

# Workshop on Machine Learning for Analysis of High-Energy Cosmic Particles



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Contribution ID: 19

Type: Talk

## Modeling IACT Gamma-ray Background using Singular Value Decomposition

*Thursday, 30 January 2025 09:40 (25 minutes)*

Extended  $\gamma$ -ray sources, such as TeV halos, evolved pulsar wind nebulae, and star clusters, impose a challenge to analyses of Imaging Atmospheric Cherenkov Telescope (IACT) data due to the difficulty in estimating irreducible background originating from cosmic-ray-induced  $\gamma$ -ray-like events in the source regions. A background estimation method is necessary to address IACT analyses in the cases when the source angular size exceeds or occupies a significant part of the field-of-view. The proposed new method analyzes the distribution of cosmic-ray-like events in the coordinate of  $\gamma$ -ray camera using singular value decomposition (SVD) to derive the irreducible background estimation. This data-driven method significantly reduces the systematic uncertainty on the background estimation, and the method performance is evaluated using VERITAS archival observations.

### Type of Contribution

talk

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