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Radio Arrays for ultra-high-energy Cosmic Particles

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Digital radio detection is about to become one of the most important techniques for high-energy particle astrophysics. The next generation of radio experiments aims at measuring cosmic-ray nuclei in hybrid observatories with unprecedented accuracy, and at searching for neutrinos and photons at energies beyond those detected until today. Doing so, radio arrays will play a crucial role in multi-messenger observations targeting the longstanding questions of the origin of the highest energy Galactic Cosmic Rays (around 10^{18} eV) and of the extragalactic cosmic rays of even higher energy. During the past decade, several antennas arrays demonstrated that cosmic-ray air showers can be detected with an accuracy similar to those of established techniques. In particular, the energy and direction resolution of state-of-the art radio arrays has become competitive to arrays of particle detectors. Radio arrays are also sensitive to the position of the shower maximum, which is a relatively accurate estimator for the composition of the primary cosmic rays. Moreover, their combination with muon detectors brings additional sensitivity to the type of the primary particle, which can enable unprecedented accuracy for future hybrid detectors. Finally, the radio technique is economic enough to build huge arrays required for the search of ultra-high-energy neutrinos. This talk will give an overview over the state-of-the-art as well as current and planned experiments.