

# Expected performance of the AugerPrime Radio Detector

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The AugerPrime Radio Detector will significantly increase the sky coverage of mass-sensitive measurements of ultra-high energy cosmic rays with the Pierre Auger Observatory. The detection of highly inclined air showers with the world's largest 3000 km<sup>2</sup> radio-antenna array in coincidence with the Auger water-Cherenkov detector provides a clean separation of the electromagnetic and muonic shower components. The combination of these highly complementary measurements yields a strong sensitivity to the mass-composition of cosmic rays.

We will present the first results of an end-to-end simulation study of the performance of the AugerPrime Radio Detector. The study features a complete description of the AugerPrime radio antennas and reconstruction of the properties of inclined air showers, in particular the electromagnetic energy. The performance is evaluated utilizing a comprehensive set of simulated air showers together with recorded background. The estimation of an energy- and direction-dependent aperture yields an estimation of the expected 10-year event statistics. The potential to measure the number of muons in air showers with the achieved statistic is outlined. Based on the achieved energy resolution, the potential to discriminate between different cosmic-ray primaries is presented.

## Keywords

Cosmic Ray, Mass separation, Reconstruction, Extensive Air Shower, Radio

## Collaboration

Auger

## other Collaboration

## Subcategory

Experimental Methods & Instrumentation

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