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Scintillating Bubble Chambers for Direct Dark Matter Detection

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The scintillating bubble chamber has the potential to be an incredibly powerful new tool for dark matter detection. Combining the world-leading electron recoil rejection of a bubble chamber with the energy information available in a liquid scintillator, these devices should achieve unprecedented discrimination against all backgrounds while working with a variety of target materials. New possibilities include xenon-based detectors with 10^{10} discrimination against electron recoils, argon-based detectors with discrimination down to few-keVr (or even sub-keVr) thresholds, and organic and fluorinated-organic scintillator detectors immune to the alpha-induced backgrounds that likely limit existing bubble chamber experiments. We'll present progress by groups at SUNY Albany and Northwestern University towards the world's first working scintillating bubble chambers, starting with liquid xenon targets. With the potential to cover spin-dependent, spin-independent, and low-mass WIMPs, and the scalability already demonstrated by both bubble chambers and liquid scintillators, this technology could rapidly become a contender for G3 dark matter searches.

Oral or Poster Presentation

Oral

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