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Characterization of Pb-206 Nuclear Recoils in Liquid Xenon

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There is a particular class of unavoidable backgrounds that plague Xenon (Xe) dark matter searches: decaying daughters of the Uranium-238 nuclear decay chain, which result from Radon plate-out on detector materials. One such daughter isotope, Polonium-210, undergoes alpha decay and produces a recoiling 103 keV Pb-206 nucleus. Such nuclear recoils can emulate low-energy dark matter interactions in liquid Xe, and thus should be directly characterized to improve background models. At DAX, the Davis Xenon R&D testbed system, we have developed a dual-phase Xe time projection chamber (TPC) for performing light and charge yield measurements of Pb-206 nuclear recoils. By coating a PIN diode with Po-210 and mounting it on the cathode of the TPC, we can trigger on the alpha emitted by the Po-210 decay in order to tag Pb-206 recoils. We will discuss our most recent results for this Pb-206 characterization.

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