



Contribution ID: 50

Type: **not specified**

Determination of the elements making up ultra-high energy cosmic rays using the Auger Engineering Radio Array.

Monday 30 May 2022 15:20 (15 minutes)

The Auger Engineering Radio Array (AERA) is an array of 153 radio antennas spanning an area of 17 km^2 , currently the largest of its kind, that probes the nature of ultra-high energy cosmic rays at energies around the transition from galactic to extra-galactic origin. It measures the MHz radio emission of extensive air showers produced by cosmic rays hitting our atmosphere. The elemental composition of cosmic rays is a crucial piece of information in determining what the sources of cosmic rays are and how cosmic rays are accelerated. The composition can be reconstructed with likelihood analysis by comparing the measured radio footprint on the ground to an ensemble of footprints from Monte-Carlo Corsika air shower simulations. These simulations are also used to determine the resolution of the method and to validate the reconstruction by identifying and correcting for systematic uncertainties. I will present the method and show the results of the cosmic-ray composition reconstruction with AERA.

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Session Classification: Parallel session