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## 20<sup>TH</sup> ANNIVERSARY OF THE PIERRE AUGER OBSERVATORY

On 16 November in Malargue, Argentina, the 20<sup>th</sup> anniversary of the founding of the Pierre Auger Observatory was celebrated. Auger, which owes its name to the discoverer of cosmic ray showers, is the largest observatory in the world for the study of ultra-high-energy cosmic rays, consisting of a network of detectors distributed over a territory thirty times the size of the city of Florence (3,000 square kilometres). Located on the plateau of the Pampa Amarilla, at an altitude of 1400 metres, the observatory is managed by an international collaboration of more than 400 scientists from 17 different countries, in which Italy participates with groups from various universities, the INFN divisions and universities of Catania, Lecce, Milan, Naples, Rome Tor Vergata and Turin, the Gran Sasso National Laboratories and the INAF facilities of Palermo and Turin.

During its twenty years of activity, the Auger Observatory has made an important contribution to the physics of ultra-high-energy cosmic rays, from confirmation of the significant reduction in the intensity of the cosmic rays flow for energies above 30 EeV (exa-electronvolt) to the recent verification of the extragalactic nature of the highest energy cosmic rays. There are, however, still many unanswered questions on which the future of the Observatory will focus.

The Auger Observatory is a hybrid system that includes surface detectors and fluorescence telescopes. The former, 1600 water tanks located 1.5 kilometres apart, observe the cosmic ray shower when it strikes the Earth's surface, detecting and counting the particles produced at ground level. The 27 telescopes distributed around the detectors, on the other hand, detect the flashes of fluorescent light produced in the air by the charged particles of the shower, thus observing its longitudinal development along the direction of origin. When the ultra-high-energy cosmic rays interact with the nuclei of the atmosphere, they generate a shower of new particles. An extensive observatory such as Auger can detect showers of this type and,

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based on the number of particles detected and their energy, calculate the energy of the primary cosmic ray. Auger's upgrading programme, called AugerPrime, is currently being implemented and has been carefully designed to address the most current frontiers that the Observatory is preparing to explore, in order to shed more light on the nature and acceleration mechanisms of this ultra-high-energy radiation.

To celebrate Auger's twentieth anniversary, in Malargue, in the province of Mendoza, a day of celebrations was organised which was attended for Italy by Daniele Martello, national coordinator of the Observatory and director of the INFN division of Lecce, Fernando Ferroni, professor at GSSI and INFN researcher representing the MIUR – Italian Ministry of Education, University and Research – Jose Kenny, scientific attachè to the Italian Embassy in Argentina, and other representatives from the academic world. The day of celebrations was introduced by a scientific symposium on the current state of research not only in the field of ultra-high-energy cosmic rays but also in studies on neutrinos and high-energy gamma rays and in the field of multimessenger astronomy. ■