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Scientific goals of the ASTRI mini-array in the framework of the Cherenkov Telescope Array observatory (Contributo)

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The Italian National Institute for Astrophysics (INAF) is leading the “Astrofisica con Specchi a Tecnologia Replicante Italiana” (ASTRI) project, in the framework of the Cherenkov Telescope Array observatory. We inaugurated the first end-to-end prototype of a dual-mirror (2M) small-size telescope (SST), equipped with a camera based on silicon photo-multipliers on Mt. Etna, in Sicily, currently undergoing engineering tests.

A remarkable improvement in terms of performance could come from the operation of the ASTRI mini-array, led by INAF in synergy with the Universidade de Sao Paulo (Brazil) and the North-West University (South Africa). The ASTRI mini-array will be composed of nine ASTRI SST-2M units and it is proposed to be installed at the final CTA southern site.

The ASTRI mini-array will extend and improve the sensitivity, which is similar to the H.E.S.S. one in the 1-10 TeV energy range, up to about 100 TeV. By combining its good sensitivity with an angular resolution of a few arcmin and an energy resolution of about 10-15%, it is well suited to study relatively bright sources (about 10^{-12} erg/cm²/s at 10 TeV) at very high energy.

We review the ASTRI mini-array scientific cases and present a preliminary set of simulated observations aimed at disentangling different theoretical models on both Galactic and extragalactic sources.

An asset of the ASTRI mini-array is its large field of view (larger than 9 degrees in diameter) which, combined with the good sensitivity up to a few degrees off-axis, will allow us both to investigate extended sources and catch a few objects during the same pointing, maximizing its scientific return.

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