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The Radar Echo Telescope

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The SLAC T-576 beam test has shown the radar echo detection method as a feasible technique to probe high-energy-particle-initiated cascades in dense media, such as ice. Furthermore, particle-level simulations show that the radar echo method has a very promising sensitivity to investigate the flux of cosmic neutrinos at energies greater than 1 PeV. Detecting these cosmic neutrinos is the aim of the Radar Echo Telescope for Neutrinos (RET-N). To show the in-nature viability of the radar echo method, we present the Radar Echo Telescope for Cosmic Rays (RET-CR). RET-CR will provide the proof of principle necessary for the construction of RET-N by detecting, using radar, the in-ice continuation of cosmic-ray induced air showers impinging on the high altitude Antarctic ice sheet. The energy and arrival direction of the original air shower will be reconstructed using a surface cosmic ray detector, complimenting the reconstruction that is possible using the in-ice radar setup. We present our current simulation efforts for RET-CR, which provides an estimate of the expected event rate, as well as the detector layout optimization. This work is then placed in context of the final RET-N detector.

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