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Performance of the ASTRI Mini-Array at the *Observatorio del Teide*

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What is this contribution about?
In this contribution we present the main performance of the ASTRI Mini-Array (ASTRI MA), a next-generation ground-based observatory for TeV and multi-TeV gamma-ray astronomy under construction at the *Observatorio del Teide* (Tenerife, Spain).

Why is it relevant / interesting?
The ASTRI MA will be composed of nine small-sized (~4 m in diameter) and large-field-of-view (~10°) Cherenkov telescopes operating in the energy range between 1 TeV and 100 TeV and beyond. Each telescope is characterized by a dual-mirror optical system and a silicon photo-multiplier camera. By means of detailed Monte Carlo simulations and suitable analysis tools, we derived the main performance of the ASTRI MA. We show how the system will be capable of significantly contributing to the TeV and multi-TeV gamma-ray astronomy, in synergy with present- and next-generation gamma-ray observatories located in the Northern Hemisphere.

What have we done?
In order to assess the ASTRI MA performance at the Teide Observatory site, we generated detailed high-statistic Monte Carlo simulations using the `CORSIKA` and `sim_telarray` software packages and subsequently reduced them with `A-SciSoft`, the scientific software package of the ASTRI Project. The main performance metrics considered in this contribution are the on-axis and off-axis differential flux sensitivity (for five different exposure times), energy resolution, angular resolution, gamma-ray effective area, and residual background rate for observations of point-like gamma-ray sources in dark sky conditions at a zenith angle of 20°. Further dedicated MC productions are being produced in order to investigate the ASTRI MA performance under different observation conditions.

What is the result?
The results show that the ASTRI MA will have:

- A differential sensitivity better than present-generation Cherenkov telescopes above a few TeV and comparable to the CTAO Northern Array (CTAO-N) above a few tens of TeV
- An angular/energy resolution of a few arcmin and ~10% above a few TeV, respectively
- An excellent off-axis performance, with a rather flat response over a wide field of view of several squared degrees

All of these performance features demonstrate the significant capabilities of the system for observations of multiple and extended gamma-ray sources in the TeV and multi-TeV energy band, particularly important for simultaneous and follow-up observations with other present- (VERITAS, MAGIC, HAWC) and next-generation (LHAASO, CTAO-N) gamma-ray observatories in the Northern Hemisphere.