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Characterization and Recovery of Lead Tungstate (PWO4) Crystals[1] ABIGAIL MCSHANE, Stanford University, DANNIE GRIGGS, George C. Marshall High School — The potential of Lead Tungstate (PWO) crystals in EM calorimeters like the Neutral Particle Spectrometer at 12 GeV JLab and future particle identification detectors of the Electron Ion Collider has been researched extensively. The small Moliere radius of PWO crystals make them ideal for use in a compact detector and their light yield outperforms that of other heavy crystals. Recent measurements have shown large variations in crystal properties. This is a major concern for the construction of particle identification detectors. Testing of the crystal uniformity and understanding the origin of the variation have thus become necessary. The characterization of PWO includes measurements of the crystal dimensions, optical transmittance, both longitudinal and transverse, the light yield and decay kinetics to identify slow luminescence components, as well as tests of radiation hardness. Optical clarity after radiation damage can in principle be restored by stimulated recovery with light. Optical bleaching with blue light is the default method, but curing at longer wavelength may be possible. The results of crystal characterization and effects of radiation on optical properties, as well as the effectiveness and practicality of the LED curing system will be discussed.

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