

## **Iranian National Observatory 3.4m optical telescope opens the eye to the Universe**

Iranian National Observatory (INO), the largest home-grown scientific facility project, has recorded the first light image of its 3.4m optical telescope, which marks a major achievement. The project was designed and developed by the Inst. for Research in Fundamental Sciences (IPM) and supported by the Ministry of Science and the vice presidency for Technology.

The engineering first light was captured in the early hours of the second night during a commissioning phase of the telescope, which resulted in an image quality of 0.8 arcsec (FWHM), matching the mean site-seeing. This is the beginning of the commissioning process, during which the telescope optics and the control system will face rigorous tests.

The first light allowed the team to quantify the telescope Alt-Az mount's ability to point and track astronomical objects for the first time since the installation of the mirrors. The tracking accuracy using an initial pointing model remains better than one arcsec over a 10 minutes exposure, significantly better than the design specifications. The motor level tracking accuracy of the telescope is better than 0.15 arcsec (RMS).

INO project was initiated about 20 years ago, aiming at the development of a medium-class telescope to provide a research facility for national users. Thanks to its geographic location, it is expected to attract international users and visiting instruments. The site selection campaign was concluded by selecting Mt. Gargash at 3600m above sea level in central Iran, 100 km north of the city of Isfahan.

“With this amazing image quality, right at the start of the commissioning, we demonstrated that the optics, mechanics and the control hardware and the software, an integral of tens of thousands of parts, work in tandem and will allow our astronomers to explore the universe within reach of this modern facility”, said Prof Habib Khosroshahi, the project director. He added that this is a special moment because most of the sub-systems have been developed in-house, either at INO or by the local industry supervised by INO. “INO is at its best right at the start of a new journey towards scientific operation”, he asserted.

The INO project goes far beyond the design and development of the telescope itself. Its 16m diameter, 22m high modern enclosure and dome are also manufactured by the local industry. Mt. Gargash is connected to the national road network, with a dedicated 11.5 km asphalted road, to the electricity grid, with a 20 kV line. The data is transmitted using fibre optics and radio.

A state-of-the-art mirror aluminizing facility is developed at IPM in collaboration with a local company. The coating system, which has a cylindrical chamber suitable for mirror coating as large as 3.4m, is the first such system developed to reach a high vacuum to aluminize glasses of the specified quality using sputtering.

INO project progressed faster than expected in the construction phase, thanks to dedicated and agile management and the hard work of its small but highly motivated staff. INO is grateful to all companies and colleagues from Iran and abroad for their assistance.