Contribution ID: **2** Type: **Lightning talk**

Solid Dreams: Advancing 0vbb and Dark Matter Detection with Crystalline Xenon TPCs

Thursday, 26 October 2023 16:07 (7 minutes)

In this talk, we present the performance of a novel crystalline/vapor xenon TPC. Compared to liquid xenon, crystal xenon demonstrates >10^3 lower activity in radon, which is a leading background source in liquid xenon dark matter experiments (Pb214 betas) and tonne-scale 0vbb detectors (Bi214 gammas). The powerful radon exclusion capability of crystal xenon enables a larger fiducial volume for 0vbb searches through the reduction of untagged radon daughters on the detector surface. Additionally, the faster electron drift observed in crystal xenon holds the potential to reduce charge signal diffusion, potentially enhancing discrimination between multiple scatters and single scatters, as well as improving the detector's energy resolution.

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Session Classification: Session 1/1