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LAr Scintillating Bubble Chambers for Rare Event Searches

Tuesday 7 October 2025 14:00 (20 minutes)

The Scintillating Bubble Chamber (SBC) collaboration is developing liquid-noble bubble chambers to detect sub-keV nuclear recoils, allowing the search for low-mass (GeV-scale) dark matter and coherent elastic neutrino-nucleus scattering from low-energy (MeV-scale) neutrinos. The scintillating bubble chamber detectors benefit from the energy reconstruction that the scintillation signal gives in addition to the superior electron-recoil insensitivity that bubble chambers naturally provide. The high level of superheat achievable in noble liquids while being electron-recoil insensitive allows for lower nuclear recoil thresholds than in existing freon-based bubble chambers, potentially reaching the 100 eV threshold desired for reactor CEvNS measurements. To validate this lower threshold, the SBC collaboration is constructing two 10 kg detectors that are functionally identical. The SBC-LAr10, which is currently being commissioned at Fermilab, is intended for engineering and calibration research and has additional possibilities in assessing coherent elastic neutrino-nucleus scattering in argon. SBC-SNOLAB, the second detector for a low-background dark matter search, will be run at SNOLAB underground. The status of SBC-LAr10 commissioning will be discussed, along with an overview of the SBC experiment.

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