Contribution ID: **246** Type: **Poster**

Toward a direct measurement of Coherent Radio Reflections from an Electron-Beam Induced Particle Cascade

Wednesday 22 May 2019 18:00 (1 hour)

The T-576 experiment at the SLAC National Accelerator Laboratory was designed to make the first direct measurement of a coherent radio reflection ('radar') off the particle shower produced by an electron beam (>10 GeV/particle; 10^9 electrons per bunch) directed into a high-density polyethylene target. This beam is approximately equivalent to the shower produced by an EeV energy neutrino interacting in cold Antarctic ice. Secondary particles created during shower development result in a short-lived ionization plasma. Depending on the initial particle energy and the parameters of the generated plasma, atomic electron ionization may become dense enough as to reflect at radio wavelengths. Coherent radar scattering is expected at frequencies below the plasma frequency, which is directly calculable from the free charge density. In such cases, electromagnetic waves will scatter off the surface of the full plasma volume.
Our preliminary results are obtained using a singular value decomposition (SVD) analysis technique and indicate a signal consistent with a radio reflection at 2.36 sigma significance above backgroud. A detector based on coherent radio reflections may therefore allow lowering the detectable neutrino energy threshold from a few EeV (corresponding to the threshold of currently operating Askaryan radio detectors) to several PeV, where the IceCube experiment runs out of statistics, thus filling the currently existing gap in sensitivity for neutrino registration.

Author: Ms NOZDRINA, Aleksandra (University of Kansas)

Presenters: Ms NOZDRINA, Aleksandra (University of Kansas); THE T576 COLLABORATION

Session Classification: Poster Session

Track Classification: Neutrinos: Models, Phenomenology, Experiments