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Characterization of Extended Gamma-Ray Sources with SWGO: Morphological Models and Detection Techniques.

The study of astrophysical sources with extended very-high-energy (VHE) emission is crucial for advancing our understanding of the most energetic processes in the Universe. Observatories such as HAWC and LHAASO have been pioneers in this field. The arrival of SWGO, with its wide field of view in the Southern Hemisphere, promises to open new frontiers in the study of extended sources, such as Supernova Remnants (SNRs), pulsar TeV halos, Pulsar Wind Nebulae (PWNe), among others. SWGO's capability to identify the morphology of extended sources using models such as disk, Gaussian, and diffusive models will be key to understanding the physical mechanisms behind gamma-ray emission. In this study, the Geminga pulsar halo, i.e., Geminga-like sources, was used as a reference, considering emission above 1 TeV and an angular extension above $\theta > 1^\circ$. We present a comparison of various simulated emission region models and the analysis developed to identify them.

Collaboration(s)

Southern Wide-field Gamma-ray Observatory (SWGO)

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