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Identifying Cosmic Ray Radio Emission in RNO-G's Deep Antennas

Ultra-High-Energy neutrinos are an invaluable messenger for learning about the most energetic and distant processes in the universe. Detecting them is challenging due to their extremely low flux and small cross section, necessitating immense detection volumes. The Radio Neutrino Observatory in Greenland (RNO-G) addresses this challenge by leveraging the Askaryan effect, using sparse radio instrumentation to detect neutrino-induced cascades in ice. However, cosmic rays can represent an important background, as their induced showers produce radio emission that can mimic neutrino signals; both in-air emission, primarily through the geomagnetic effect, and in-ice Askaryan emission from shower cores that reach the ice can act as backgrounds for a neutrino search. At the same time, these radio emissions from cosmic-ray induced air showers provide a crucial tool for detector calibration and validation. This work presents progress toward quantifying and separating these backgrounds in RNO-G's deep antennas using machine learning classification methods.

Collaboration(s)

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