Contribution ID: **67** Type: **Oral/Presentation**

Dichroicons: Spectral Photon Sorting for Neutrino Detectors

Tuesday 19 November 2024 14:27 (18 minutes)

Many neutrino detectors use photons as their primary event detection method, typically detecting numbers of photons and their arrival times. Photons also carry information about an event through their wavelength, polarization, and direction, but often little to none of this information is utilized. The "dichroicon," a Winston-style light cone comprised of dichroic filters, allows detectors to use the wavelength information encoded in photons. This talk will discuss measurements of the performance of the dichroicon at the CHESS detector, focusing on the dichroicon's scintillation and Cherenkov photon detection and separation efficiency. The results will include measurements from two types of dichroicons paired with water based and liquid scintillators exposed to radioactive and cosmogenic sources. In addition to the benchtop results, the talk will discuss the deployment of dichroicons in Eos, a 20 ton hybrid Cherenkov-scintillation detector. The Eos detector is a demonstrator for very large scale neutrino detectors, including Theia, and features the first deployment of 12 large-scale monolithic dichroicons. Preliminary measurements of the performance of the dichroicons in the Eos detector will be presented, as well as predictions of the performance in future detectors like Theia. These results will include studies of the collection efficiency and discrimination between Cherenkov and scintillation light, new handles on particle ID, and novel reconstruction techniques that leverage the advantages of both Cherenkov and scintillation light.

Do you need a VISA letter for traveling to Canada ?

No

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Session Classification: Astroparticles, Astrophysics and Astronomy (1) (Chair: Xiaoyue Li, Seraphim Koulosousas)

Track Classification: Applications: Astroparticles, Astrophysics and Astronomy