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Drone-Based Calibration of AugerPrime Radio Antennas

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Radio emissions of extensive air showers can be observed at the Pierre Auger Observatory with the AugerPrime radio detector (RD). As part of the AugerPrime upgrade, RD is being installed on 1660 water-Cherenkov detectors on an area of about 3000 km² and consists of dual-polarized Short Aperiodic Loaded Loop Antennas (SALLA). To achieve high measurement precision, RD needs to be well-calibrated, which requires the antenna response pattern to be well-known. We introduce a method to measure the directional response of the SALLA using a well-defined biconical antenna mounted to a drone. The drone-based setup possesses active stabilization and precise pointing with the use of a gimbal. Additionally, the drone's position is tracked using differential GPS with $\mathcal{O}(\text{cm})$ precision. This setup allows us to precisely extract the antenna response pattern from any direction in the frequency range of 30 – 80 MHz. In a recent in-situ campaign, calibration measurements of the AugerPrime radio detector have been performed. First results of these measurements are presented and compared to simulations.

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