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Xebub, a prototype liquid xenon bubble chamber as dark matter detector

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The search for dark matter, which makes up to 25% of the mass of the universe, is one of today's most exciting fields of particle physics. As bigger detectors are being built to increase their sensitivity, background reduction is an ever more challenging issue. To this end, a new type of dark matter detector is being developed, a liquid xenon bubble chamber, which would combine the strengths of liquid xenon TPCs, namely event by event energy resolution, with those of a bubble chamber, namely insensitivity to electronic recoils. In addition, it would be the first time ever that a dark matter detector is active on all three detection channels, ionization and scintillation characteristic of xenon detectors, and heat through bubble formation in superheated fluids. Preliminary simulations have shown that depending on threshold, a discrimination of 99.99% to 99.9999+ % can be achieved, which is on par or better than many current experiments. The status of a prototype that is currently being built and tested at the University at Albany, SUNY, is presented.

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