The ASTRI Mini-Array Core Science Program

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What is this contribution about?
In this contribution we present the Core Science Program of the ASTRI Mini-Array, which is an array of nine dual-mirror, Schwarzschild-Couder telescopes to be deployed at the Observatorio del Teide (Canary Island, Spain). We discuss the major scientific breakthroughs that will be achieved during the first four years of operations.

Why is it relevant?
This contribution describes how the major assets of the ASTRI Mini-Array (10^{o} field of view, 3' angular resolution and 10% energy resolution at 10 TeV) will provide significant contributions for Galactic, extra-galactic and time-domain astrophysics in the 1-200 TeV energy-range. We address currently open science questions, such as which are the Galactic sources that accelerate protons up to 10^{15} eV and beyond; which is the origin of cosmic-rays and their propagation; how to probe the extra-galactic background light in the IR (10-100 micron) regime by means of observations of blazars; how fundamental physic phenomena such as the Lorentz invariance violation can be investigated by means of extra-galactic observations; which is the maximum energy that can be reached by a gamma-ray burst.

What have we done?
We performed detailed scientific simulations of several Galactic and extra-galactic sources in the 1-200 TeV energy band making use of both open source science tools like *Gammapy* and *Ctools* and the most recent instrument response function describing the ASTRI Mini-Array for different integration times. We selected the most promising targets that can be observed by the Observatorio del Teide, investigating their physical properties derived from the most recent literature.

What is the result?
We demonstrated that the ASTRI Mini-Array will be able to provide answers to several very high-energy astrophysics open questions, by joining together the *very high-energy domain* typical of water Cherenkov detector arrays (such as HAWC, LHAASO, and Tibet AS) with the *precision domain*, i.e., the combination of accurate energy and angular resolutions, typical of imaging atmospheric Cherenkov telescopes (such as H.E.S.S., MAGIC, and VERITAS).