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Scintillating Bubble Chambers for Direct Dark Matter Detection, and an Update on SBC-LAr10

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The Scintillating Bubble Chamber (SBC) Collaboration aims to use the liquid-noble bubble chamber technology as a low-threshold detector for dark matter particles of 1-10 GeV/c². The detector combines the remarkable electron recoil (ER) discrimination of the bubble chamber with the event-by-event energy resolution provided by liquid argon (LAr) scintillation, with the crucial added benefit that ER discrimination in liquid-noble bubble chambers extends to much lower thresholds than in past freon-filled bubble chambers, with the potential for quasi-background-free operation at thresholds of 100 eV in nuclear recoil (NR) energy. SBC has developed two functionally identical 10 kg detectors: SBC-LAr10 at Fermilab will calibrate low-threshold performance, while the radio-pure SBC-SNOLAB chamber will execute SBC's first deep-underground dark matter search. SBC-LAr10 at Fermilab was recently installed in the MINOS tunnel 100 meters underground, and the first bubbles are expected this fall. I will present the current status of SBC-LAr10 and describe the suite of gamma and neutron calibrations we will execute. The calibrations will confirm the physics reach of this new technology, motivating not just the SBC-SNOLAB chamber now being assembled but also future searches into the solar neutrino fog at 1 GeV/c².

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