

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



UNIVERSITY OF DELAWARE
BARTOL RESEARCH
INSTITUTE

Contribution ID: 16

Type: **Talk**

Denoising Radio Pulses from Air Showers Using Machine Learning Methods (Remote)

Wednesday, 29 January 2025 12:00 (15 minutes)

The Giant Radio Array for Neutrino Detection (GRAND) aims to detect radio signals from extensive air showers caused by ultra-high-energy cosmic particles. Galactic, instrumental, and anthropogenic noise are expected to contaminate these signals.

To address this problem, we propose training an unsupervised convolutional network known as an autoencoder. This network is used to learn a coded representation of the data and remove specific features from it. This denoiser is trained using realistic air-shower simulations generated by CoREAS and ZHAireS, which are specifically designed to closely resemble the signals detected by GRAND. In this talk, we will present details about our machine-learning model and preliminary results on the sensitivity gain obtained when our denoising algorithm is applied to realistically simulated noisy GRAND signals of varying signal-to-noise ratios.

Type of Contribution

poster / flash talk (for work in progress)

Primary author: Mr LAI, Zhisen (SFSU)

Co-authors: Dr BENOIT-LÉVY, Aurélien (CEA-List); Prof. MACIAS, Oscar (San Francisco State University); Dr GUEPIN, Claire; FERRIERE, Arsene (CNRS)

Presenter: Mr LAI, Zhisen (SFSU)

Session Classification: Talks