

## The Snowball Chamber: Neutron-Induced Nucleation in Supercooled Water

*Sunday, 9 December 2018 16:00 (30 minutes)*

The cloud and bubble chambers have been used historically for particle detection, capitalizing on supersaturation and superheating respectively. We now present the snowball chamber, which utilizes supercooled liquid. In our prototype, 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  $^{252}\text{Cf}$  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 WIMP and low-mass dark matter searches.

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