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Quantum dots and liquid scintillators in neutrino-less double beta decay searches DIANA GOODING, JON OUELLET, Massachusetts Institute of Technology, BRIAN NARANJO, UCLA, LINDLEY WINSLOW[1], Massachusetts Institute of Technology — Liquid-scintillator detectors make neutrino measurements at around 1 MeV with energy resolution of ˜5% -a factor of two better than water Cherenkov detectors, and just as scalable from 1 ton to 1 kiloton. At this energy, however, the scintillation light is isotropic and cannot provide enough information to reconstruct the trajectories of outgoing particles. While most of the Cherenkov light produced is absorbed and reemitted by the scintillator, a fraction of it propagates through the detector, retaining its directional information. Separating these scintillation and Cherenkov signals requires fast photo detectors and an ability to tune the spectral response of the scintillator. Along this front, quantum dots have emerged as promising wavelength shifters, since their size and thus fluorescence properties are highly tunable. Most importantly, these quantum dots can be made of candidate isotopes for neutrino-less double beta decay, and then suspended in standard scintillators like linear alkyl benzenes. This talk outlines the optical characterization and performance of quantum-dot-doped liquid scintillator.

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