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Detection Prospects for AGNs with the Cherenkov Telescope Array

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The Cherenkov Telescope Array Observatory (CTAO) is the next-generation ground-based gamma-ray observatory, designed to enhance sensitivity and energy coverage (20 GeV – 300 TeV) over current Imaging Atmospheric Cherenkov Telescopes (IACTs). The instrument's specifications will enable detailed Active Galactic Nuclei (AGN) studies in the very-high-energy (VHE) regime. Predicting the AGN population detectable by CTAO is challenging due to uncertainties in flux extrapolations from lower energies to the VHE domain. Using Fermi-LAT catalogs and measures of the long-term variability of the sources, we refine detectability estimates, evaluate AGN populations under different scenarios, and compare them with spectral models from current IACTs. We assess variability effects and the detectability of distant sources. Our results identify the most promising AGNs for CTAO, indicating that CTAO will significantly expand the scope of current IACT detections, including fainter and more distant sources previously undetectable in the VHE regime. These findings support CTAO's extragalactic task force in optimizing observational strategies and refining AGN population models.

Collaboration(s)

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