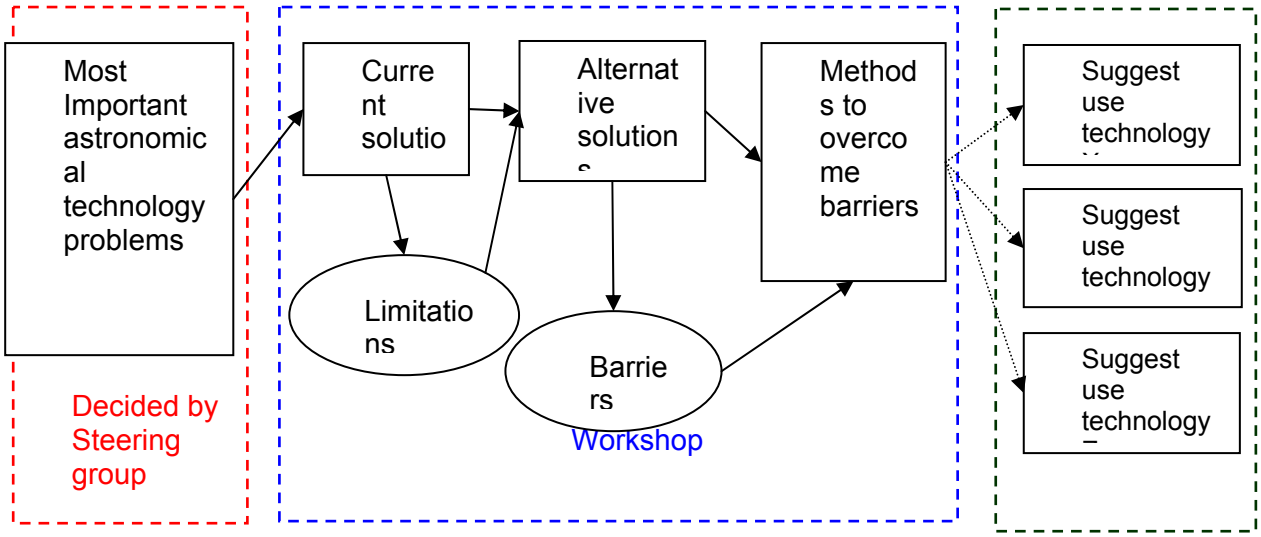
WP 9.1: Key Technologies

Initial planning meetings for WP9.1 were held with the team from STFC and NOVA. A plan was devised to best meet the objectives of the work package.

The Position Sensing workshop will take on April 21st 2010 and there has already been considerable progress made on defining the format of the workshop and which particular topics to focus on.

The primary aim of this workshop is to bring about the opportunity for key astronomy technology problems in position sensing to be solved through the application of technology from other domains. Secondary aims are: to enhance the awareness of European industries with expertise in this area of the opportunities in Astronomy Technology; and to identify possible areas where astronomy technology might be applied in other domains

The workshop process is illustrated here:



The main outcome of the workshop itself is the recommendations. These will be included in the workshop report and added to the OPTICON website.

Following on from the workshop the expected outcomes are:

- Pass the recommendations/ suggestions on to specific projects/teams;
- Write up an ideas or ideas in a paper
- Look for funding to carry out further R&D work to develop an idea.

The steering group has already met (11-Nov-08) and selected the following topics as they offered a good range of both application areas and operating parameters:

- Positioning a grating within an instrument
- Positioning beam steering mirrors within an instrument
- Three larger scale issues which require further discussion to determine if they can be tackled together or separately
    - Positioning of primary mirror segments in an ELT system (Both macro alignment and fine positioning)
    - Formation Flying for Space Telescopes
    - Baseline measurement / path-length compensation for interferometery

WP 9.2: Software Standards

The network conducted monthly phone meetings and had its kick-off meeting in Milan on July 16-17, 2009. Agendas and minutes of the meetings are publicly available on the Network Web-pages <https://www.eso.org/wiki/bin/view/Opticon> where also discussions and documents can be found.

Based on the high-level architecture and applications framework documents (produced by OPTICON Network 3.6 under the FP6 contract), a first draft of a document on the parameter interface was prepared and discussed. Further, different options of a software package manager were considered. Major parts of this work were done in Milan and Marseilles. These documents were discussed in detail during the Network 9.2 kick-off meeting where also a very first prototype implementation of important parts of the system was demonstrated. Prototypes using Python and Java were shown by Milan and Marseilles, respectively. For simplicity, they used the IVOA SAMP messaging protocol whereas other options will be considered in the future. The work was presented at international meetings including IVOA, ADASS, and the IAU General Assembly. These contributions have been submitted to the proceedings for publication in 2010.

9.3 Deviations from original plan and plans for the next reporting Period

WP 9.1: Key Technologies

The deliverable 9.1.1 'Revision of the Technology Roadmap' has been reprogrammed to month 36. The reason is that the KTN is holding a series of workshops focusing on particular technologies. It makes sense to complete these workshops and only then feed their output into the revised roadmap, hence the change of date for the deliverable.

As noted above the first KTN workshop is scheduled for April 21st 2010. Preparations are also in hand for the workshop on polarimetric technology, coordinated by Frank Molster of NOVA. Colin Cunningham will present an invited talk at the SPIE Astronomical Telescopes and Instrumentation Symposium in June 2010, as part of the Modern Technologies in Space and Ground Based Telescopes and Instrumentation, entitled: 'The OPTICON technology roadmap for optical and infrared astronomy'.

WP 9.2: Software Standards

Due to the late release of funds, it was not possible to hire the foreseen man-power until the second half of 2009. This affects the schedule of all deliveries and milestones listed in the original plan. They will all be shifted by 6 months with the new expected dates as follows:

- Delivery: Interface standards v1 – month 18 → 2010 June
- Milestone: Review of Interface Standards v1 – month 21 → 2010 September
- Delivery: Prototype implementation – month 24 → 2010 December
- Delivery: Interface Standards v2 – month 30 → 2011 June

WP10: Europe of the Future: Science

10.1 Introduction

WP10 comprises two related activities. WP10.1 (ELT science) is intended to continue to develop and monitor the scientific case for the building of the 42m European Extremely Large telescope, a key astronomical infrastructure required for the next decade and a feature of the ESFRI roadmap for large infrastructures.

WP10.2 is designed to make the case for integrating High Time Resolution Astrophysics (HTRA) into the science case for the European Extremely Large Telescope. By doing so we will enable the E-ELT to open a new parameter space – sub-second astronomy - with a consequent potential for new discoveries. Current HTRA observations concentrate upon objects that either fall into the category of extreme physics (phenomena associated with neutron stars and black holes) or having the potential for discovering and characterising exo-planets. Both of these are objectives in the ASTRONET Science Vision for European Astronomy

10.2 Progress and achievements by Work Package

WP10.1 ELT science

Planning for the next large ELT science conference "Astronomy with Megastructures" is well underway. This is being sponsored jointly by OPTICON and RadioNET, and will focus on joint science with the E-ELT and SKA. The meeting will be held 10-14 May 2010 in Crete. The SOC has been formed and a web site set up at
http://www.physics.ox.ac.uk/users/Karastergiou/Greece2010/home.html

Registration is open (deadline end of February 2010), and we are aiming for over 100 participants.

Preparations continue for hiring a postdoctoral fellow to work in Rome. The advertisement is ready to go out and is now in the hands of the administration of the Rome Observatory.

Isobel Hook has been working with ESO on a top-level science case brochure for the ELT. In addition she continues to chair the E-ELT Science Working Group, whose current activity is focused on the options for first-light instrumentation.

Isobel has also begun working with ESO on the science case for the E-ELT construction proposal. The format and content has been agreed. The bulk of the work on this will be in the 1st half of 2010. The case will incorporate work from various sources including the Design Reference Mission (developed by the Science Working Group with ESO), the instrument science cases and broad community input from workshops and the Design Reference Science Plan.

WP10.2: European Network for High Time Resolution Astrophysics - HTRA

During this period the main activity was to establish the network and to set priorities for the network under FP7. As the timeline for contributing to the E-ELT science case is short it was also intended to make coordinated representation to the E-ELT science group through ESO's E-ELT Design Reference Mission. During

the first year the network was to plan an international workshop to develop the HTRA case for E-ELTs. The WP members met face to face on two occasions – in Padua in March 2009 and in MPE Garching in November.

At Padua the strategy for developing the E-ELT science case was developed, including the approach towards ESO DRM workshop in May 2009. A presentation was subsequently made at the workshop - [www.eso.org/sci/facilities/eelt/science/drm/workshop09/programme.html]. During the ESO meeting discussions were held with the team of the proposed Micado E_ELT instrument. Follow-up discussions were held in Galway in September and an HTRA component has been included into the Micado design.

Two phone conferences and a number of e-mail exchanges were held to plan an international workshop to discuss HTRA in the context of E-ELTs with a view to making an effective input into the HTRA science case

10.3 Deviations from original plan and plans for the next reporting period

There have been no major deviations in either Work Package although progress on recruitments for WP10.1 (ELT) was delayed by the late signing of the contract. The plan for the next period for WP10.1 includes recruiting a postdoctoral research fellow and finalising arrangements for, and then holding, the workshop on 'Astronomy with MegaStructures to be held in Crete, 10-14 May 2010. Work on the science case for the E-ELT construction proposal will continue throughout the period jointly with ESO and the E-ELT Science Working Group.

For WP10.2 (HTRA) all activities are on budget and schedule. Activiteis for 2010 include a workshop to be held in Crete from the 5-7th May 2010 (ahead of the larger E-ELT meeting). A second meeting in Garching will be held in the spring to finalise plans for the Crete meeting.

WP 11: Enhancing Community Skills

11.1 Introduction

The objective of this Work Package is the transfer of skills from experienced astronomers to new-users. It is intended to support two distinct communities with rather different needs. WP11.1 (Community Development) concentrates on supporting new users of classical 2-8m telescopes, especially those in developing communities in the CEE countries. The objective is to raise the general standard and indicate to all communities the potential offered by the increasing integration of Europe's suite of telescopes. This will be achieved by technical schools and workshops, including 'hands-on' experience at front-line observatories in collaboration with experienced astronomers. WP 11.2 (the European Interferometry Initiative) is intended to ensure community-wide involvement in the world's first common user large optical interferometer, the VLTI. Activities of this work package include an exchange programme (Fizeau), astrophysical working groups and regular meetings of the European interferometry community.

11.2 Progress and achievements by Work Package

WP 11.1 Community Development

This Working Group held its kick-off meeting at ESO-Garching on February 19-20, 2009 (minutes available on the OPTICON web site). The achievements of the previous (FP6) programme were reviewed, and the lessons learned discussed so they could be used during the implementation of the two first years (2009-2010) of the new programme. While observing schools (the NEON schools) will remain the backbone of the programme, it was agreed that, in view of the reduced funding compared with that proposed, their number would have to be reduced to at most one school per year so that resources could be devoted to promote new activities. These new activities include "Awareness conferences", exchange schemes for young scientists or engineers, and small workshops dedicated to training user on the use of new and complex instrumentation. A steering committee was been set-up and a provisional schedule for 2009-2010 was agreed. This schedule has most of the activity planned towards the end of the first year and then into the second year, due to the expected late arrival of the funds. This plan has been followed during 2009.

Support in the form of lecturers was given to the second observing school organised by the Institute of Astronomy of the Bulgarian Academy of sciences at its Rozhen Observatory (Oct. 5-12): M. Auriere delivered a lecture on spectro-polarimetry and stellar magnetic fields, while M. Dennefeld gave two lectures, one on low-dispersion spectroscopy, and one on the evolution of telescope optics from Galileo up to the E-ELT. Immediately following this observing school, the first "Awareness conference" was organised in Sofia (Bu), October 13 and 14th, entirely sponsored by OPTICON. Eight high-level lectures were given by foreign scientists, covering the "hot-topics" in Astrophysics, and including an overview of the available ground-based, and space-based facilities. Two presentations were also given by local scientists, summarising the scientific and instrumental programmes developed in Astrophysics in Bulgaria. This meeting was attended by over 50 participants, mainly from Sofia University, and BAS-Institute of Astronomy, but also by members from the Shumen University or Plovdiv institute, and from the BAS-Space Science Institute. A visit of the Rozhen observatory was organised for those interested after the conference, as this observatory is offered as a regional facility for the astronomers of all South-Eastern Europe. This conference was the

first of its type in the new series, and will serve as a model for the future, to favour exchanges with, and enhance integration of, astronomers in the new EU member states or accessing countries.

The Chair of the WG attended the SREAC (Sub-Regional European Astronomical Committee) meeting in Belgrade end of September, to listen to the needs of the south-eastern European astronomical community, and present the possibilities of the OPTICON programme to them. The SREAC, presently sponsored by UNESCO, is trying to implement a regional organisation in south-eastern Europe, and neighbouring countries, to pool resources in astronomy and develop scientific collaborations. Our WG is developing contacts with all their members, and encouraging them to use also all the facilities made available by OPTICON.

The needs of the OPTICON "Research Training" programme were presented at the JENAM in Hertfordshire (UK) in April. As reported under WP12 this meeting included an OPTICON sponsored session partly for the benefit of the European Telescope Strategy Review Forum set-up by ASTRONET. The availability of well equipped, medium-sized telescopes as essential for the training activity was emphasised.

These needs were also discussed at the Telescope Director's Forum (where this WG is officially represented) in Copenhagen (DK) in October. Regular exchanges between the TDF and the WG are essential, to ensure that the plan takes into account the needs expressed by both the various observatories in the Trans-National Access programme and the wider community.

The development of the Web site is nearing completion. It will host the registration facility for the LaCaille exchange scheme which is hoped to enter service at the same time as the results of the first call for observing proposals for the OPTICON Common Time Allocation Process (WP 12.1) become available.

WP 11.2: The European Interferometry Initiative

The Work Package web site was setup, as were internal financial rules for Work Package activities.

The “Fizeau exchange grants” programme was started up, including defining the regulations and an announcement of the 2009B call in September. Total pressure factor for this call was 1.5, and 8 exchanges awarded funding. Three exchanges were partially executed (€2.596,75), the remaining will take place until March 2010

The “Circumstellar disks and planets working group” was setup, with a meeting scheduled in 2010, at Kiel (D) The “Science cases for a second generation facility” working group was established. This plans a meeting in 2010, during JENAM at Lisbon;

11.3 Deviations from original plan and plans for the next reporting period

In the case of WP 11.1 preparations for 2010 are well under way. A proposal has been submitted to have the next Awareness conference held in Lisbon, during the JENAM, with special emphasis on engineering, and technical skills required for the next generation of telescopes. The eighth NEON observing school (the first

one under the FP7 programme) will take place in Calar Alto observatory in June 2010, and the call for applications was issued in December 2009. Despite a slow start, due to the financial uncertainties in 2009, the programme is now well under way, and a ramp-up is foreseen in the next two years to implement all the ideas developed by the steering committee.

WP11. 2 will announce two Fizeau calls 2010A (March) and 2010B (September) and an extra call in conjunction with the VLTI summer school in February 2010. As noted above working group meetings will take place in Kiel (D) and Lison (P). A further working group “AGNs and the galactic centre” will be established. A meeting of the scientific council EII will be defined and will take place; no meeting took place in Period 1 as initially planned.

WP12: Enhancing The community: Optimising Science Access

12.1 Introduction

This multi-pronged activity relates to optimising the use of Europe's 2-4m night-time telescopes and its major solar telescopes. The day and night time facilities are grouped together since they have many activities (such as time allocation) which benefit from an integrated approach. The telescope directors forum (WP12.1) is a grouping of directors from all the observatories (night time and solar) in the transnational access programme. Its objectives are to agree policies and objectives for the Trans-National Access programme, to discuss issues of common interest and oversee the day to day running of the Trans-National Access programme. It meets once or twice a year. Its meeting dates and the minutes of those meetings are published on the OPTICON web page. Many of these night time telescopes are included in a joint ASTRONET/OPTICON panel (WP 12.2) which was set up to review options for a rationalisation of Europe's suite of 2-4m telescopes in the light of the ASTRONET 'Science Vision' published early in the year. The panel is co-chaired by Janet Drew (UK) and Jacqueline Beregron (F). A similar joint panel was established in 2009 to consider European options for new instrumentation required for astronomical Wide Field Spectroscopy. WP12.3 EAST (The European Association for Solar Telescopes) is a new grouping of solar physicists who are developing a network to improve co-ordination of existing solar telescopes (there are four within the OPTICON programme) and develop an agreed European plan for a next generation solar telescope.

12.2 Progress and achievements by Work Package

WP12.1: TDF, Common TAC and Common Proposal Software

The TDF met twice during this reporting period.

The first meeting was at the April 2009 JENAM where a special session was organized on the future of Europe's medium sized telescopes. This was intended both as an opportunity to present their plans to the potential user community and to provide background to the ETSRC panel (WP12.2) which was, at that time, just starting its work. There was also a closed business meeting to discuss Trans-National Access budgets and our plan to move towards a common time allocation committee (TAC) for the Trans-National Access programme.

The second meeting was in Copenhagen in October 2009. After the normal briefing on Trans-National Access matters and budgets the main business here was to iterate on and accept the terms of reference for the new common TAC. A detailed description of the process, prepared by the project scientist and a sub-committee of the TDF was presented to the meeting. This process was discussed in detail and few modifications made. A final iteration by e-mail over the following weeks resulted in an agreed plan for implementation in 2010.

The Project Scientist, who had chaired the forum for 5 years during FP6 stood down and was replaced by a rotating chairperson, to be re-elected every two

years. The first incumbent of this position was J Andersen, director of the Nordic Optical Telescope.

The planned common time allocation process requires a dedicated proposal tool for submission and review of proposals to the common TAC. This is being implemented at ASTRON (NL) who are modifying the FP6 RadioNET developed NORTHSTAR tool to the needs of a suite of optical and infrared telescopes. This process is being carried out in close consultation with the project scientist and the observatory technical teams. It is on course for the planned Feb 2010 call. Some of the individual observatories are now using NORTHSTAR for their national communities as well as the OPTICON Trans-National Access programme. This provides extra momentum, cross-fertilisation of ideas and potential for shared support costs.

W12.2: Planning for a viable future (ETSRC Review of 2-4m Telescopes)

The panel has consciously operated at 'arms-length' from the OPTICON and ASTRONET boards in order to develop its conclusions as independently as possible. The OPTICON project scientist assists the panel, but is not a member of it. As well as the OPTICON organised session at the 2009 JENAM, the TDF co-operated by responding to detailed questionnaires on the facilities at each observatory. Various tables and diagrams summarizing the observatory capabilities were prepared for the panel by the project scientist.

The panel launched a web-based consultation over the summer (re-using the software as used for the ASTRONET consultation the previous year) and met physically twice, In January 2009 (London) and September 2009 (Madrid). Various subsets of the panel held repeated telecons as they developed the report.

WP 12.3 EAST

EAST has created a common Time Allocation Committee to handle the solar observing time of both OPTICON and the CCI International Time programmes. The Comité Científico Internacional (CCI) of the CANARY Islands observatories had agreed that the EAST TAC would handle both observing programs jointly. The TAC has five members, one from each institution involved (France, Germany, Netherlands, Sweden), and one from Spain.

EAST organized two General Assembly Meetings of the Consortium, in January 2009 (Madrid), and in October 2009 (Freiburg). Major topics of these meetings were the progress of the ongoing Preliminary Design Study of the European Solar Telescope (EST).

The first EAST-ATST (ATST is the US led Advanced technology Solar Telescope, an American analogue to the proposed EST) Workshop, organized by the EAST office and members of the Kiepenheuer-Institut, took place in Freiburg from 14 to 16 October 2009. About 100 solar physicists from all over the world attended the meeting. The workshop addressed the science to be done with solar telescopes of an aperture beyond 1 meter. It was held as a joint EAST-ATST workshop and demonstrated the common interests of the European and US solar physics community toward next-generation, large-aperture solar telescopes. The workshop also summarized the scientific justification of these telescope projects, and reviewed the current status of relevant solar physics topics. At the workshop,

the status of current projects was presented, and recent accomplishments with today's large facilities were reviewed.

12.3 Deviations from original plan and plans for the next reporting period

In the context of WP 21.1 the principle of the common TAC process was agreed in the Spring and a schedule accepted. It was agreed to defer the launch of this process until semester 2010B following the review by the September TDF. This was achieved with a call in Feb 2010 (next reporting period). The TAC panel, web-pages etc will be developed and deployed for this call. If all goes well a further call will occur in August 2010 for Semester 2011A

The delayed signature of the contract, the sudden loss of a dedicated staff member and restructuring of the Isaac Newton Group (an element of STFC) created some administrative difficulties with the Trans-National Access programme delaying some travel refunds. This was resolved by transferring some of these activities to the Project Scientist during the transition to the common TAC process. The situation will be reviewed in Spring 2010 following an analysis of the common TAC process.

The ETSRC (WP12.2) report was well in hand at the end of the reporting period and will be presented to ASTRONET in the Spring of 2010. The nominal delivery data is February 2010 but the plan is to present a draft in January and a final version in March after a final review of the factual details by the TDF.

EAST activities are is proceeding according to plan. The proceedings of the workshop will be published in summer of 2010 as a special issue of "Astronomische Nachrichten" with W. Schmidt (KIS) and R. Schlichenmaier (KIS) as Editors. It will contain about 25 contributions based on the talks presented at the meeting.

3.4 Deliverables and Milestones Tables

Deliverables

Del No	Deliverable name	WP no	Lead beneficiary	Nature	Dissemination level	Delivery date from Annex 1 (proj month)	Delivered (yes/no)	Actual/ Forecast delivery date	Comments
1.2.1	CANARY on-sky test report	1.2	UDUR		PP	48	No	48	On-track
1.3.1	Coronagraphic phase diversity final test report	1.3	ONERA		PP	36	no	36	On-track
1.3.8	Post focal plane wavefront sensor final test report	1.3	CNRS-INSU-LAOG		PP	30	no	30	On-track
1.3.9	Optimized real time algorithms final test report	1.3	ONERA		PP	30	no	30	On-track
1.4.1	LBT Laser guide star Ground layer AO final design report	1.4	MPE		PP	42	no	20	On-track
1.6.1	Laser pre-production unit delivery & test report	1.6	ESO		CO	48	no	48	On-track

Meetings:

WP	Type of Meeting	Date	Place	Minutes
1.2	Kick-off meeting	26/03/09	Paris	Opticon jra1 wp1.2 mom 20090328.pdf
1.3				
1.4	Kick-Off meeting	26-27/05/086	Florence	ARGOS_Kick-off_minutes_Florenz_20090528.pdf
1.4	PDR	17/02/2009	Garching	ARGOS_PDr_Review_Agenda_20090217.doc ARGOS_PDR_DOCUMENTS.ZIP
1.5	Kick-Off meeting	28/05/2009	telecon	Minutes of KOM WP1-5.doc
1.6				
1.7	Kick-off meeting	26/03/09	Paris	Opticon jra1 wp 1 7 20090226.pdf
1.8	Kick-off meeting	05/05/2009	Observatoire de Meudon	M-KO-W1p8v1.doc
1.9	Kick-off meeting	29/06/2009	Garching	Minutes of the FP7 W1p9.pdf
1.1	JRA1 general meeting	09/07/2010	Garching	Minutes and presentations

TABLE 1. DELIVERABLES[1]									
Del. no.	Deliverable name	WP no.	Lead participant	Nature	Dissemination level	Due delivery date from Annex I	Delivered Yes/No	Actual / Forecast delivery date	Comments
2.1.1	Annual report	2	CNRS	R	PP	12	Yes	12	
2.2.1	LGS detector requirements	2	ESO	R	PP	6	Yes	12	Process took slightly more time than scheduled

[1] For Security Projects the template for the deliverables list in Annex A1 has to be used.

3.5 Project Management

3.5.1 Task and achievements

The consortium is large and diverse, with the Work Packages led by competent and tested managers so top-level consortium management is concentrated on strategic policy issues and financial management. The executive committee met twice, in Krakow (PL) in March 2009 and Paris (FR) on 7 Sept 2009.

The project scientist attended the kick-off meetings of WP1 (Garching,D), WP2 (Marseilles, FR), WP3 (Durham, UK), WP9.1 (Dwingeloo NL),WP10.2, (Garching D), WP11.1 (Garching D) and WP12.1 -which includes WP7- Hatfield (UK). At these meetings he gave an overview of the project and updated the participants on financial and reporting requirements. Information gleaned from these meetings was fed back to the co-ordinator as required.

There is close co-operation between the project scientist and the co-coordinator and their respective assistants who communicate regularly by telephone and e-mail.

3.5.2 Problems and Solutions

There have been no major programmatic problems or large scale deviations from the plans. Issues and recovery actions specific to each Work Package are given in section 3 on a case by case basis.

3.5.3 Consortium changes and legal status of beneficiaries

There have been no changes. The leagal status of the AAO may change in 2010 following the end of UK involvement in the observatory bt plans to accommodate this administrative change are in hand.

3.5.4 Meetings and Dates

The OPTICON webpages include a calendar of major OPTICON and related meetings (http://www.astro-opticon.org/fp7/meetings.html) with links to the meeting organisers and minutes. Individual meeting within Work Packages are noted at appropriate points with section 3.

3.5.5 Project planning, status and deliverables

Each WP has delineated its status and plans in section 3. Some deliverables will slip due to the late start-up of the contract, but none of these delays are fatal to the overall project goals.

3.5.6 Project Website

A new website was developed and published in the summer of 2009 using the same url as before (www.astro-opticon.org). The ‘look and feel’ of this was modernized more into keeping with contemporary styles and in particular to have a similar layout to the FP7 RadioNET. The old FP6 pages were retained and linked to the new front page for reference only. The website includes a list of consortium members and of Work Packages. The web-page was used to announce the call for Trans-National Access in 2010B. An FAQ section is included; this includes questions on travel refunds and the common TAC process. A page of logos and other publicity material etc is available for downloads by both beneficiaries and outside users.

3.5.7 Dissemination and use of foreground

Since the project is only in its first year, and was slow starting due to the delays in starting the contract there are as yet few new detailed results to disseminate. Some technical papers resulting from the work done so have been published and are listed where appropriate in section 3. Articles on the project in general have been published in the newsletter of the European Astronomical Society. The Project scientist visited Estonia to present the project, especially its Trans-National Access opportunities at the Tartu Observatory 10-11 June 2009.

3.5.8 Co-operation between beneficiaries and with other projects

As noted in the report on WP12, the software being used for the 2010B Trans-National Access call is based on a package originally developed for RadioNET. This package is also being deployed for national use by some beneficiaries. The ETSRC web consultation used software developed for the ASTRONET process. There are close interactions between WP1 and 2 (Adaptive Optics and Detectors), between WP 3,5,6 and 9.1 (Instrumentation technology), WP4 and WP 11.1 (Interferometry) and between WP7, 11.1, 12.1,12.2 (Trans-National Access, medium telescopes and training). WP10 is closely linked to the FP7 E-ELT preparatory phase grant.

OPTICON collaborates closely with other I3 and related projects. The most obvious are the joint activities with ASTRONET (the ETSRC and WF Spectroscopy panels) set out in the description of WP 11.2. More generally the project scientist participated in an EC infrastructures meeting in Lund in 2009. The co-ordinator attended a meeting of the I3NET infrastructure co-ordination group in April 2009. OPTICON has produced material for publicity material produced by both the commission and by the I3NET. In addition the project scientist has discussed management issues with the RadioNET manager Andre van Es and with a number of managers of the synchrotron and airborne atmospheric research facilities on specific issues concerning Trans-National Access.

3.6 Explanation of the use of resources

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 1 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP6	Travel and meeting costs	3193	Costs for travel to and holding of meetings
WP8	Personnel costs	34307	
WP8	Travel and meeting costs	37032	Costs for travel to and holding of meetings
TOTAL DIRECT COSTS		74532	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 2 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP1	CPU board	10915	Hardware procurement for WP1 activities
WP1	SL240 cards	7068	Hardware procurement for WP1 activities
WP1	Lunch for OPTICON meeting 9 July 2009	380	Lunch provided by catering firm for meeting in Garching
WP1	Travel costs	103	N. Hubin, Opticon WP1 progress meeting in Florence 14-15 Jan 2010
WP1	Travel costs	269	J. Kolb, Opticon WP1 progress meeting in Florence 14-15 Jan 2010
WP1	Travel costs	59	J. Strasser, Opticon WP1 progress meeting in Florence 14-15 Jan 2010
WP1	Personnel Costs	9808	Personnel costs for WP1 activities
WP2	Travel Costs	1136	N. Hubin, Opticon WP2 kick-off meeting in Marseille 15-17 June 2009
WP2	Travel Costs	906	M. Downing, Opticon WP2 kick-off meeting in Marseille 15-17 June 2009
WP2	Travel Costs	727	J. Kolb, Opticon WP2 kick-off meeting in Marseille 15-17 June 2009
WP2	Personnel Costs	97836	Personnel costs for WP2 activities
WP4	Personnel Costs	17087	Personnel costs for WP4 activities
WP9	Dinner for N9.2	412	Opticon N9.2 meeting in Milan, 16-17 July 2009
WP9	Travel Costs	6164	Opticon N9.2 meeting in Milan 16-17 July 2009 (P. Grosbol, K. Banse, P. Linde, J. Currie, Y. Granet, D. Ponz, C. Surace, T v.d. Huist, D. Tody)
TOTAL DIRECT COSTS		152870	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 3 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP2	Personnel Costs	8291	OCAM Study
WP2	Travel Costs	4117	Travel to various Opticon meetings
WP2	Equipment	2490	peripheral equipment
WP9	Personnel Costs	7428	Package Manager costs

WP11	Travel Costs	7794	Travel to various Opticon meetings
WP11	Conference costs	8199	Conference costs
WP1	Personnel Costs	6823	Costs for J-L Beuzit
WP2	Personnel Costs	24660	Costs for P Feautrier
WP3	Personnel Costs	11821	Costs for P Kern
WPWP5	Personnel Costs	1301	Costs for D Le Mignant and E Hugot
	TOTAL DIRECT COSTS	82924	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 4 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP6	Personnel costs	32771	Personnel costs for WP6 activities
WP6	Travel costs	747	Zerbi to Garching 22-25 Feb 2009 for project meeting
WP6	Travel costs	621	Zerbi to La Palma 26-29 Jan 2009 for project meeting
WP6	Travel costs	561	Zerbi to Lisbon 23-24 March 2009 for project meeting
WP6	Travel costs	663	Zerbi to Edinburgh 1-3 April 2009 for E-ELT UK National Meeting and project meeting
WP6	Travel costs	606	Spano to Tenerife 16-19 Sept 2009 for project meeting
WP6	Travel costs	1081	Zerbi to ESTEC 19-20 March 2009 for project meeting
WP6	Travel costs	1640	Spano to Garching 14-18 June 2009 for project meeting
WP6	Equipment costs	170	PC Studio XPS 16 Intel Core
WP6	Equipment costs	56	3D digital feeler pin
WP6	Equipment costs	131	MacBook Pro 17”
WP6	Personnel costs	20097	Personnel costs for WP9.2 activities
	Transnational Access	41598	TNG: 6 nights of approved access at estimated unit cost
	TOTAL DIRECT COSTS	100742	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 5 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP1.4	None	0	No costs in 2009 as money arrived late. Costs are moved to 2010
WP4.2.3	None	0	Costs are planned for 2010
WP7	Transnational access	93710	CAHA 3.5m: 5 nights of approved access at actual cost. CAHA 2.2m: 14.5 nights of approved access at actual cost
	TOTAL DIRECT COSTS	93710	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 6 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP8	Personnel costs	57873	3 people (Manager, Support, Finance)

			for total of 1513 hours
WP8	Travel costs	13846	Travel for John Davies during 2009
WP10.1	Travel expense	79	A Rowlinson claim for attendance at Cambridge meeting in September 2009
WP11.1	Travel costs	1497	J. Davies: Paris, Feb 09, E. Gonzales-Solaries: Sofia Oct 09, W. Waclew: Chile
WP12.1	Travel costs	8278	Travel and registration expenses for TDF x 8 people
WP12.1.4: Access Office	Personnel costs	7857	ING office support staff @ 223.75 hours
WP12.1.4: Access Office	Access Office costs	18444	ING (Juan Pablo) access office running costs
WP12.1.4: Access Office	Telescope nights – WHT	31968	4 x telescope nights at WHT @ 7991.78 each
WP12.1.4: Access Office	Telescope nights – UKIRT	20749	27 hours at UKIRT @ 768.48 each
WP5	Personnel costs	6464	7 x Project staff at 150.75 hours
WP5	Travel costs	2956	KoM Travel and expenses, Netherlands
WP1: Telescope Simulator	Personnel costs	18281	8 x Project staff at 539.80 hours
WP9.1	Personnel costs	4005	2 x Project staff at 104.50 hours
Other	Travel costs	14449	Travel claims made direct to ING
TOTAL DIRECT COSTS		206746	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 7 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP7	Transnational Access	29582	TCS: 14 nights of access at estimated unit cost
TOTAL DIRECT COSTS		29582	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 8 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP1	Personnel Costs	39000	Staff costs
WP7	Transnational Access	24521	User fees at 3503 EUR for 7 nights
WP12.3	Personnel Costs	6868	Staff costs
WP12.3	Consumables	7630	Consumables for EAST
TOTAL DIRECT COSTS		78019	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 9 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP7	Transnational Access	26384	SST: 10 days of access at a daily rate based on actual costs
TOTAL DIRECT COSTS		26384	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 10 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP3.2	Photonics spectrograph testbench	61544	Personnel and subcontractor costs
WP7	Transnational Access	21042	14 nights @ 1503 per night
TOTAL DIRECT COSTS		82586	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 11 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP7	Transnational Access	46900	12 nights of approved access at actual cost
WP8	Management	497	Travel to Board and Executive Committee meetings
TOTAL DIRECT COSTS		47397	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 12 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP7	Transnational Access	0	No TNA granted for the reporting period
TOTAL DIRECT COSTS		0	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 13 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP7	Transnational Access	0	No costs in 2009
TOTAL DIRECT COSTS		0	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 14 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP7	Transnational Access	0	No costs in 2009
TOTAL DIRECT COSTS		0	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 15 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP1	Personnel costs	13528	costs for staff involved in WP1
WP1	Equipment costs	9186	costs relating to WP1
TOTAL DIRECT COSTS		22714	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 16 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP5	Personnel Costs	13804	Manpower costs
WP5	Travel Costs	1844	Technical meeting at UK-ATC
TOTAL DIRECT COSTS		15648	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 17 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP1	AMOS AM1Mirror	113000	For ESO adapative optics
WP4	None	0	No costs in 2009
WP5	Travel costs	353	Boland to Krakow April 2009
WP7	DOT	14950	10 days user access
WP9.1	None	0	No costs in 2009
TOTAL DIRECT COSTS			

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 21 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP11	Personnel Costs	8509	Costs to run WP11.2 activities
WP11	Travel Costs	2597	Travel costs for WP11.2 activities
TOTAL DIRECT COSTS		11106	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 26 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP6	Personnel cost	8745	Personnel cost for research and management activities
WP6	Direct cost - consumables	900	Small equipment: accessory for optical board
WP6	Direct cost - consumables	466	Chemicals for synthesis of materials
TOTAL DIRECT COSTS		10111	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 27 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP1	Personnel costs	951	Costs for R Myers
WP3	Personnel costs	3823	Costs for J Allington-Smith
WP3	Travel costs	9227	Travel costs for various Opticon meetings
TOTAL DIRECT COSTS		14001	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 28 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP1	Equipment	113000	Amos Optics
WP5	Travel costs	352.57	Travel expenses for Opticon meeting
WP7	Transnational Access	14950	10 days at actual cost
TOTAL DIRECT COSTS		128302.57	

TABLE 3.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR DIRECT COST ITEMS FOR BENEFICIARY 30 FOR THE PERIOD			
Work Package	Item description	Amount	Explanations
WP12	Personnel costs	72335.50	Personnel costs for WP12
TOTAL DIRECT COSTS		72335.50	

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE	Participant Identity Code	999977172
Organisation short Name	UCAM	Beneficiary nr.	1
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	60.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	0.00	0.00	0.00	34,307.07	0.00	34,307.07
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	3,192.98	0.00	37,032.31	0.00	40,225.29
Indirect costs *	0.00	1,915.79	0.00	42,803.63	0.00	44,719.42
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	5,108.77	0.00	114,143.01	0.00	119,251.78
Maximum EC contribution	0.00	3,416.49	0.00	114,143.01	0.00	117,559.50
Requested EC contribution						117,559.50

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II 15 2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
THE CHANCELLOR, MASTERS & SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE	Renata Schaeffer
	Date & signature
	12/05/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	EUROPEAN SOUTHERN OBSERVATORY - ESO EUROPEAN ORGANISATION FOR ASTRONOMICAL RESEARCH IN THE SOUTHERN HEMISPHERE	Participant Identity Code	999988036
Organisation short Name	ESO	Beneficiary nr.	2
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	124,730.41	0.00	0.00	0.00	0.00	124,730.41
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	21,563.79	6,575.63	0.00	0.00	0.00	28,139.42
Indirect costs *	29,258.84	1,315.13	0.00	0.00	0.00	30,573.97
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	175,553.04	7,890.76	0.00	0.00	0.00	183,443.80
Maximum EC contribution	131,664.78	7,035.92	0.00	0.00	0.00	138,700.70
Requested EC contribution						138,700.70

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II 15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
European Organisation for Astronomical Research in the Southern Hemisphere ES O	Patrick Geeraert
	Date & signature
	08/02/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Participant Identity Code	999997930
Organisation short Name	CNRS	Beneficiary nr.	3
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	60.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	52,895.83	7,427.70	0.00	0.00	0.00	60,323.53
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	6,606.50	0.00	15,992.58	0.00	0.00	22,599.08
Indirect costs *	35,701.40	4,456.62	9,595.55	0.00	0.00	49,753.57
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	95,203.73	11,884.32	25,588.13	0.00	0.00	132,676.18
Maximum EC contribution	71,402.80	7,947.64	17,112.06	0.00	0.00	96,462.50
Requested EC contribution						96,462.50

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
CNRS - INSU 3, rue Michel-Ange 75766 PARIS cedex 16	Dominique LE QUEAU
	Date & signature
	15/03/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by Third Party) Only applicable if special clause nr 10 is used

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
3rd party legal Name	UNIVERSITE DE PROVENCE	3rd Party Identity Code (PIC)	999883567
3rd party Organisation short Name	UNIVERSITE DE PROVENCE	Working for beneficiary nr.	3
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	60.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	0.00	0.00	0.00	0.00	0.00	0.00
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	0.00	0.00	0.00	0.00	0.00	0.00
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00
Maximum EC contribution	0.00	0.00	0.00	0.00	0.00	0.00
Requested EC contribution						0.00

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary.
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €)	

6. Third Party's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Third Party's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
UNIVERSITE DE PROVENCE	Jean-Paul CAVERNI
	Date & signature
	22/02/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by Third Party) Only applicable if special clause nr 10 is used

Project nr.	**226604**	**Funding scheme**	**Combination of CP & CSA**
Project Acronym	**OPTICON**		
Period from	01/01/2009	Is this an adjustment to a previous statement?	**No**
To	31/12/2009		
3rd party legal Name	OBSERVATOIRE DE PARIS	**3rd Party Identity Code (PIC)**	**999623122**
3rd party Organisation short Name	OBSERVATOIRE DE PARIS	**Working for beneficiary nr.**	**3**
Funding % for RTD activities (A)	75.00	**If flat rate for indirect costs, specify %**	**60.00**

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	**Coordination (B)**	**Support (C)**	**Management (D)**	**Other (E)**	**Total (A+B+C+D+E)**
Personnel costs	0.00	0.00	0.00	0.00	0.00	0.00
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	0.00	0.00	0.00	0.00	0.00	0.00
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00
Maximum EC contribution	0.00	0.00	0.00	0.00	0.00	0.00
Requested EC contribution						0.00

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?			No
Name of the auditor		**Cost of the certificate (in €), if charged under this project**	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?			No
Name of the auditor		**Cost of the certificate (in €)**	

6. Third Party's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;

- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;

- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Third Party's Stamp	**Name of the Person(s) Authorised to sign this Financial Statement**
MINISTÈRE DE L'ÉDUCATION NATIONALE DE L'ENSEIGNEMENT SUPÉRIEUR ET DE LA RECHERCHE OBSERVATOIRE DE PARIS 61, Av. de l'Observatoire 75014 PARIS	Daniel EGRET
	Date & signature
	24/02/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by Third Party) Only applicable if special clause nr 10 is used

Project nr.	226604	**Funding scheme**	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	**No**
To	31/12/2009		
3rd party legal Name	UNIVERSITE DE NICE - SOPHIA ANTIPOLIS	**3rd Party Identity Code (PIC)**	**999877553**
3rd party Organisation short Name	UNIVERSITE DE NICE - SOPHIA A...	**Working for beneficiary nr.**	**3**
Funding % for RTD activities (A)	75.00	**If flat rate for indirect costs, specify %**	**60.00**

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	**Coordination (B)**	**Support (C)**	**Management (D)**	**Other (E)**	**Total (A+B+C+D+E)**
Personnel costs	0.00	0.00	0.00	0.00	0.00	0.00
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	0.00	0.00	0.00	0.00	0.00	0.00
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00
Maximum EC contribution	0.00	0.00	0.00	0.00	0.00	0.00
Requested EC contribution						0.00

* Indirect costs relating to
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary.
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		**Cost of the certificate (in €), if charged under this project**	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		**Cost of the certificate (in €)**	

6. Third Party's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;

- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;

- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Third Party's Stamp	**Name of the Person(s) Authorised to sign this Financial Statement**
	Albert MAROUANI Le Président de l'Université de Nice - Sophia Antipolis
	Date & signature 22/02/2010
	Albert MAROUANI

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	ISTITUTO NAZIONALE DI ASTROFISICA	Participant Identity Code	999868920
Organisation short Name	INAF	Beneficiary nr.	4
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	60.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	32,771.31	20,097.04	0.00	0.00	0.00	52,868.35
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	6,275.06	0.00	0.00	0.00	0.00	6,275.06
Indirect costs *	23,427.82	12,058.22	0.00	0.00	0.00	35,486.04
Access costs			41,598.00			41,598.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	62,474.19	32,155.26	41,598.00	0.00	0.00	136,227.45
Maximum EC contribution	46,855.64	21,503.83	41,598.00	0.00	0.00	109,957.47
Requested EC contribution						109,957.47

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
ISTITUTO NAZIONALE DI ASTROFISICA Viale del Parco Mellini, 84 - 00136 Roma	Giampaolo Vettolani
	Date & signature
	23/02/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	MAX PLANCK GESELLSCHAFT ZUR FOERDERUNG DER WISSENSCHAFTEN E.V.	Participant Identity Code	999990267
Organisation short Name	MaxPlanck	Beneficiary nr.	5
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	N/A

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	0.00	0.00	0.00	0.00	0.00	0.00
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	0.00	0.00	0.00	0.00	0.00	0.00
Access costs			93,710.00			93,710.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	93,710.00	0.00	0.00	93,710.00
Maximum EC contribution	0.00	0.00	93,710.00	0.00	0.00	93,710.00
Requested EC contribution						93,710.00

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
Max-Planck-Institut für Astronomie Heidelberg	Prof. Dr. Thomas Henning
	Date & signature
	05/02/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	SCIENCE AND TECHNOLOGY FACILITIES COUNCIL	Participant Identity Code	999980179
Organisation short Name	STFC	Beneficiary nr.	6
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	N/A

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	24,745.27	11,861.74	0.00	57,872.83	0.00	94,479.84
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	2,956.24	49,046.47	0.00	13,845.55	14,449.17	80,297.43
Indirect costs *	25,982.53	830.32	0.00	60,766.48	0.00	87,579.33
Access costs			31,967.92			31,967.92
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	53,684.04	61,738.53	31,967.92	132,484.86	14,449.17	294,324.52
Maximum EC contribution	40,263.03	61,738.53	31,967.92	132,484.86	14,449.17	280,903.51
Requested EC contribution						280,903.51

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary.
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;

- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;

- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Victoria Ramsay
	Date & signature
	09/03/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	**Funding scheme**	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	INSTITUTO DE ASTROFISICA DE CANARIAS	**Participant Identity Code**	999806355
Organisation short Name	IAC	**Beneficiary nr.**	7
Funding % for RTD activities (A)	75.00	**If flat rate for indirect costs, specify %**	60.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	0.00	0.00	0.00	0.00	0.00	0.00
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	0.00	0.00	0.00	0.00	0.00	0.00
Access costs			29,582.00			29,582.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	29,582.00	0.00	0.00	29,582.00
Maximum EC contribution	0.00	0.00	29,582.00	0.00	0.00	29,582.00
Requested EC contribution						29,582.00

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II 15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?			No
Name of the auditor		**Cost of the certificate (in €), if charged under this project**	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?			No
Name of the auditor		**Cost of the certificate (in €)**	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
INSTITUTO DE ASTROFISICA DE CANARIAS	FRANCISCO SANCHEZ MARTINEZ
	Date & signature
	23/02/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	**226604**	**Funding scheme**	**Combination of CP & CSA**
Project Acronym	**OPTICON**		
Period from	01/01/2009	Is this an adjustment to a previous statement?	**No**
To	31/12/2009		
Legal Name	KIEPENHEUER-INSTITUT FUER SONNENPHYSIK	**Participant Identity Code**	**999534464**
Organisation short Name	KIS	**Beneficiary nr.**	**8**
Funding % for RTD activities (A)	75.00	**If flat rate for indirect costs, specify %**	**60.00**

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	**Coordination (B)**	**Support (C)**	**Management (D)**	**Other (E)**	**Total (A+B+C+D+E)**
Personnel costs	0.00	6,868.36	0.00	0.00	0.00	6,868.36
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	39,000.00	7,629.74	0.00	0.00	0.00	46,629.74
Indirect costs *	23,400.00	8,698.86	0.00	0.00	0.00	32,098.86
Access costs			24,521.00			24,521.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	62,400.00	23,196.96	24,521.00	0.00	0.00	110,117.96
Maximum EC contribution	46,800.00	15,512.97	24,521.00	0.00	0.00	86,833.97
Requested EC contribution						86,833.97

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary.
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II 15 2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		**Cost of the certificate (in €), if charged under this project**	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		**Cost of the certificate (in €)**	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;

- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;

- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	**Name of the Person(s) Authorised to sign this Financial Statement**
KIEPENHEUER-INSTITUT FÜR SONNENPHYSIK Schöneckstr. 6, D-79104 FREIBURG Tel.: 0761-3198-0, Fax: 3198-111	Wolfgang Schmidt
	Date & signature
	23/02/2010

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Submitted to Coordinator - Version: 1

Project Information

General Show

Details

Reporting Period : no. 1 (from 01/01/2009 - to 31/12/2009)

Form C

Beneficiary

Contractor's Legal Name	KUNGLIGA VETENSKAPSAKADEMIEN	Participant Identity Code	998764769
Short Name	RSAS	Beneficiary No.	9
Comment			
Lump Sums Used		Indirect Cost Method	Special Transitional Flat Rate
Funding % for RTD activities	75	Flat Rate for Indirect Costs %	60

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

Eligible costs (in €)	Type of activities RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (F)=(A)+(B)+(C)+(D)+(E)
Personnel costs						0.00
Subcontracting						0.00
Other direct costs						0.00
Indirect costs						0.00
Access costs			26383.54			26383.54
Lump sums / flat-rate / scale of unit declared						0.00
Total			26383.54			26383.54
Maximum EC Contribution			26383.54			26383.54
Requested EC contribution						26383.54

2. Declaration of Receipts (in €)
Did you receive any financial transfers or contributions in kind, free of charge from third parties?
Or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?
If yes, please mention the amount (in €)

3. Declaration of interest generated by the pre-financing (in €) (To be completed only by the coordinator)
Did the pre-financing you received generate any interest according to Art. II.19?
If yes, please mention the amount (in €)

4. Certificate on the methodology
Do you declare average personnel costs according to Art. II.14.1?
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art. II.4.4?
Name of the auditor Cost of the certificate (in €), if charged under this project

5. Certificate on the financial statements
Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art. II.4.4?
Name of the auditor Cost of the certificate (in €)

6. Beneficiary's declaration on their honour ?
Name of the person authorised to sign this Financial Statement Dan Kiselman Date 26/02/2010

Back Reject

Stockholm 2010-04-06

OBSERVATORIUM STOCKHOLM

Form C 1.3.7 in PROD

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	ANGLO-AUSTRALIAN TELESCOPE BOARD	Participant Identity Code	997427915
Organisation short Name	AAO	Beneficiary nr.	10
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	60.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	44,000.00	0.00	0.00	0.00	0.00	44,000.00
Subcontracting	17,500.00	0.00	0.00	0.00	0.00	17,500.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	26,400.00	0.00	0.00	0.00	0.00	26,400.00
Access costs			21,042.00			21,042.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	87,900.00	0.00	21,042.00	0.00	0.00	108,942.00
Maximum EC contribution	65,925.00	0.00	21,042.00	0.00	0.00	86,967.00
Requested EC contribution						86,967.00

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement? No

If yes, please mention the amount (in €)

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19? No

If yes, please mention the amount (in €)

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1? No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4? No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4? No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Neville Legg
	Date & signature
	23/03/2010

ANGLO AUSTRALIAN
TELESCOPE BOARD (AATB)
ABN - 71 871 323 905

Draft - Version: 1

Project Information

General — Show

Details

Reporting Period : no. 1 (from 01/01/2009 - to 31/12/2009)

Form C

Beneficiary

Contractor's Legal Name: NORDIC OPTICAL TELESCOPE SCIENTIFIC ASSOCIATION

Participant Identity Code: 999987005

Short Name: NOTSA

Beneficiary No.: 11

Comment:

Lump Sums Used:

Indirect Cost Method: Standard Flat Rate

Funding % for RTD activities: 75

Flat Rate for Indirect Costs %: 20

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

Eligible costs (in €)	Type of activities					Total (F)=(A)+(B)+(C)+(D)+(E)
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	
Personnel costs						0.00
Subcontracting						0.00
Other direct costs				414.03		414.03
Indirect costs				82.81		82.81
Access costs			46900.54			46900.54
Lump sums / flat-rate / scale of unit declared						0.00
Total			***46900.54***	***496.84***		***47397.38***
Maximum EC Contribution	0.00	0.00	46900.54	496.84	0.00	**47397.38**
Requested EC contribution						**47397.38**

2. Declaration of Receipts (in €)

Did you receive any financial transfers or contributions in kind, free of charge from third parties? Or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement? ☐

If yes, please mention the amount (in €)

3. Declaration of interest generated by the pre-financing (in €) (To be completed only by the coordinator)

Did the pre-financing you received generate any interest according to Art. II.19? ☐

If yes, please mention the amount (in €)

4. Certificate on the methodology

Do you declare average personnel costs according to Art. II.14.1? ☐

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art. II.4.4? ☐

Name of the auditor

Cost of the certificate (in €), if charged under this project

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art. II.4.4? ☐

Name of the auditor

Cost of the certificate (in €)

6. Beneficiary's declaration on their honour ?

Name of the person authorised to sign this Financial Statement Johannes Andersen

Date 17/03/2010

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Nordic Optical Telescope Scientific Association

Form C 1.3.6 in PRC

FP7 - Grant Agreement - Annex VI – Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr	226604	Funding scheme		Combination of CP & CSA
Project Acronym	OPTICON			

Period from	01/01/2009	Is this an adjustment to a previous statement ?	No
To	31/12/2009		

Legal Name	THEMIS S.L.	Participant Identity Code	999737000
Organisation short Name	THEMIS	Beneficiary nr	12

Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	60.00

1- Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	TOTAL (A+B+C+D+E)
Personnel costs	0.00	0.00	0.00	0.00	0.00	0.00
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	0.00	0.00	0.00	0.00	0.00	0.00
Access costs	0.00	0.00	0.00	0.00	0.00	0.00
Lump sums/flat-rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00
Maximum EC contribution	0.00	0.00	0.00	0.00	0.00	0.00
Requested EC contribution						0.00

2- Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art II.17 of the grant agreement ? No

If yes, please mention the amount (in €)

3- Declaration of interest yielded by the pre-financing (to *be completed only by the coordinator*)

Did the pre-financing you received generate any interest according to Art. II.19 ?

If yes, please mention the amount (in €)

4. Certificate on the methodology

Do you declare average personnel costs according to Art. II.14.1 ? No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art. II.4.4 ? No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5- Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4 ? No

Name of the auditor		Cost of the certificate (in €)	

6- Beneficiary's declaration on its honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;

- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art. II.17 of the grant agreement,

- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art. II.19 of the grant agreement ,

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
THEMIS S.L. C.I.F. B38583886 C/ Via Lactea, s/n 38200 TENERIFE I.A.C. LA LAGUNA 922 32 91 48 Tel 922 31 42 80 922 32 91 45 Fax 922 31 42 94	Bernard F. GELLY, Director
	Date & signature
	11/03/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	NATIONAL OBSERVATORY OF ATHENS	Participant Identity Code	999653677
Organisation short Name	NOATHENS	Beneficiary nr.	13
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	N/A

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	0.00	0.00	0.00	0.00	0.00	0.00
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	0.00	0.00	0.00	0.00	0.00	0.00
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00
Maximum EC contribution	0.00	0.00	0.00	0.00	0.00	0.00
Requested EC contribution						0.00

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;

- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;

- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	JOANNA KOLLIAKOU
	Date & signature
	19/02/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	LIVERPOOL JOHN MOORES UNIVERSITY	Participant Identity Code	998079949
Organisation short Name	LJMU	Beneficiary nr.	14
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	60.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	0.00	0.00	0.00	0.00	0.00	0.00
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	0.00	0.00	0.00	0.00	0.00	0.00
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00
Maximum EC contribution	0.00	0.00	0.00	0.00	0.00	0.00
Requested EC contribution						0.00

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Susan Jackson
	Date & signature
	15/04/2010

LIVERPOOL JOHN MOORES UNIVERSITY
19 APR 2010
Financial Services

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES	Participant Identity Code	999994438
Organisation short Name	ONERA	Beneficiary nr.	15
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	N/A

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	13,528.31	0.00	0.00	0.00	0.00	13,528.31
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	9,186.44	0.00	0.00	0.00	0.00	9,186.44
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	22,714.75	0.00	0.00	0.00	0.00	22,714.75
Maximum EC contribution	17,036.06	0.00	0.00	0.00	0.00	17,036.06
Requested EC contribution						17,036.06

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement? No

If yes, please mention the amount (in €)

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19? No

If yes, please mention the amount (in €)

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1? No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4? No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4? No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
Office National d'Etudes et de Recherches Aérospatiales O.N.E.R.A. Direction des Affaires Économiques et Financières	STOLTZ THIERRY
	Date & signature: 07/05/2010

FP7 - Grant Agreement - Annex VI - Collaborative Project

Form C- Financial Statement (to be filled in by each beneficiary)

Project nr	226604	Funding scheme	Collaborative Project
Project Acronym	OPTICON		

Period from	01.01.2009
To	31.12.2009

Is this an adjustment to a previous statement ? **No**

Yes/No

Legal Name	Centre Suisse d'Electronique et de Microtechnique SA	Participant Identity Code	999958839
Organisation short Name	CSEM	Beneficiary nr	16

Funding % for RTD activities (A)	75%	If flat rate for indirect costs specify %	N/A

1- Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity				
	RTD (A)	Demonstration (B)	Management (C)	Other (D)	TOTAL (A+B+C+D)
Personnel costs	13803.7				13803.7
Subcontracting					
Other direct costs	1844.12				1844.12
Indirect costs	24294.52				24294.52
Lump sum/flat rate/scale of unit declared					
Total	39942.34				39942.34
Maximum EC contribution	29956.76				
Requested EC contribution					29956.76

2- Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement ? **No**

If yes, please mention the amount (in €)

3- Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest according to Art. II.19 ? Yes/No

If yes, please mention the amount (in €)

4. Certificate on the methodology

Do you declare average personnel costs according to Art. II. 14.1? yes

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4? No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5- Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4. ? No

Name of the auditor		Cost of the certificate (in €)	

6- Beneficiary's declaration on its honour We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and Article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art. II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art. II.19 of the grant agreement ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
CSEM Centre Suisse d'Electronique et de Microtechnique SA Jaquet-Droz 1 CH-2002 NEUCHATEL	André Laville
	Date & signature 29/4/2010

Submitted to Coordinator - Version: 1

Project Information

General

Hide

Project Acronym :	OPTICON	**Contract No :**	226604
Contract version :	Amendment No. 1 (Proposal Version 3)	**Framework :**	FP7
Funding Scheme :	Combination of CP & CSA	**Sub-Funding Scheme :**	Integrating Activities / e-Infrastructures
Call Identifier :	FP7-INFRASTRUCTURES-2008-1		
Start Date (dd/mm/yyyy) :	01/01/2009	**End Date (dd/mm/yyyy) :**	31/12/2012

Details

Reporting Period : no. 1 (from 01/01/2009 - to 31/12/2009)

Form C

Beneficiary

Contractor's Legal Name

Short Name

Comment

Participant Identity Code

Beneficiary No.

Lump Sums Used

Funding % for RTD activities

Indirect Cost Method

Flat Rate for Indirect Costs %

1. Declaration of eligible costs/lump sum/flate-rate/scale of unit (in €)

Eligible costs (in €)	Type of activities					Total (F)=(A)+(B)+(C)+(D)+(E)
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	
Personnel costs	14950.00					14950.00
Subcontracting						0.00
Other direct costs	113252.57					113252.57
Indirect costs	3090.00					3090.00
Access costs						0.00
Lump sums / flat-rate / scale of unit declared						0.00
Total	***131292.57***					***131292.57***
Maximum EC Contribution	98469.43					**98469.43**
Requested EC contribution						**98469.43**

2. Declaration of Receipts (in €)

Did you receive any financial transfers or contributions in kind, free of charge from third parties?
Or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?

If yes, please mention the amount (in €)

3. Declaration of interest generated by the pre-financing (in €) (To be completed only by the coordinator)

Did the pre-financing you received generate any interest according to Art. II.19?

If yes, please mention the amount (in €)

4. Certificate on the methodology

Do you declare average personnel costs according to Art. II.14.1?

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art. II.4.4?

Name of the auditor

Cost of the certificate (in €), if charged under this project

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art. II.4.4?

Name of the auditor

Cost of the certificate (in €)

6. Beneficiary's declaration on their honour ?

Name of the person authorised to sign this Financial Statement Jan Blommers **Date** 22-04-2010

UNIVERSITEIT LEIDEN FACULTEIT W&N

Done

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	FACULDADE DE ENGENHARIA DA UNIVERSADE DO PORTO	Participant Identity Code	999819159
Organisation short Name	FEUP	Beneficiary nr.	21
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	60.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	0.00	8,508.79	0.00	0.00	0.00	8,508.79
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	2,596.75	0.00	0.00	0.00	2,596.75
Indirect costs *	0.00	6,663.32	0.00	0.00	0.00	6,663.32
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	17,768.86	0.00	0.00	0.00	17,768.86
Maximum EC contribution	0.00	11,882.93	0.00	0.00	0.00	11,882.93
Requested EC contribution						11,882.93

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary.
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II 15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Maria Antónia Carravilla
	Date & signature
	22/02/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	**226604**	**Funding scheme**	**Combination of CP & CSA**
Project Acronym	**OPTICON**		
Period from	01/01/2009	Is this an adjustment to a previous statement?	**No**
To	31/12/2009		
Legal Name	POLITECNICO DI MILANO	**Participant Identity Code**	**999879881**
Organisation short Name	POLIMI	**Beneficiary nr.**	**26**
Funding % for RTD activities (A)	75.00	**If flat rate for indirect costs, specify %**	**N/A**

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	**Coordination (B)**	**Support (C)**	**Management (D)**	**Other (E)**	**Total (A+B+C+D+E)**
Personnel costs	8,313.38	0.00	0.00	431.90	0.00	8,745.28
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	1,365.60	0.00	0.00	0.00	0.00	1,365.60
Indirect costs *	9,444.90	0.00	0.00	0.00	0.00	9,444.90
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	19,123.88	0.00	0.00	431.90	0.00	19,555.78
Maximum EC contribution	14,342.91	0.00	0.00	431.90	0.00	14,774.81
Requested EC contribution						14,774.81

* Indirect costs relating to
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary.
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15.2 a), b) and c) of the grant agreement

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?			No
Name of the auditor		**Cost of the certificate (in €), if charged under this project**	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?			No
Name of the auditor		**Cost of the certificate (in €)**	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	**Name of the Person(s) Authorised to sign this Financial Statement**
	PROF. STEFANO SERVI - DIRECTOR OF THE DEPARTMENT CMIC "GIULIO NATTA"
	Date & signature
	15/03/2010

DI CHIMICA, MATERIALI E INGEGNERIA CHIMICA
"GIULIO NATTA"
Via L. Mancinelli, 7 - 20131 MILANO
tel. 02/2399 3151 - C. F. 80057930150

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	226604	Funding scheme	Combination of CP & CSA
Project Acronym	OPTICON		
Period from	01/01/2009	Is this an adjustment to a previous statement?	No
To	31/12/2009		
Legal Name	UNIVERSITY OF DURHAM	Participant Identity Code	999866010
Organisation short Name	UDUR	Beneficiary nr.	27
Funding % for RTD activities (A)	75.00	If flat rate for indirect costs, specify %	60.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	Coordination (B)	Support (C)	Management (D)	Other (E)	Total (A+B+C+D+E)
Personnel costs	4,775.14	0.00	0.00	0.00	0.00	4,775.14
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	9,227.37	0.00	0.00	0.00	0.00	9,227.37
Indirect costs *	8,401.51	0.00	0.00	0.00	0.00	8,401.51
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	22,404.02	0.00	0.00	0.00	0.00	22,404.02
Maximum EC contribution	16,803.02	0.00	0.00	0.00	0.00	16,803.02
Requested EC contribution						16,803.02

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II.15 2 a), b) and c) of the grant agreement

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?			No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?			No
Name of the auditor		Cost of the certificate (in €), if charged under this project	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?			No
Name of the auditor		Cost of the certificate (in €)	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;

- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;

- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	Name of the Person(s) Authorised to sign this Financial Statement
	Paulina LUBACZ
	Date & signature
	28/04/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	**226604**	**Funding scheme**	**Combination of CP & CSA**
Project Acronym	**OPTICON**		
Period from	01/01/2009	Is this an adjustment to a previous statement?	**No**
To	31/12/2009		
Legal Name	NATIONAL UNIVERSITY OF IRELAND, GALWAY	**Participant Identity Code**	**999978045**
Organisation short Name	NUIG	**Beneficiary nr.**	**28**
Funding % for RTD activities (A)	75.00	**If flat rate for indirect costs, specify %**	**60.00**

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	**Coordination (B)**	**Support (C)**	**Management (D)**	**Other (E)**	**Total (A+B+C+D+E)**
Personnel costs	0.00	0.00	0.00	0.00	0.00	0.00
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	4,542.75	0.00	0.00	0.00	4,542.75
Indirect costs *	0.00	2,725.65	0.00	0.00	0.00	2,725.65
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	7,268.40	0.00	0.00	0.00	7,268.40
Maximum EC contribution	0.00	4,860.74	0.00	0.00	0.00	4,860.74
Requested EC contribution						4,860.74

* Indirect costs relating to:
- "Coordination" and "Support" activities are reimbursed up to a maximum of **7%** of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary.
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II 15.2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	No
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		**Cost of the certificate (in €), if charged under this project**	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		**Cost of the certificate (in €)**	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;

- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;

- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	**Name of the Person(s) Authorised to sign this Financial Statement**
	Orla Timon
	Date & signature
	27/04/2010

FP7 - Grant Agreement - Annex VI - Combination of CP & CSA

Form C - Financial Statement (to be filled in by each beneficiary)

Project nr.	**226604**	**Funding scheme**	**Combination of CP & CSA**
Project Acronym	**OPTICON**		
Period from	01/01/2009	Is this an adjustment to a previous statement?	**No**
To	31/12/2009		
Legal Name	STICHTING ASTRONOMISCH ONDERZOEK IN NEDERLAND	**Participant Identity Code**	**999492754**
Organisation short Name	ASTRON	**Beneficiary nr.**	**30**
Funding % for RTD activities (A)	75.00	**If flat rate for indirect costs, specify %**	**N/A**

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					
	RTD (A)	**Coordination (B)**	**Support (C)**	**Management (D)**	**Other (E)**	**Total (A+B+C+D+E)**
Personnel costs	0.00	72,335.50	0.00	0.00	0.00	72,335.50
Subcontracting	0.00	0.00	0.00	0.00	0.00	0.00
Other direct costs	0.00	0.00	0.00	0.00	0.00	0.00
Indirect costs *	0.00	5,063.49	0.00	0.00	0.00	5,063.49
Access costs			0.00			0.00
Lump sums/flat rate/scale of unit declared	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	77,398.99	0.00	0.00	0.00	77,398.99
Maximum EC contribution	0.00	77,398.99	0.00	0.00	0.00	77,398.99
Requested EC contribution						77,398.99

* Indirect costs relating to
- "Coordination" and "Support" activities are reimbursed up to a maximum of 7% of the direct eligible costs relating to these activities excluding the direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary,
- "RTD", "Management" and "other" activities are reimbursed in accordance with the various options foreseen in Article II 15 2 a), b) and c) of the grant agreement.

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?	No
If yes, please mention the amount (in €)	

3. Declaration of interest yielded by the pre-financing *(to be completed only by the coordinator)*

Did the pre-financing you received generate any interest according to Art.II.19?	No
If yes, please mention the amount (in €)	

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?	Yes
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?	No

Name of the auditor		**Cost of the certificate (in €), if charged under this project**	

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?	No

Name of the auditor		**Cost of the certificate (in €)**	

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;

- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;

- the interest declared above is the only interest yielded by the pre-financing which falls within the definition of Art.II.19 of the grant agreement;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Beneficiary's Stamp	**Name of the Person(s) Authorised to sign this Financial Statement**
ASTRON Netherlands Institute for Radio Astronomy	J. Wubs-Komdeur
	Date & signature
	11/02/2010

Oude Hoogeveensedijk 4, 7991 PD Dwingeloo
P.O. Box 2, 7990 AA Dwingeloo, The Netherlands
Phone +31 521 59 51 00, Fax +31 521 59 51 01
secretary@astron.nl, www.astron.nl

Summary Financial Report - Collaborative Project - to be filled in by coordinator

Project acronym	OPTICON	Project nr	226604	Reporting period from:	01/01/2009	to:	31/12/2009

Funding scheme	CP

Beneficiary n°	If 3rd Party, linked to beneficiary	Adjustment (Yes/No)	Organisation Short Name	Type of activity: RTD (A)		Demonstration (B)		Support (C)		Management (D)		Other (E)		Total eligible costs (A)+(B)+(C)+(D)		Receipts	Interest
				Total	Max EC Contribution	Total	Max EC Contribution	Total	Max EC Contribution	Total	Max EC Contribution	Total	Max EC Contribution	Total	Max EC Contribution		
1		NO	UCAM			3,193.00	3,193.00			71,339.00	71,339.00			74,532.00	74,532.00	0.00	0.00
2		NO	ESO	146,294.00	109,720.50	6,576.00	6,576.00							152,870.00	116,296.50	0.00	0.00
3		NO	CNRS											0.00	0.00	0.00	0.00
4		NO	INAF	39,047.00	29,285.25	20,097.00	20,097.00	41,598.00	41,598.00					100,742.00	90,980.25	0.00	0.00
5		NO	MaxPlanck					93,710.00	93,710.00					93,710.00	93,710.00	0.00	0.00
6		NO	STFC	27,701.00	20,775.75	92,877.00	92,877.00			71,719.00	91,719.00	14,449.00	14,449.00	206,746.00	219,820.75	0.00	0.00
7		NO	IAC					29,582.00	29,582.00					29,582.00	29,582.00	0.00	0.00
8		NO	KIS					26,384.00	26,384.00					26,384.00	26,384.00	0.00	0.00
9		NO	RSAS					26,384.00	26,384.00					26,384.00	26,384.00	0.00	0.00
10		NO	AAO	61,544.00	46,158.00			21,042.00	21,042.00					82,586.00	67,200.00	0.00	0.00
11		NO	NOTSA					46,900.00	46,900.00	497.00	497.00			47,397.00	47,397.00	0.00	0.00
12		NO	THEMIS					0.00	0.00					0.00	0.00	0.00	0.00
13		NO	NOAthens					0.00	0.00					0.00	0.00	0.00	0.00
14		NO	LJMU					0.00	0.00					0.00	0.00	0.00	0.00
15		NO	ONERA											0.00	0.00	0.00	0.00
16		NO	CSEM											0.00	0.00	0.00	0.00
17		NO	NOVA-UU	113,353.00	85,014.75			14,950.00	14,950.00					128,303.00	99,964.75	0.00	0.00
21		NO	FEUP											0.00	0.00	0.00	0.00
26		NO	POLIMI	19,556.00	14,667.00									19,556.00	14,667.00	0.00	0.00
27		NO	UDUR											0.00	0.00	0.00	0.00
28		NO	NUIG	113,353.00	85,014.75			14,950.00	14,950.00					128,303.00	99,964.75	0.00	0.00
30		NO	ASTRON			72,335.00	72,335.00							72,335.00	72,335.00	0.00	0.00
TOTAL				520,848.00	390,636.00	195,078.00	195,078.00	315,500.00	315,500.00	143,555.00	163,555.00	14,449.00	14,449.00				
Requested EC contribution for the reporting period (in €) without taking into account receipts					390,636.00		195,078.00		315,500.00		163,555.00		14,449.00	1,079,218.00			
Requested EC contribution for the reporting period (in €) taking into account receipts [=Periodic Invoice]														1,079,218.00			
Amount of the financial interests generated by the prefinancing														0.00			

3.8 Certificates

Beneficiary	Organisation short name	Certificate on financial statements provided? Yes/No	Any useful comment, in particular if a certificate is not provided
1	UCAM	No	Expenditure threshold not reached
2	ESO	No	Expenditure threshold not reached
3	CNRS	No	Expenditure threshold not reached
4	INAF	No	Expenditure threshold not reached
5	MaxPlanck	No	Expenditure threshold not reached
6	STFC	No	Expenditure threshold not reached
7	IAC	No	Expenditure threshold not reached
8	KIS	No	No costs
9	RSAS	No	Expenditure threshold not reached
10	AAO	No	Expenditure threshold not reached
11	NOTSA	No	Expenditure threshold not reached
12	THEMIS	No	No costs
13	NOAthens	No	No costs
14	LJMU	No	No costs
15	ONERA	No	Expenditure threshold not reached
16	CSEM	No	Expenditure threshold not reached
17	NOVA	No	Expenditure threshold not reached
21	FEUP	No	Expenditure threshold not reached
26	POLIMI	No	Expenditure threshold not reached
27	UDUR	No	Expenditure threshold not reached
28	NUIG	No	Expenditure threshold not reached
30	ASTRON	No	Expenditure threshold not reached