

Science at the very high energy with the ASTRI mini-array

Monday 2 December 2019 17:30 (15 minutes)

The ASTRI Project aims at the design and development of a technologically innovative solution for small (4 m diameter) and large field of view (about 10 degrees) telescopes, of the same class of the Small-Sized Telescopes (SSTs) of the Cherenkov Telescope Array (CTA) devoted to cover the energy band up to 100 TeV and beyond. In the first phase of the project, an ASTRI prototype in a dual-mirror Schwarzschild-Couder (SC) configuration has been installed in Mt. Etna (Italy) and proposed as a CTA SST. The prototype, called the ASTRI-Horn telescope (in honor of the Italian-Jewish astronomer Horn D'Arturo, inventor of the tessellated mirror solution for astronomical telescopes), has started its scientific operation in fall 2018 and has provided the first detection of very high-energy (VHE) gamma-ray emission from the Crab Nebula by a Cherenkov telescope in dual mirror configuration. A camera based on SiPM sensor and CITIROC read-out electronic has been specifically developed for the scopes. As a continuation of the project, a mini-array of 9 (up to 12) ASTRI dual-mirror telescopes is currently being implemented. It will be deployed at the Observatorio del Teide, in the Canary Island of Tenerife, in collaboration with IAC. Thanks to its expected overall performance, better than current Cherenkov telescopes' arrays for energies above ~ 10 TeV and up to ~ 100 TeV, and its wide field of view, the ASTRI mini-array will be an important instruments to perform soon deep observations of the Galactic and extra-Galactic sky at the TeV energy scale and beyond. Important synergy with already existing Imaging Atmospheric Cherenkov Telescopes and Water Cherenkov facilities in the both northern and southern hemisphere are also foreseen. The ASTRI mini-array will also pave the way to the highest energy observations to be done with CTA southern site.

In this contribution, we introduce the ASTRI concept in the context of the CTA Observatory and discuss the scientific prospects of the mini-array in the fields of Galactic and extra-Galactic astrophysics, and fundamental physics.

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Session Classification: Parallel

Track Classification: Gamma rays