Contribution ID: **132** Type: **not specified**

Deep Learning for the Classification and Recovery of Cosmic-Ray Radio Signals Against Background Measured at the South Pole

Tuesday, 7 June 2022 11:10 (20 minutes)

A major hurdle in radio detection of cosmic-ray air showers is the continuous background that contaminates the signals. In this work, we use deep learning techniques to mitigate the effect of background by training two convolutional neural networks (CNNs). One network is used to distinguish the radio traces containing air-shower signals from those traces containing only background. The other network is trained to extract the underlying radio signals by removing the noise from the contaminated traces. In order to produce the required dataset for the CNNs training, we used CoREAS for the geomagnetic field and observation height of the South Pole to simulate radio signals. As noise samples, we used generated radio background as well as radio background recorded by SKALA antennas of a prototype station of the IceCube-Gen2 surface array at the South Pole. The frequency band used in the analysis ranges from 100 MHz to 350 MHz. These networks can improve, on the one hand, the detection threshold of externally triggered radio array and, on the other hand, improve the accuracy of the pulse parameters, such as the arrival direction and amplitude of the radio pulses, which are subsequently used to reconstruct the properties of cosmic-ray air showers.

Primary authors: REHMAN, Abdul; COLEMAN, Alan; SCHRÖDER, Frank

Presenter: COLEMAN, Alan

Session Classification: Ice Radio Experiments 1