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Cosmic Ray search for the Radar Echo Telescope for Cosmic Rays

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The Radar Echo Telescope for Cosmic Rays (RET-CR), a pathfinder experiment for a future ultra-high-energy neutrino detector, is an experiment designed to detect the ionization trail from a cosmic-ray-induced particle cascade penetrating a high-altitude ice sheet. In high-elevation ice sheets, a high-energy cosmic ray ($E > 10$ PeV) at a small zenith angle deposits more than 10 percent of its primary energy into the ice sheet, resulting in energy densities several orders of magnitude higher than in air. This dense in-ice cascade can then be interrogated with an in-ice radar system. This technique, called the radar echo method, relies on reflection of a transmitted radio wave off the ionization trail produced in a UHE particle interaction. RET-CR consists of a phased-array transmitter and an array of receiving antennas located in the ice, triggered by scintillator panels on the surface. RET-CR is a pathfinder experiment, which aims to test the radar echo method for the Radar Echo Telescope for Neutrinos (RET-N). RET-CR was deployed at Summit Station, Greenland, running from May to August 2024. We present the ongoing cosmic-ray analysis of the 2024 campaign, and initial results will be presented.

Collaboration(s)

Radar Echo Telescope Collaboration

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