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Characterization of anomalous air shower events in SWGO

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The interaction of very-high-energy gamma rays and cosmic rays with the Earth's atmosphere leads to the production of cascading particle events known as Extensive Air Showers (EAS). The aim of my project is to use state-of-the-art simulations to characterize shower features at the ground and connect them to the longitudinal development of the shower, with a focus on identifying anomalous events, as their study provides valuable insights into the underlying physical mechanisms of shower development. This study may also lead to improvements in current methods for gamma/hadron discrimination, which is crucial for observatories like the future Southern Wide-field Gamma-ray Observatory (SWGO), as it will only rely on its large and dense array to distinguish between the shower's electromagnetic and muonic components.

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