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Extragalactic Observatory Science with the ASTRI Mini-Array at the Observatorio del Teide

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for the ASTRI Project

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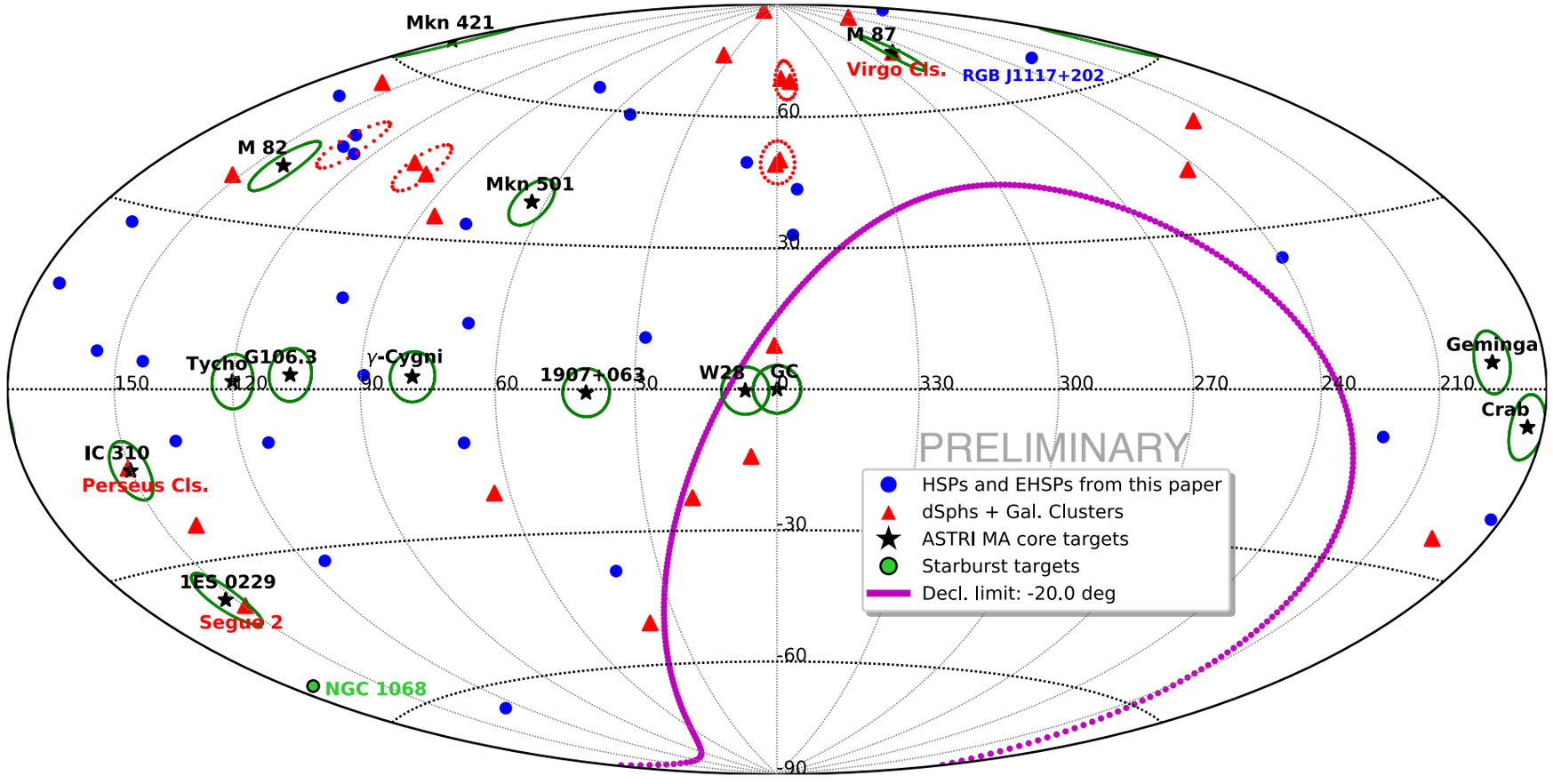
OVERVIEW

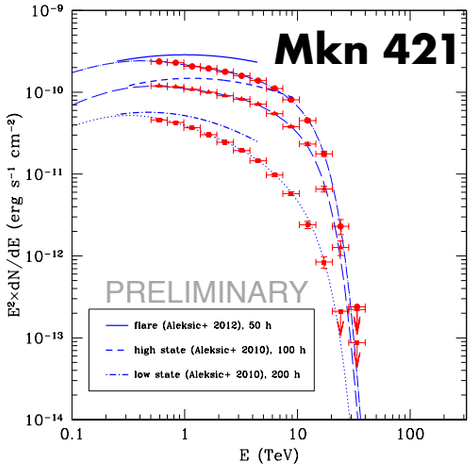
Mini-Array

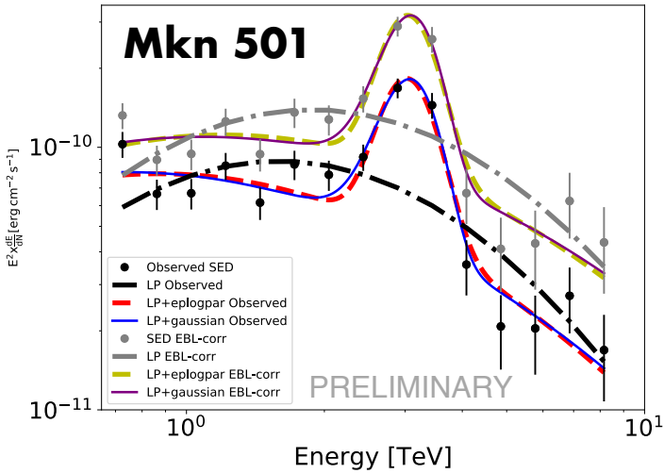
- The ASTRI Mini-Array (nine 4-m IACTs with FoV ~ 10º, spatial resolution of few arcmin and energy resolution of ~10%) is specifically designed to observe at VHE.
- During its life, the instrument will be first operated as an experiment and later as an open observatory. During this second phase, the main goals of extragalactic astronomy will be observations of AGN and indirect DM searches.
- The large ASTRI FoV can be exploited to perform simultaneous observations of sources located within an angular distance of up to ~5º.

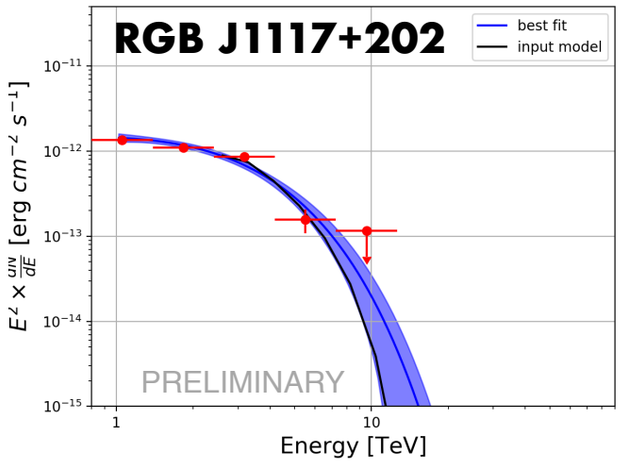


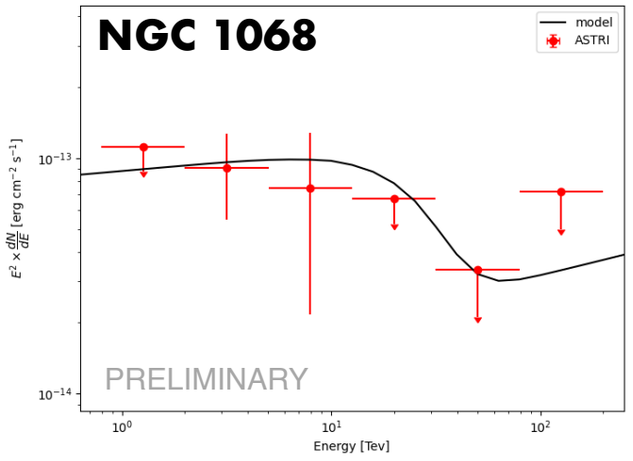
AGN AT MULTI-TeV ENERGIES

- The main AGN targets for the ASTRI Mini-Array will be blazars and Seyfert galaxies.
- To quantify the capabilities of the ASTRI Mini-Array to detect and study AGN spectral features, we investigate simulations of the two closest blazars Mkn 421 and Mkn 501, the source RGB J1117+202 and the Seyfert 2 galaxy NGC 1068.





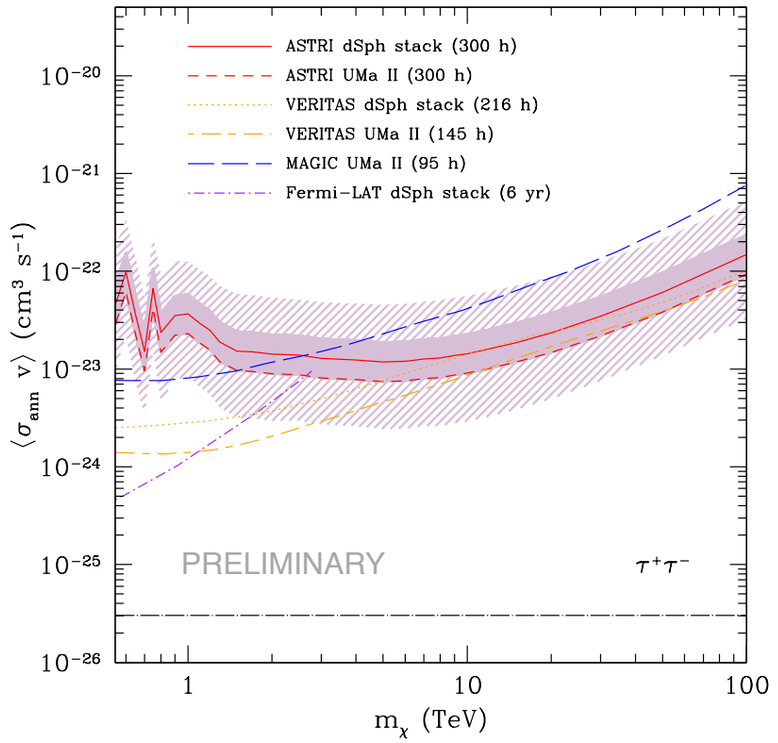


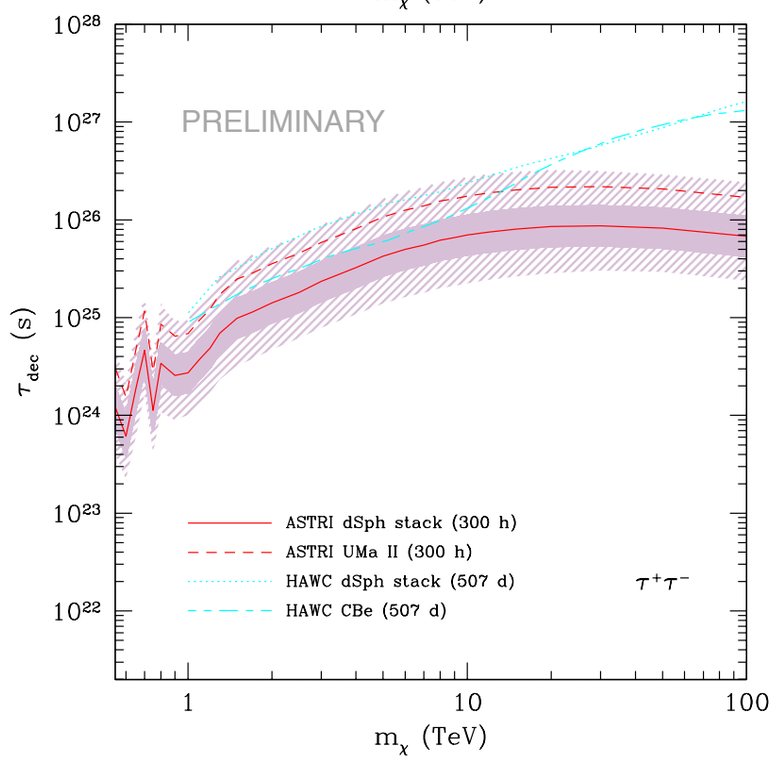


- We find that, depending on source state, exposure times from ~1 h to ~200 h will allow to characterize VHE spectral features in blazars (cut-offs, narrow emissions).
- Also, long-term (~200-h) observations may unveil the signal of sources still undetected at VHE with current Cherenkov telescopes.
- For Seyfert galaxies, 200-h observations will allow to successfully test different VHE emission models.

INDIRECT DM SEARCHES

- Dark matter (DM) is one of the major components of the Universe's energy content, but its properties are so far unconstrained.
- A frontier of indirect DM searches is represented by the identification of weakly interacting massive particles (WIMPs) that could annihilate or decay into γ-ray photons.
- The most promising DM-dominated extragalactic sources are the dwarf spheroidal galaxies (dSphs), due to their proximity ($d_\odot < 250$ kpc) and lack of background emission.
- We consider the three optimal dSphs Ursa Minor (UMi), Coma Berenices (CBe) and Ursa Major II (UMaII), observed for 100 h each. For UMaII, we also perform 300-h observing simulations.
- We thus derive 300-h ASTRI Mini-Array constraints on the DM annihilation cross section and decay lifetime that are comparable with or better than those currently available, especially at multi-TeV DM masses.





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Thank you!