Abstract Submitted
for the MAS20 Meeting of
The American Physical Society

Classification and Denoising of Radio Signals emitted by Cosmic-Ray Air Showers using Machine Learning[1] ABDUL REHMAN, FRANK SCHROEDER, ALAN COLEMAN, Bartol Research Institute, Department of Physics and Astronomy, University of Delaware — High-energy cosmic rays that are coming from outside our solar system are of great interest to astroparticle physics. Measuring the energy, direction, and composition of these cosmic rays can help us understand the phenomena going on not only within our galaxy but in extragalactic objects as well. These particles enter our atmosphere, interact with it, and produce extensive air showers. Radio emission from these showers can be used to measure the properties of the initial cosmic-ray particles. One significant challenge of radio detection is the continuous radio background which contaminates the radio emission. We present a machine learning technique for the classification and reduction of the background of those radio signals. For that purpose we use Keras, a build-in library in Python, to create a convolutional neural network. For training and testing of the network, we use simulated data-set both for creating the radio signal from extensive air showers and for the background noise. Once trained, the network will be used to lower the radio detection threshold of cosmic rays at Antarctica and also to recover the underlying radio signal from the background.

[1]NASA EPSCoR Grant Number 80NSSC20M0138

Abdul Rehman
Bartol Research Institute, Department of Physics and Astronomy, University of Delaware

Date submitted: 30 Oct 2020 Electronic form version 1.4