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## IC443 3D Gammapy Analysis with VERITAS

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IC443, a shell-type supernova remnant, provides a unique environment for studying cosmic ray acceleration at shock fronts and interactions with an adjacent molecular cloud. In this remnant, high-energy protons and nuclei interact with the dense interstellar medium, leading to gamma-ray production through pion decay.

My ongoing research utilizes VERITAS data and the advanced, open-source analysis framework Gammapy, which is specifically designed for imaging atmospheric Cherenkov telescope data. VERITAS (the Very Energetic Radiation Imaging Telescope Array System) is a ground-based observatory sensitive to gamma rays in the energy range of approximately 100 GeV to 30 TeV. Gammapy's innovative 3D spatial and spectral modeling techniques extend traditional two-dimensional methods, enabling a more detailed examination of the gamma-ray emission.

The primary aim of this study is to constrain the spatial extension of IC443 and investigate potential regional variations in the gamma-ray production mechanisms. By employing techniques such as forward-folding and refined background modeling, the analysis seeks to distinguish between hadronic processes (pion decay) and possible leptonic contributions (inverse Compton scattering).

## Keyword-1

gamma rays

## Keyword-2

Cosmic Rays

## Keyword-3

supernova remnant

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