



OPTICON: Optical Infrared Coordination Network for Astronomy

Large telescopes are the essential infrastructure of optical and infra-red astronomy. Larger telescopes produce better science and, thanks to modern computer control systems, there seems almost no limit to their future size. Preparing the ground for a future Extremely Large Telescope (ELT), with a hundred times the power of today's instruments, is a key aim of the EU-funded OPTICON project. The continuation of the OPTICON project is developing the new networks and technologies that will be needed to support the ELT as well as improving access to the current generation of telescopes.

● A GALAXY OF ASTRONOMERS

The further you look, the more there is to see: if this is, in a sense, true of science in general, it applies literally to astronomy. Almost everything we know about the realm beyond our Earth has been inferred by looking – first with the naked eye, and more recently with telescopes and radio telescopes.

And when it comes to telescopes, better almost always means bigger. Doubling the diameter of a telescope gives four times the light-gathering power, and four times the ability to detect faint objects deep in space. Even more significantly, the time needed to make a given observation – using what is effectively a digital camera – falls by a factor of 16.

The biggest telescopes in the world today have mirrors between 6 and 11 metres in diameter, but the constant push to see fainter and farther objects means that astronomers want much larger instruments. The planned ELT, for instance, will have an aperture of around 42 metres. Since even a 10-metre mirror would be too difficult to make from solid glass, the ELT will have many small mirrors, a design concept pioneered in the two 10-metre Keck telescopes on Mauna Kea, Hawaii. Like all large modern telescopes, the ELT will use 'active optics', in which flexible, lightweight mirrors are supported and adjusted by an array of computer-controlled actuators.



Preparing the way for the ELT is a key objective of the OPTICON project, which brings together nearly 50 European observatories and other astronomical institutions. The OPTICON partners fund, operate and develop Europe's major optical and infra-red astronomical infrastructures, as well as several world-class facilities for solar astronomy in the Canary Islands.

More specifically, OPTICON includes networking, transnational access and joint research activities (JRAs) to further improve access to existing large telescopes and develop new technology in adaptive optics and other areas, as well as foster the cooperation needed for the ELT.

Transnational access has been very successful in previous OPTICON projects and is now very over-subscribed. As such, work is being done to increase access to astronomy facilities and train and support new and isolated users. This is in addition to the transnational, multi-observatory peer-review process, which will provide the best feedback possible on proposals and training programmes.



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● BETTER TELESCOPES AND BETTER NETWORKS

OPTICON's networking activities are working to ensure the widest possible community for next-generation research facilities. Support will be given to the development of the European ELT and the application of new high time resolution astrophysics. Technology developed and information gained from this project will be beneficial to scientists and researchers for years to come.

The joint research activities under OPTICON are focused on improving current telescope technology. In particular research will be dedicated to developing lasers, fast sensitive detectors and adaptive optics, among other things. Research will also look into creating new prototype materials for instrumentation. Research will investigate everything from photonics to holograms and will work to minimise cost while maximising efficiency. Furthermore, researchers will investigate new innovative instrumental devices which will allow astronomers to approach the limits of high angular resolution observation.



Project acronym: OPTICON

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EU project officer: Hugues Crutzen

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Partners:

The Chancellor, Masters and Scholars of the University of Cambridge (UK)
European Southern Observatory (DE)
Centre National de la Recherche Scientifique (FR)
Istituto Nazionale di Astrofisica (IT)
Max Planck Gesellschaft (DE)
The Science and Technology Facilities Council (UK)
Instituto de Astrofisica de Canarias (ES)

Kiepenheuer-Institut für Sonnephysik (DE)
The Royal Swedish Academy of Sciences (SE)
Anglo-Australian Telescope Board (AU)
Nordic Optical Telescope Scientific Association (DK)
THEMIS (ES)
National Observatory of Athens (EL)
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