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GRAND: Giant Radio Array for Neutrino Detection

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The Giant Radio Array for Neutrino Detection (GRAND) is a planned observatory whose main goal is to study the Universe at ultra-high energies. GRAND will detect UHE cosmic rays, gamma rays, and neutrinos with unprecedented sensitivity. Using large arrays of antennas, GRAND will detect the radio emission from extensive air showers initiated by cosmic particles impinging on the atmosphere. Approximately twenty sub-arrays, each containing 10000 antennas, will be deployed over ~10,000 km² in radio-quiet areas around the world. GRAND will be constructed in stages, to ensure that the techniques employed are properly validated. Already in the early phases, it will be possible to realise important scientific goals, including accurate measurements of cosmic-ray and gamma-ray showers with energies between 30 PeV and 1 EeV, studies of the Epoch of Reionisation, and detection of Fast Radio Bursts. When completed, GRAND will reach sub-degree resolution and cover the whole sky, enabling neutrino astronomy and follow-ups of electromagnetic and gravitational-wave transients. Finally, the final design of GRAND will likely enable the detection, for the first time, of cosmogenic neutrinos with energies \geq 100 PeV, shedding light on the yet-unresolved issue of the origin of the highestenergy particles in the Universe.

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