New materials for astronomy

The development of enabling technologies is based on innovative materials that can simplify astronomic instrumentation

VOLUME PHASE HOLOGRAPHIC GRATING BASED ON PHOTOPOLYMERS DEVELOPED AT INAF – ASTRONOMICAL OBSERVATORY OF BRERA

The development of enabling technologies is based on innovative materials that can simplify astronomical instrumentation. Future in astronomy will require bigger and bigger telescopes. In the meantime, technological research is constantly endeavouring to design reliable instruments based on the requirements and new needs of astronomers. A key player in this arena is OPTICON (www.astro-opticon. org/), a large EU-funded European consortium (H2020) engaging in development efforts that combine enabling technologies with networking and observation activities. One of its historical Italian partners is INAF, the National Institute for Astrophysics, through its operating facilities at the Astronomical Observatory of Brera. Activities are currently underway to develop new photosensitive materials to apply in optical elements, in collaboration with Chiara Bertarelli of the Politecnico di Milano. "The basic idea is to use new materials that reduce the high complexity of the new astronomical instruments", explained Andrea Bianco, the team leader of INAF in OPTICON for this research line. "Given the increasing complexity of instruments, if we develop innovative materials that shoulder part of this complexity, then the instrumental project will prove simpler." Research is also focused on photosensitive materials to build dispersing elements. "Astronomy does not deal only with 'imaging', as the spectrum of the light coming from celestial objects is also recorded. Last October, we organized a workshop in Milan on dispersing elements in astronomy, analysing all possible existing technologies having implications in the astronomical field. Eighty subject matter experts from all over the world attended, determining the success of the event." In this framework, volume phase holographic gratings are the most exciting technology, which reach extremely high efficiency. "With regard to this area, we are focusing on photopolymers, whose distinguished feature is to be developed directly during the holographic writing process." Last but not least, INAF research also aims at transferring this technology to a precompetitive industrial level: "a more challenging goal", concluded Bianco, "that technological development is also linked to economic spin-offs.."

NIGHT PHOTO OF GALILEO NATIONAL TELESCOPE, WHICH IS INVOLVED IN THE OPTICON PROJECT AS REGARDS THE OBSERVATIONAL ACTIVITY