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DELight – Searching for light dark matter using superfluid helium

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The Direct search Experiment for Light Dark Matter (DELight) aims to develop a novel detector technology for the search for light dark matter based on the properties of the superfluid phase of the inert gas 4He. This detector uses the purest material imaginable, provides multiple independent signals for background suppression, has the potential to exploit directionality for event identification, and offers the ability to extend the sensitivity of direct dark matter search to the MeV range. In the first phase, we will build a 10-liter prototype detector with metallic magnetic calorimeters (MMCs) as photon and phonon sensors to investigate the signal threshold that can be reliably detected and to study the directional dependence of the quantum evaporation of He atoms on the energy and mass of the scattering particle. Here we will discuss the physics and the potential of such a detector for light dark matter as well as the goals and long-term perspective of DELight.

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