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The Giant Radio Array for Neutrino Detection (GRAND) Project

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The Giant Radio Array for Neutrino Detection (GRAND) is designed to detect ultra-high-energy cosmic particles —specially neutrinos, cosmic rays and gamma-rays using radio antennas. On its final design, the radio array will contain 200,000 antennas and cover a total area of 200,000 km^2 split in $\sim$20 montainous sites spread worldwide. The detection strategy is based on the coherent radio emission (in the 50-200 MHz range) produced by the extensive air showers (with energis above 10^{17}eV) induced in the atmosfere by the cosmic particles. Regarding neutrinos, the study is two-fold. In astronomy, the planned sensitivity of 10^{-10} GeV cm^{-2} s^{-1} sr^{-1} above 5×10^{17} eV will likely ensure the detection of "cosmogenic" neutrinos that are produced in the most common scenarios. In particle physics, PeV–EeV neutrinos can test particle interactions at energies above those achieved in accelerators at Earth. Furthermore, with baselines between megaparsecs and a few gigaparsecs, even tiny new-physics effects could accumulate during propagation and reach detectable levels. GRANDProto300, the 300-antenna pathfinder array, is planned to start taking data in 2021. It aims at demonstrating autonomous radio detection of inclined air-showers, and study cosmic rays around the transition between Galactic and extra- Galactic sources. We present the current overall status of the project and simulation results that support the science case.

Preferred track

Cosmic Rays and Astrophysics

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