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Preliminary results of the new ASTRI-Horn observing campaigns

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The ASTRI-Horn telescope is a prototype of a compact aplanatic dual-mirror (4 m diameter) Imaging Atmospheric Cherenkov Telescope developed under the leadership of the Italian Istituto Nazionale di Astrofisica (INAF). It is the pathfinder of the small-sized telescopes adopted for both the ASTRI Mini-Array (Tenerife, Canary Islands) and the SST/CTA array (Paranal, Chile) for gamma-ray astronomy at very high-energy. It combines an unprecedented high angular/energy resolution and flux sensitivity across a large Field of View (8°) in the energy band 1–200 TeV. For the first time, the ASTRI-Horn telescope successfully demonstrated the optical behavior of a dual-mirror Schwarzschild-Couder telescope as a Cherenkov system, achieving the detection of the Crab Nebula in 2018. Since ASTRI-Horn operates in a harsh environment on an active volcano, in the period between 2020 and 2022 the telescope has been subject to significant maintenance and refurbishment to restore systems and improve performance. Mirrors have been substituted, adopting high-performance coatings, and the camera electronics have been further optimized. Now the telescope is extensively used to investigate gamma rays, cosmic rays, and to perform the muography of the Etna volcano. In particular, new observations of astrophysical targets were carried out between fall 2022 and spring 2024. The collected data are also very important in the perspective of the ASTRI Mini-array development: the validation and analysis chain could be considered a "kick-off"test for the first data collected by the first three telescopes of the array (within the first half of 2025). In this contribution, we present the preliminary results achieved with the ASTRI-Horn telescope during the latest observing campaign.

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