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Deep Learning Methods for Gamma/Hadron Separation in SWGO

The Southern Wide-field Gamma-ray Observatory (SWGO) is a planned water Cherenkov-based observatory to be located in Pampa La Bola, Chile, providing continuous, wide-field observations of the gamma-ray sky. SWGO will provide a unique view of the wide Southern Hemisphere gamma-ray sky, complementing other very-high-energy observatories such as HAWC, CTA and LHAASO. A key challenge in ground-based gamma-ray astronomy is an effective gamma/hadron separation to suppress the dominant cosmic-ray background. In this contribution, we will present ongoing studies on advanced classification techniques for SWGO, specifically exploring deep learning approaches based on Graph Neural Networks and Transformer architectures. These methods, currently tested through simulations, offer promising advancements in gamma/hadron separation and event reconstruction.

Collaboration(s)

SWGO

Authors: SCHNEIDER, Martin (ECAP, FAU Erlangen-Nürnberg); PIRKE, Markus (ECAP, FAU Erlangen-Nürnberg)

Presenter: SCHNEIDER, Martin (ECAP, FAU Erlangen-Nürnberg)

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