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Type: **Talk**

Training Neural Networks to Classify and Denoise Cosmic-Ray Radio Signals Using Background Measured at the South Pole

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Cosmic-ray air showers produce radio signals which can be detected from Earth's surface. However, the radio background that is detected along with these signals can make it difficult to identify an air shower signal from the local background. To solve this problem, this project aims to train two convolutional neural networks (CNNs): a "classifier" and a "denoiser". The classifier distinguishes a trace containing an air shower signal from a trace containing only background. The denoiser takes a noisy signal and removes the noise (background) from it. The dataset used to train these networks includes simulated air shower signals produced in CoREAS as well as background traces recorded with a prototype station at the IceCube Neutrino Observatory at the geographic South Pole. The training and analysis is performed using the frequency band from 100 to 350 MHz. The goal of these CNNs is to improve the detection threshold of radio experiments to detect signals with lower energies and to improve the removal of background noise from air shower radio signals. I will show how the CNNs perform in identifying cosmic ray signals and in extracting air shower pulses from the noisy waveforms.

Type of Contribution

talk

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