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Radio Detection of Cosmic Ray Air Showers

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Radio measurements yield calorimetric information on the electromagnetic shower component around the clock. However, until recently it was not clear whether radio measurements can compete in accuracy with established night-time techniques like air-Cherenkov or fluorescence detection. Due to recent progress in the radio technique as well as in the understanding of the emission mechanisms, the performance of current radio experiments has significantly improved. Above 100 PeV, digital, state-of-the-art antenna arrays achieve a reconstruction accuracy for the energy similar to that of other techniques, and can provide an independent measurement of the absolute energy scale. Furthermore, radio measurements are sensitive to the mass-composition of the primary particles: First, the position of the shower maximum can be reconstructed from the radio signal. Second, in combination with muon detectors the measurement of the electromagnetic component provides complementary information on the primary mass. Since the radio footprint is huge for inclined showers, and the radio signal does not suffer absorption, future radio arrays either focus on inclined showers at the highest energy, or on ultra-high precision measurements with extremely dense arrays. This talk reviews the current status of radio experiments and simulations as well as future plans.

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