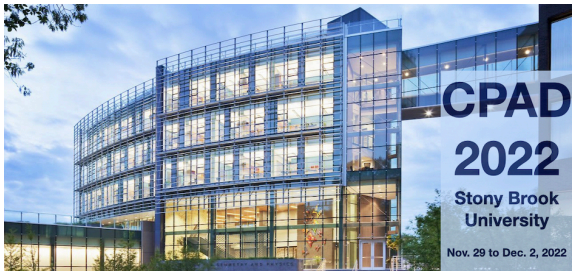

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Calibrating the scintillation and ionization responses of xenon recoils for high-energy dark matter searches

Wednesday, 30 November 2022 12:15 (20 minutes)

Liquid xenon-based direct detection dark matter experiments have recently expanded their searches to include high-energy nuclear recoil events as motivated by effective field theory dark matter and inelastic dark matter interaction models, but few xenon recoil calibrations above 100 keV are currently available. In this presentation, we will describe the experimental setup and results from our recent work measuring the scintillation and ionization yields of xenon recoils up to 426 keV. The experiment uses 14.1 MeV neutrons to scatter off xenon in a compact liquid xenon time projection chamber and produce quasi-monoenergetic xenon recoils between 39 keV and 426 keV. The xenon recoil responses and their electric field-dependence for recoil energies were measured up to 306 keV; due to the low event statistics and the relatively mild field dependence, the yield values at higher energies are reported as the average of xenon responses for electric fields between 0.2-2.0 kV/cm. This result will enable xenon-based dark matter experiments to significantly increase their high energy dark matter sensitivities by including energy regions that were previously inaccessible due to lack of calibrations.
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