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The Snowball Chamber: An Alternative Detection Method for Dark Matter

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The cloud and bubble chambers have historically been used for particle detection, capitalizing on supersaturation and superheating respectively. We present now on the snowball chamber, which utilizes a supercooled liquid. In our prototypes, an incoming particle triggers crystallization of purified water. We demonstrate that water is supercooled for a significantly shorter time with respect to control data in the presence of AmBe and ^{252}Cf neutron sources. A greater number of multiple nucleation sites are observed as well in neutron calibration data, as in a PICO-style bubble chamber. Similarly, gamma calibration data indicate a high degree of insensitivity to electron recoils inducing the phase transition, making this detector potentially ideal for dark matter searches seeking nuclear recoil alone. We will explore the possibility of using this new technology for that, updating everyone on new results that will be a prelude of our newest generation tests.

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