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Gamma-Ray Potential Detection of Star-Forming Galaxies in the TeV Range

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Star-forming galaxies, although low in gamma-ray luminosity, offer insights into cosmic ray processes. While gamma-ray emission in the GeV range is closely linked to their star formation rate, the origins of their higher-energy emissions remain unclear due to limited observations.

We gathered a comprehensive sample of galaxies, including those observed by Fermi-LAT in the GeV range and others cataloged in the near-infrared within the Local Volume, with the aim to identify the most promising candidates star-forming galaxies that could be detected by future gamma-ray observatories. We utilized both physical models and empirical data to predict their TeV spectra and evaluated their detectability with the latest instrument response functions.

Our findings indicate that nearly a dozen star-forming galaxies could be detected by the next generation of Cherenkov telescopes. Observing these galaxies in the TeV range is crucial for understanding cosmic ray acceleration, transport mechanisms, and absorption processes, thereby enriching our knowledge of galactic physics.

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