

Abstract Submitted
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Detecting dark matter with scintillating bubble chambers¹ JIANJIE ZHANG, C ERIC DAHL, MIAOTIANZI JIN, DANIEL BAXTER, Northwestern University — Threshold based direct WIMP dark matter detectors such as the superheated bubble chambers developed by the PICO experiment have demonstrated excellent electron-recoil and alpha discrimination, excellent scalability, ease of change of target fluid, and low cost. However, the nuclear-recoil like backgrounds have been a limiting factor in their dark matter sensitivity. We present a new type of detector, the scintillating bubble chamber, which reads out the scintillation pulse of the scattering events as well as the pressure, temperature, acoustic traces, and bubble images as a conventional bubble chamber does. The event energy provides additional handle to discriminate against the nuclear-recoil like backgrounds. Liquid xenon is chosen as the target fluid in our prototyping detector for its high scintillation yield and suitable vapor pressure which simplifies detector complexity. The detector can be used as an RD tool to study the backgrounds present in the current PICO bubble chambers or as a prototype for standalone dark matter detectors in the future.

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