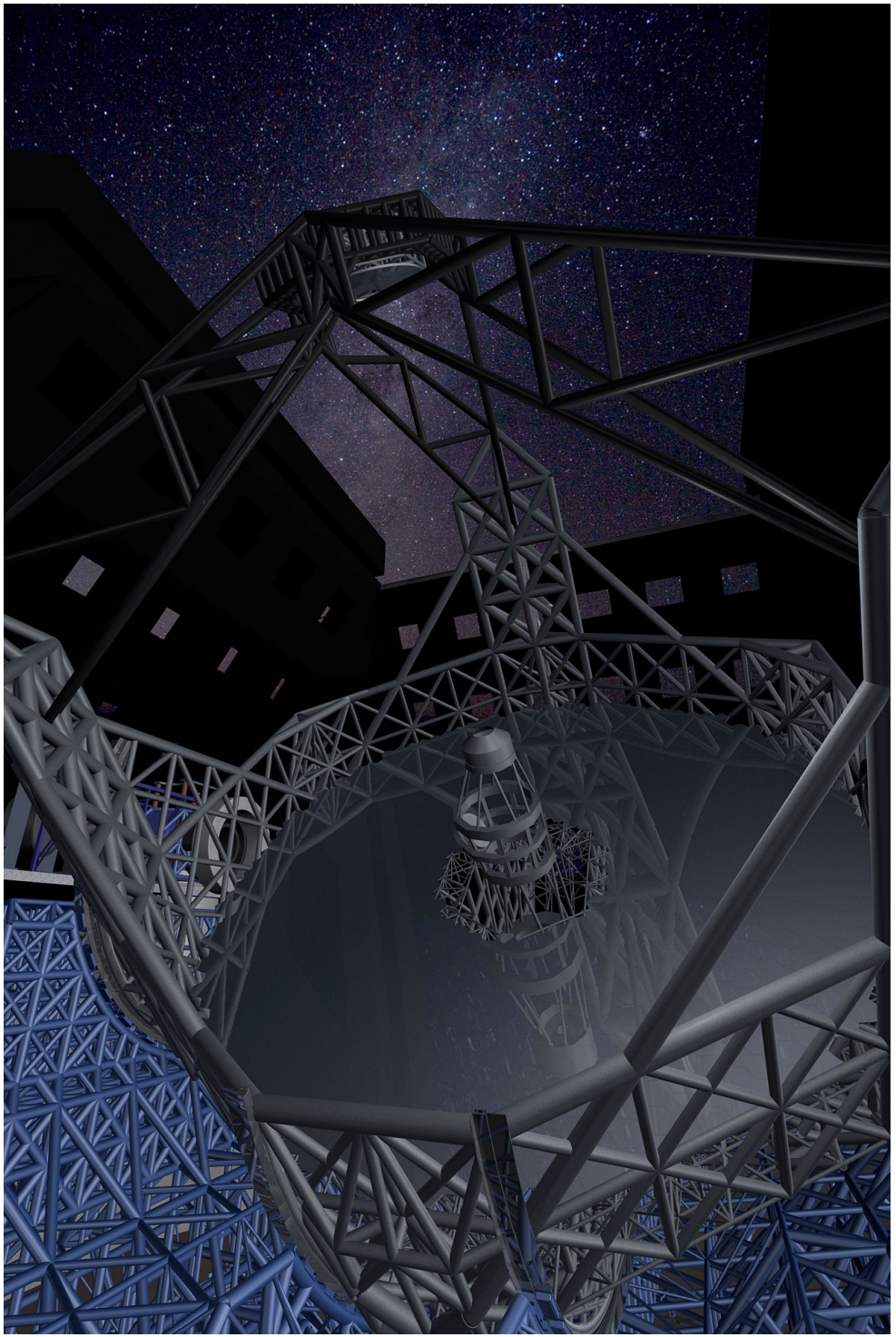
E-ELT Science Network

Isobel Hook

E-ELT project update

Ideas for OPTICON FP7-2A

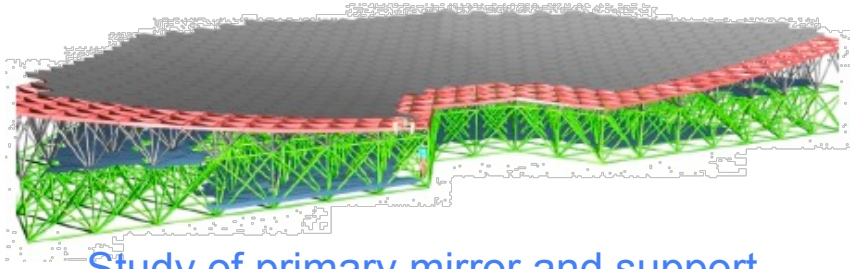


European ELT Update – Sep 2011

Delta

- ^ Phase B nearing completion
  - Many industrial contracts finished
  - Several include fixed-price offer to build
- Baseline site selected
  - Cerro Armazones, Chile
- Instrumentation plan being made now
- Construction proposal being written
  - Includes science case based on DRM, community input and instrument science cases
  - DRM postdocs hired by EU FP7 ELT "Prep Phase" program now finished
- Construction proposal will go to ESO Council in December 2011

E-ELT closer to being realised

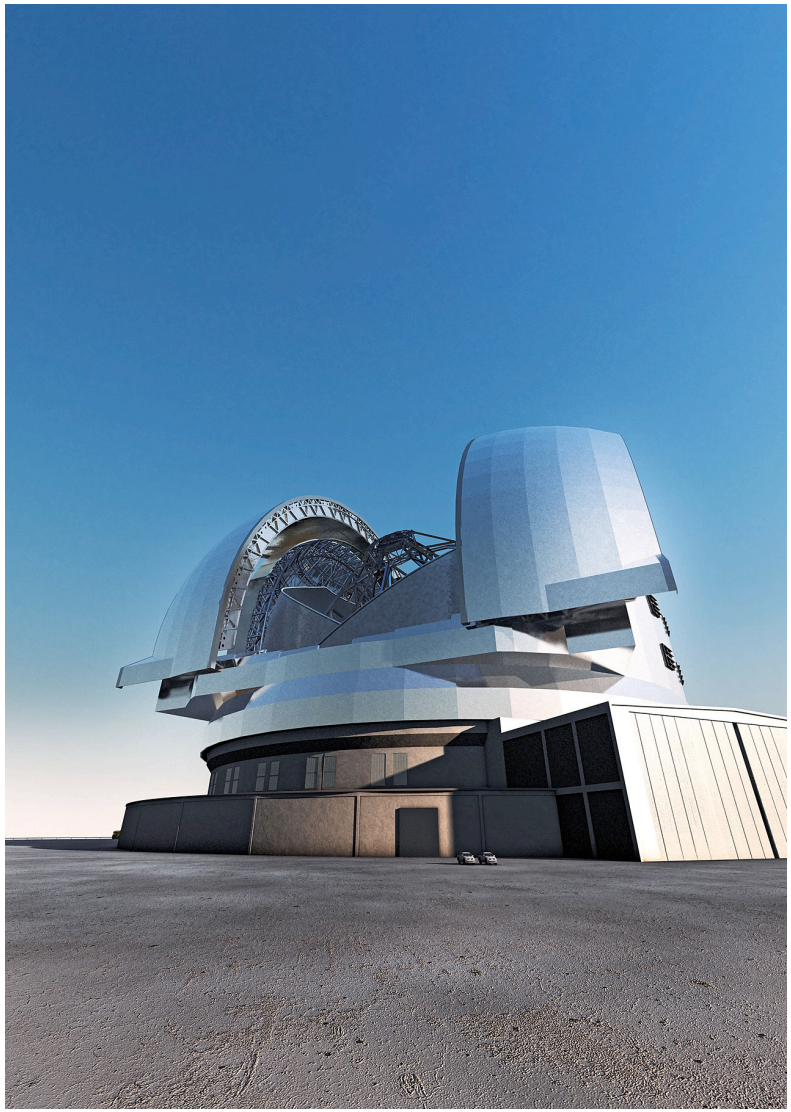


Study of primary mirror and support structure

Cerro Armazones, Chile

E-ELT Delta Phase B

- Phase B was completed in Sep 2010
  - Passed an external review : Technically ready for construction
  - Comments on schedule and level of contingency
- E-ELT now at the end of Delta Phase B
  - Goal: reduce cost and risk of E-ELT
- Looked at three main options
  - Baseline 42m (*)
  - 42m (*) reduced cost (fewer foci, smaller platforms)
  - 39m (two rings of segments removed, faster primary, smaller secondary)
- June 2011 : ESO council endorsed proposal to adopt 39m as baseline
- Some industrial contracts extended
  - Some new fixed-price contracts valid for another 12 months
- Science impact assessed

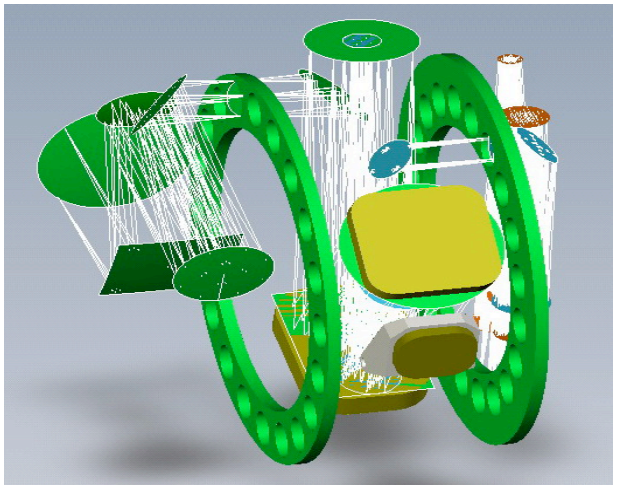


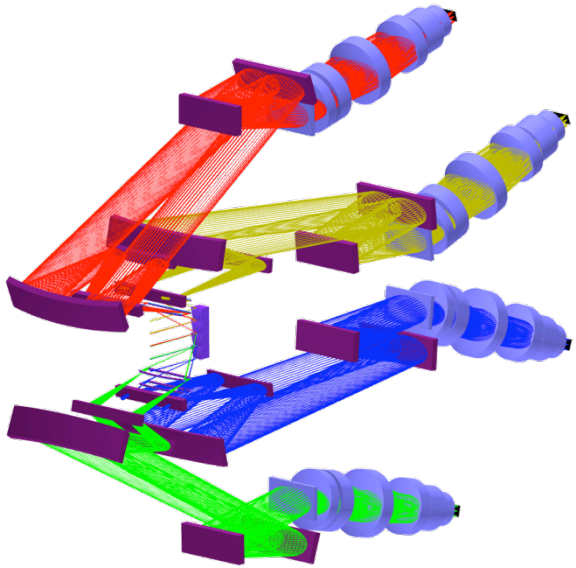
E-ELT instrumentation: Phase A studies

EAGLE	Multi-IFU, AO-fed near-IR spectrometer
EPICS	XAO imager/spectro-polarimeter for exo-planets
HARMONI	Diffraction-limited, near-IR IFU with optical extension
METIS	Mid-IR (3-14 μ m) imager & spectrometer
OPTIMOS	Seeing-limited/GLAO high-multiplex spectrograph
CODEX	Ultra-high-resolution optical spectrograph
MICADO	Near-IR, high-resolution imaging camera
SIMPLE	Near-IR, high-resolution spectrograph
AO-relays	MAORY (MCAO relay) & ATLAS (LTAO relay)

Instrumentation Roadmap

- Two instruments selected for first light
  - ELT-CAM : Diffraction-limited NIR camera
  - ELT-IFU : wideband IFU spectrograph
  - with associated AO system(s)
- Roadmap being made now
  - Specifies selection dates for next insts
  - One every ~2 years
  - Likely to include open slot for new ideas
- Construction + operations budget sufficient for instruments 1-7
- Operations budget continues throughout lifetime of the telescope
  - Choices will continue to be made





Above: Phase A optical layouts of MICADO and HARMONI

Outlook for the E-ELT Project

- Brazil is joining ESO
- Sep 2011: E-ELT cost review
- Oct - Dec 2011: E-ELT Construction proposal to ESO Finance Committee and Council
- Jan 2012: Construction could start
- 2021: First light
  - Schedule driven by spending profile
  - First science 6-9 months later

Implications for OPTICON

- Crucial period now in lead-up to approval
  - OPTICON-sponsored workshop, Ischia
- Instrumentation choices continue over next 10-20+ years!
  - Community needs to be informed and have input [ELT Network]
  - Technology development [JRAs, KTN] affects choices
  - Capabilities of intermediate-size telescopes affects choices
  - Suggest stronger link between ELT science network and other OPTICON activities– joint workshops?
- E-ELT data will be different! Need to prepare the community
  - Tools for data analysis (esp AO) – not under ESO's remit
  - Train next generation of astronomers ('Building Communities network) – joint E-ELT science / training sessions?

OPTICON FP7-2A proposal

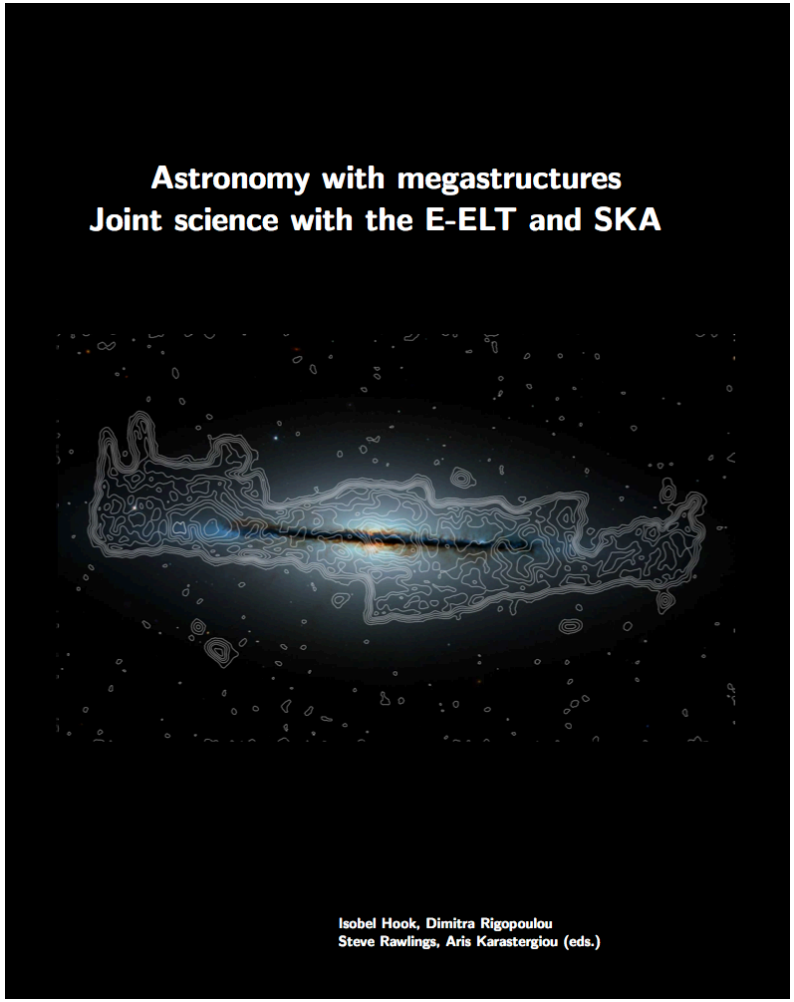
- Feedback from Brussels meeting
  - Link OPTICON to E-ELT timetable
  - Separate long and short term activities
- Feedback from formal EC feedback :
  - Need wider dissemination of results beyond astro community (young people, schools…)
- Call for proposals (Workprogramme 2012 research infrastructures)
  - **INFRA-2012-1.1.25. Research Infrastructures for optical/IR astronomy.** *A project under this topic must provide and facilitate access to the key research infrastructures in Europe for optical and infrared astronomy. It should aim to integrate these facilities and resources with a long term perspective. A project under this topic should also stimulate new scientific activities aimed at taking full advantage of new experimental possibilities which will be offered by the future European Extremely Large Telescope ("E-ELT").*

FP7 OPTICON WP10.1 : ELT Science Case

- WP10.1 supports the European Extremely Large Telescope science case development
  - support development of the science case
  - maintain European community involvement and awareness of the E-ELT project
  - promote the E-ELT throughout Europe and prepare the community for its use
- Work is generally going to plan

Highlights from FP7 so far

- Staff
  - IH 50%
  - New postdoc (Annalisa Calamida) from 1 Oct 2010
- Workshop "Astronomy with Megastructures", Crete 10-14 May 2010
  - About 90 participants
  - Science WGs in 5 themes
  - Written proceedings in press
  - OPTICON allocated 15kE
- ELT SWG – IH Chair
- Talks, public outreach, documents...



Highlights from FP7-II

- “Feeding the Giants” meeting
- ~75 participants
- OPTICON allocated 25kE
- Talks, World Café, public event

Upcoming events

- EWASS (JENAM), Rome 2-6 July 2012
  - Applied for half-day session
  - Focus on science with first instruments

- Possible joint workshop in Portugal, 2012

E-ELT Science after approval

- ESO will be responsible for
  - Managing operations and construction of the telescope
  - Critical path items, tradeoff decisions
  - ESO team will include Project Scientist + deputy advised by SAC or similar
  - Note: ESO science office has limited resources
- Working with ESO, the community is responsible for …
  - Constructing the instruments
  - Preparation for the analysis of E-ELT data
- OPTICON goal: Enhance the E-ELT programme
  - Focus on areas that don't need daily interaction with the project
  - No duplication
- Already discussed OPTICON proposal with ESO
  - E-ELT Project Scientist, Markus Kissler-Patig

FP7 continuation: Suggestions - I

- Continue program of ELT science workshops and talks
  - In collaboration with ESO
    - Inform community of progress and key choices
    - Collect broad input and feedback for the project
  - NEW Coordinate with training networks – joint sessions
  - Talks at institutes and national astronomy meetings
  - Outreach

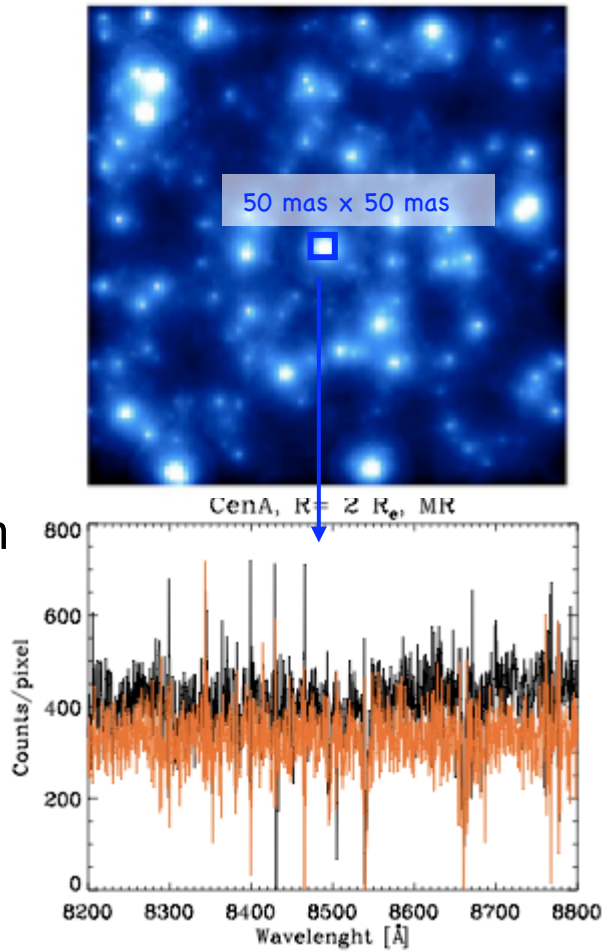
Photos by Joseph Caruana

FP7 continuation: Suggestions - II

- NEW: Workshops on long term future E-ELT instrumentation
  - Independent of ESO (otherwise could be seen as endorsement of particular instrument concepts)
  - Links within OPTICON– e.g. joint workshops
    - HTRA, JRAs (Fast detectors, new materials, astrophotonics)
    - KTN (innovation)
    - Development of 2-4m telescopes

FP7 continuation: Suggestions - III

- 3) Analysis tools: development is needed for optimal use of E-ELT
  - AO PSF photometry
  - Spectroscopy in crowded fields
  - Sky subtraction (e.g. with AO-fed IFUs)
- Propose to work on tools that users will need
  - Develop algorithms and code
  - Test on simulated data (from DRM) and 4-8m observations
  - Organise mini workshops
- Not the responsibility of ESO or the instrument teams
- Would require new postdoc effort
  - Was included in previous proposal



Simulations by Giuseppina Battaglia of Cen A – RGB at tip (black) and 0.5 mag below tip (orange

Resource Summary

- 0) Assume contract runs from 1 Jan 2013 to Dec 2016
- 1) Workshops & Talks
  - Extension of current postdoc, full time, 3 yrs
- 2) E-ELT Analysis tools (~200k)
  - 2 scientists, full time, 1 Jan 2014-Dec 2016 (3 yrs)
- 3) WP Coordination
  - IH 50%, Jan 2013 – Dec 2016 (4 yrs)
- 4) Funding for workshops, travel & computers
  - 2 major workshops, 25kE each = 50kE
  - 3 mini workshops = 20kE
  - Travel & computers corresponding to above positions = 20kE
- Total budget ~ 500 kEuro

FP8

- Era of E-ELT operation
- New instrumentation continues to be developed
- Scope remains for community to look ahead

  – implement long-range plans (Astronet, ESFRI +)

Conclusions

- A strong E-ELT focus in FP7-2A is required
- Many pieces already there
- ELT Science Network proposes
  - ELT science workshops, talks & outreach
  - Future ELT instrumentation workshops
  - Development of analysis tools for the community
- Need better links within OPTICON between ELT Science Network and
  - JRAs (future ELT instrumentation)
  - HTRA (future instrumentation)
  - KTN (innovation, links with industry)
  - Training network
  - 2-4m telescope development
- Possible solutions
  - Joint workshops
  - A revised structure with a top-level ELT network providing the connection?

The End

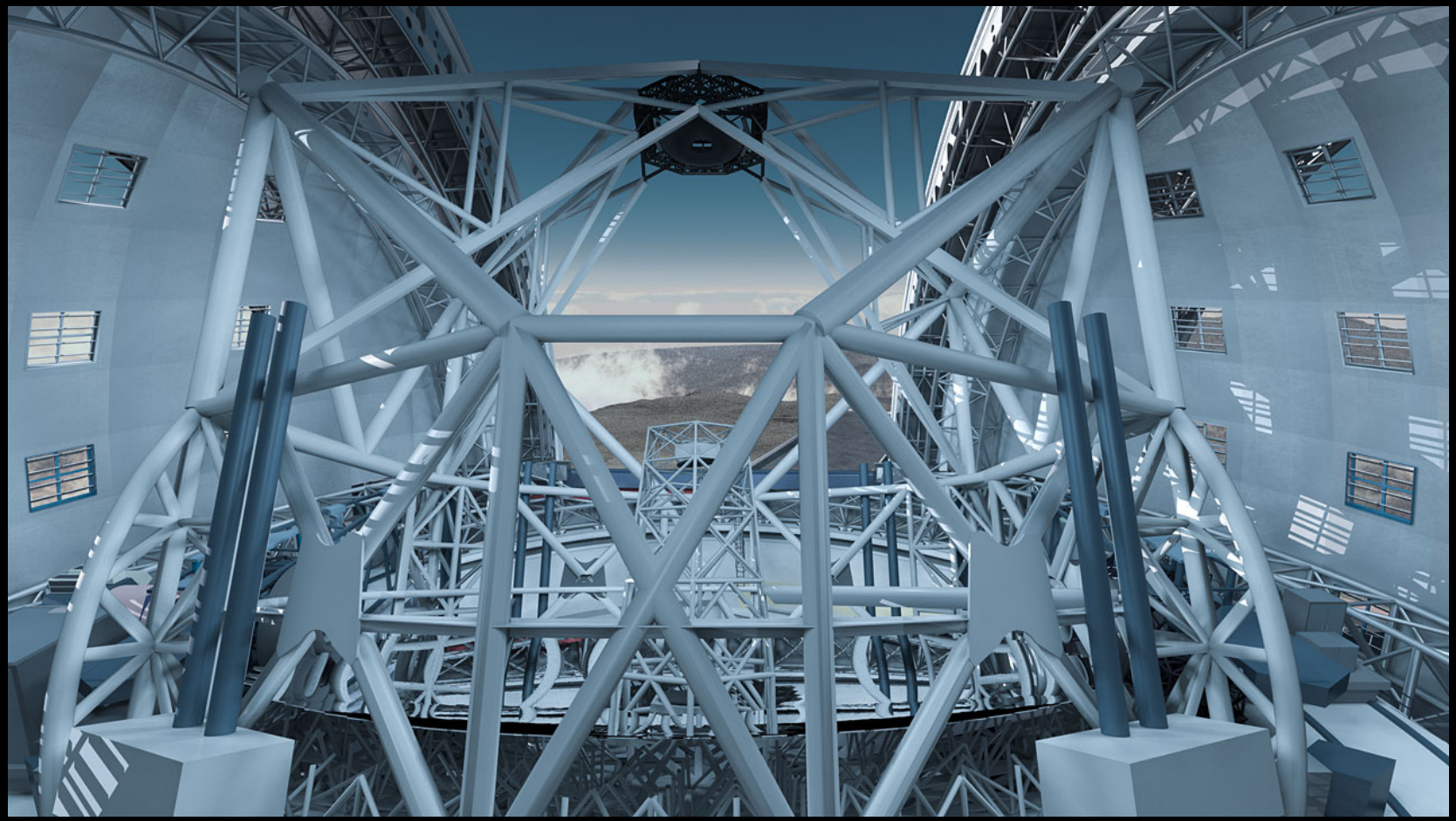


Image credit : Swinburne Astronomy Productions/ESO