Optical astronomy for Europe

Attracting the next generation…

Astronomy is the most popular and accessible science. The iconic images, from Hubble and other telescopes, are known to all. Children are captivated by the night sky, and many are attracted to study science by astronomy's wonder. Part of this attraction is visual appeal, part the rate of astronomical discovery, and scientific progress. This is the golden age of discovery in astronomy – planets around other stars, the big bang and the origin of the universe, the formation of the oxygen we breathe, awesomely beautiful structures, black holes, etc. have all been discovered recently, and are becoming understood. This understanding requires highly skilled (young) people, and state-of-the-art technology – telescopes, cameras, spectrographs, computers. Europe is a global leader in the most prominent aspects of this progress, especially in optical and infrared astronomy. OPTICON, the EC-funded optical infrared co-ordination network for astronomy, exists to strengthen that leadership and scientific progress into the future.

Courtesy of ESO

The public enjoying the transit of Venus

Courtesy of ESO

The Crab nebula, remnant of an exploding star, spreading newly created oxygen through the Universe for future worlds

Astronomy is technology-enabled, and people limited – we spend our funds on high technology development, partly in partnership with specialised industry, and partly in innovative research and development of promising new technologies to justify future large developments. We train the next generation of researchers in new techniques, new technologies, and from new communities. We ensure, through an active access programme, that the people with the best ideas are given access to the best telescopes, irrespective of national origin. We plan and develop for the astronomy of the future by enhancing the performance of those telescopes. By working together across Europe, we are developing a viable, cost-effective, future for European astronomy, helping to keep our community at the leading edge of progress in this astonishing subject, and ensuring that the next generation of children will have the opportunity to be inspired into science by astronomy for themselves.

OPTICON supports technical development and planning of key technologies. We identify promising new technologies that may have future astronomical application, and invest in the R&D needed to verify their potential, prior to full implementation. Examples include the development of organic materials as optical light dispersing elements, to supersede glass and steel; the development of micro-machines

The whirlpool galaxy

© Courtesy of Daniel López

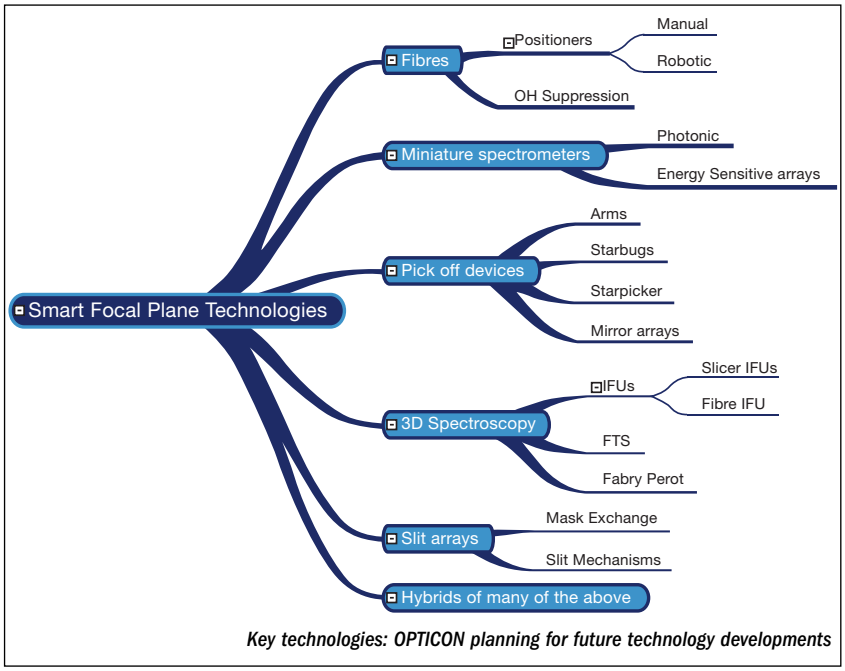
Star trails above the Canary Islands observatory

and precision location systems, to reduce mass and cost, and to improve performance; through to the development of the hardware, and real-time fast control systems, needed to implement the physically large precision systems that deliver real-time correction of the distortions in an astronomical image caused by turbulence in the Earth's atmosphere. These 'adaptive optics' correction systems are the basis of the future of ground-based astronomy, allowing Hubble quality performance at a fraction of the cost. Making these systems operate reliably and affordably is a critical path requirement for the future excellence of European astronomy, even apart from the many commercial spin-off applications.

One among many of the impressive advances under OPTICON funding has been the development of the world's fastest high precision faint light camera system, O-Cam. This, using sensitive detectors developed in the UK, with a control system developed in France, with German and Spanish participation, will be widely used and commercially produced. In fact, one of the successes of OPTICON has been the number of international contracts won by our partner SMEs to deliver high technology systems developed under our auspices.

O-Cam, the worlds fastest low-noise camera, developed by OPTICON, and to be marketed

A future of excellence requires investment in people, in ideas, in technology. Investing in astronomy is a superb way to deliver technology advances, to excite young people into science and technology, and, most importantly, to continue European leadership in mankind's discovery of the wonders of the universe.



Key technologies: OPTICON planning for future technology developments

Gerry Gilmore, FInstP ScD
Professor of Experimental Philosophy,
Cambridge University, UK;
and Project Coordinator

Opticon
Institute of Astronomy
Cambridge University
Madingley Road
Cambridge CB3 0HA

Tel: +44 (0)1223 337506
Fax: +44 (0)1223 339910/7523

gil@ast.cam.ac.uk
www.ast.cam.ac.uk/~gil/
www.astro-opticon.org