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# The Core Science Program of the ASTRI Mini-Array

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Celestial sources emitting at high-energy (HE, E>100 MeV) and at very high-energy (VHE, E>100 GeV) are of the order of a few thousands and a few hundreds, respectively. The number of sources emitting at ultra high-energy (UHE, E> several tens of TeV) are just a few dozen, and are currently being investigated by means of both ground-based imaging atmospheric Cherenkov telescopes (IACTs) and particle shower arrays. These rare VHE and UHE sources represent a new frontier in the astro-particle field. In a few years, an array composed of nine ASTRI dual-mirror, Schwarzschild-Couder telescopes will be deployed and start scientific observations at the Observatorio del Teide (Tenerife, Spain). The ASTRI Mini-Array will devote the first three to four observing years to specific science topics, with the aim of providing robust answers to a few selected open questions in the VHE and UHE domains. We identified the following Core Science topics to be investigated: the origin of cosmic rays, the extra-galactic background light and the study of fundamental physics, the novel field in the VHE domain of gamma-ray bursts and other multi-messenger transients, and finally the usage of the ASTRI Mini-Array to investigate ultra high-energy cosmic rays and to address stellar intensity interferometry studies. These topics have strong connections with astro-particle physics, dealing with particle acceleration and propagation and fundamental physics studies. We review the scientific prospects assessed through dedicated simulations, proving the potential of the ASTRI Mini-Array in pursuing breakthrough discoveries and discuss the synergies with current and future VHE facilities in the Northern hemisphere, such as MAGIC, LHAASO, HAWC and CTAO-N.

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Gamma rays

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