

Spectroscopy measurements to enhance readout of xenon TPCs

Over the past several decades, the dual-phase xenon time projection chamber (TPC) has risen to the forefront of the race to directly detect dark matter (DM). The technology utilizes photomultiplier tubes (PMTs), or other light detection devices, to readout scintillation produced promptly after a particle scatters in the liquid and electroluminescence generated when electrons freed by the interaction are drifted into a gaseous amplification region. The scintillation spectrum has been well measured under the cryogenic operating conditions of these detectors, but the electroluminescence spectrum has only been measured at room temperature. A precise unbiased investigation is required to improve response models of xenon to the scattering of particles and decrease systematic uncertainty in future DM searches. I will describe an R&D setup designed to make such measurements.

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