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Designing and building a pair of scintillating bubble chambers for WIMPs and reactor CEvNS

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The Scintillating Bubble Chamber (SBC) is a rapidly developing novel technique for 0.7 - 7 GeV nuclear recoil detection. Demonstrations in liquid xenon at the few-gram scale have confirmed that this technique combines the event-by-event energy resolution of a liquid-noble scintillation detector with the world-leading electron-recoil discrimination capability of the bubble chamber, and in fact maintains that discrimination capability at much lower thresholds than traditional Freon-based bubble chambers. The promise of unambiguous identification of sub-keV nuclear recoils in a scalable detector makes this an ideal technology for both GeV-mass WIMP searches and CEvNS detection at reactor sites. We will present progress from the SBC Collaboration towards the construction of a pair of 10-kg argon bubble chambers at Fermilab and SNOLAB to test the low-threshold performance of this technique in a physics-scale device and search for dark matter, respectively.

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