

First results from the AugerPrime Radio Detector

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Summary

The Pierre Auger Observatory investigates the properties of the highest-energy cosmic rays with unprecedented precision. The aim of the AugerPrime upgrade is to improve the sensitivity to the primary particle type. The improved mass sensitivity is the key to exploring the origin of the highest-energy particles in the Universe. The purpose of the Radio Detector (as part of AugerPrime) is to extend the sensitivity of the mass measurements to zenith angles above 60° . A radio antenna, sensitive in two polarization directions and covering a bandwidth from 30 to 80 MHz, will be added to each of the 1661 surface detector stations over the full 3000 km^2 area, forming the world's largest radio array for the detection of cosmic particles. Since November 2018, an engineering array comprised of ten stations has been installed in the field.

The radio antennas are calibrated using the Galactic (diffuse) emission. The sidereal modulation of this signal is monitored continuously and is used to obtain an end-to-end calibration from the receiving antenna to the ADC in the read-out electronics. The calibration method and first results will be presented.

The engineering array is also fully integrated in the data acquisition of the Observatory and records air showers regularly. The first air showers detected simultaneously with the water-Cherenkov detectors and the Radio Detectors will be presented. Simulations of the detected showers, based on the reconstructed quantities, have been conducted with CORSIKA/CoREAS. A comparison of the measured radio signals with those predicted by simulations exhibits satisfying agreement.

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