

# Radio Detection of Air Showers at the Pierre Auger Observatory

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The Pierre Auger Observatory in Argentina features the largest antenna array for air-shower detection, the Auger Engineering Radio Array (AERA). AERA consists of 153 antenna stations over 17 km<sup>2</sup>, detecting air showers in the frequency band of 30-80 MHz. With AERA, the collaboration achieved key results, such as an absolute measurement of the radiation energy of the radio signal, which is highly correlated to the size of the electromagnetic shower component.

The radio technique can be used in two ways to contribute to the cosmic-ray mass composition, as confirmed by our analysis of AERA data in combination with data from the surface array and the fluorescence telescopes. First, by the reconstruction of the position of the shower maximum. Second, by the combination of radio and muon measurements provided by the particle detectors.

During the next two years, the collaboration is installing the AugerPrime upgrade of the Pierre Auger Observatory, enhancing its 3000 km<sup>2</sup> surface array in several ways. Among these is the deployment of a SALLA-type antenna above each water-Cherenkov detector of the surface array. While the water-Cherenkov detectors effectively measure the muons produced in very inclined showers, the radio antennas will measure their electromagnetic component. Therefore, the combination of both measurements is expected to improve our understanding of the physics in inclined air showers and to increase the total measurement accuracy. In this talk the results obtained with AERA will be summarized. In addition, the plans and science goals for the radio upgrade of the surface array will be discussed.

**Authors:** SCHRÖDER, Frank (Karlsruhe Institute of Technology (KIT)); PIERRE AUGER COLLABORATION, for the

**Presenter:** SCHRÖDER, Frank (Karlsruhe Institute of Technology (KIT))

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