

*Mercator , a 1.2 m semi-robotic telescope , is located at 2333m above sea level on La Palma, Canary Islands, Spain) (center). Credit: KUL.*

## **Ground-Based Astronomy in Belgium. ESO and the E-ELT.**

### **Introduction**

Belgium is one of the six founding members of ESO, the European Southern Observatory. ESO, with fourteen members now, has grown towards **the** European institution for ground-based astronomy, and in fact has become the **most competitive observatory worldwide**, thanks to the very successful construction of the La Silla and Paranal Observatories, culminating in the Very Large Telescope (VLT) and its diverse and innovative instrumentation. ESO now also plays a leading role in ALMA, the Atacama Large Millimeter/Submillimeter Array.

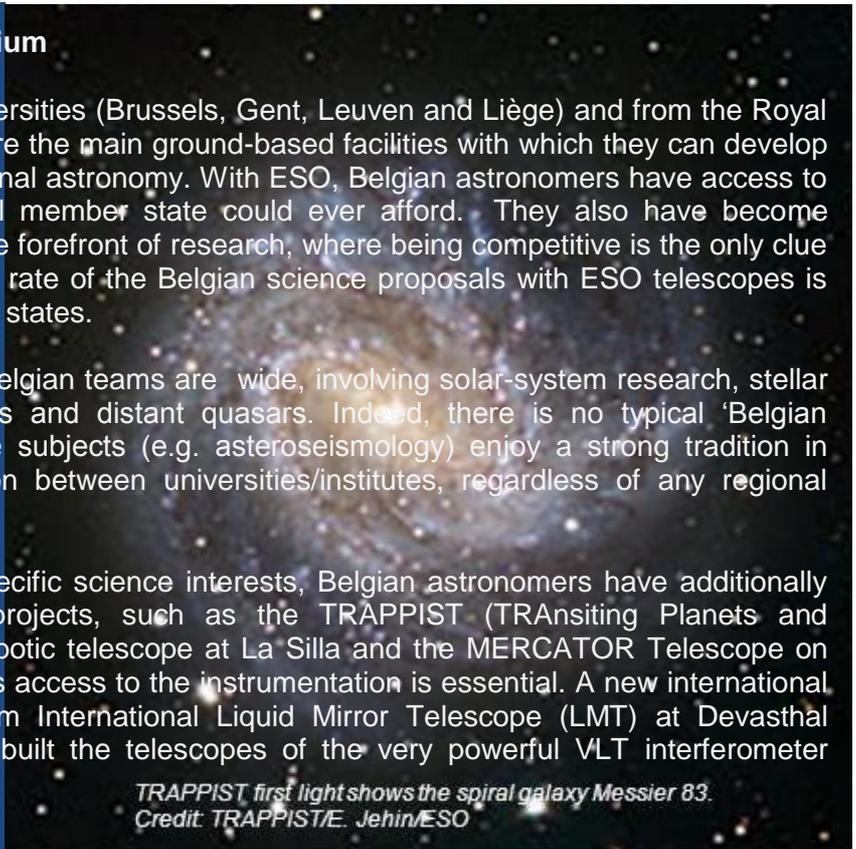
### **Ground-based astronomy in Belgium**

For Belgian astronomers, from universities (Brussels, Gent, Leuven and Liège) and from the Royal Observatory, the ESO telescopes are the main ground-based facilities with which they can develop their research projects in observational astronomy. With ESO, Belgian astronomers have access to instrumentation which no individual member state could ever afford. They also have become integrated into an organization at the forefront of research, where being competitive is the only clue to get observing time. The success rate of the Belgian science proposals with ESO telescopes is similar to that of other ESO member states.

The scientific fields addressed by Belgian teams are wide, involving solar-system research, stellar astrophysics, the study of galaxies and distant quasars. Indeed, there is no typical 'Belgian astronomical topic', although some subjects (e.g. asteroseismology) enjoy a strong tradition in Belgium and intensive collaboration between universities/institutes, regardless of any regional borders.

Besides ESO, for some of their specific science interests, Belgian astronomers have additionally developed their own telescopic projects, such as the TRAPPIST (TRANSiting Planets and Planetesimals Small Telescope) robotic telescope at La Silla and the MERCATOR Telescope on La Palma; in both cases, continuous access to the instrumentation is essential. A new international collaboration is the forthcoming 4m International Liquid Mirror Telescope (LMT) at Devasthal (India). Within ESO, Belgium has built the telescopes of the very powerful VLT interferometer (VLTI).

*TRAPPIST first light shows the spiral galaxy Messier 83.  
Credit: TRAPPIST/E. Jehin/ESO*



## Ground-based versus space-borne

What ESA is for astronomy from space (and CERN is for particle physics), ESO is for ground-based astronomy. However, the specific industrial boundary conditions (contract placement, geo-return policy ...) in the two different organizations differ.

The scientific communities exploiting ESO in Belgium are basically the same as those involved in the field of space astrophysics. There is a vigorous symbiosis between science with space missions and ground-based research. Intense involvement in X-ray and IR space missions has led to unique follow-up research from the ground; the strong tradition in asteroseismology has triggered a prominent presence in the exploitation of missions such as CoRoT and Kepler.

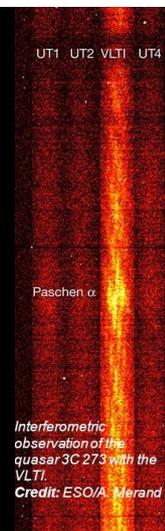
### Fundamental science and instrument development

The spectacular current progresses in astrophysics, whether using ground or space based observations, are closely related to technology developments. Industry and science are partners here. From the viewpoint of the astronomical community, it is increasingly clear that involvement in instrumentation projects means better opportunities for forefront science exploitation.

In the field of space science, where a federal funding mechanism (PRODEX) is available for instrument development, close collaborations have been developed between the research groups and technology developers, with remarkable results for both industry and science. The ESA model, where instruments are built with the specific involvement from consortia in the member states, becomes now more frequently adopted also by ESO, in particular for the E-ELT. It is thus desirable that means be found to increase the Belgian participation in the construction of instruments for ESO where industrial and scientific ambitions meet. The scientists of the Belgian astronomical institutes/universities are eager to participate to such efforts.

*The 4m International Liquid Mirror Telescope project: view of the mirror. Credit: J. Surdej*

## The challenges of the E-ELT



The E-ELT project builds on the technological leadership ESO has achieved and presents Europe with a unique chance to set the agenda for astronomy during the next decade. The Belgian astronomers strongly support the E-ELT project because:

- they subscribe to the thesis that the E-ELT is the logical next step for ESO to fully sustain its role as the pre-eminent intergovernmental science and technology organization in ground-based astronomy in Europe. The future strength of ESO depends on its ability to continue to innovate, and the E-ELT project is, in this respect, an ambition which is at the same time scientifically daring and technologically realistic. And, this time, ESO will be the first;
- scientific exploitation of the facilities at La Silla and Paranal have enabled research teams of several universities and scientific institutions all over the country to become competitive players on the international scene. The Belgian scientific community is now ready to face the challenges set by the E-ELT, which indeed will be the major new facility to address key issues in the research projects of European astronomers in general, and of Belgian ones in particular.

## Structure of the Belgian astronomical community

Representatives of Belgian astronomers regularly meet within the 'Belgian National Committee for Astronomy' (BNCA), and those involved in ESO, in the 'Belgian National ESO Committee' (BNEC). All institutes/universities are represented in both bodies. The BNEC recommends to the Minister the scientific delegate to the ESO Council, while the governmental representative is proposed by the Belgian Science Policy Office (BELSPO).

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