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HeRALD, a new detector concept for light dark matter direct detection

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We present HeRALD (Helium Roton Apparatus for Light Dark matter), a new detector concept using superfluid helium as the target material for sub GeV dark matter nuclear recoil. Helium, in its superfluid state, promises a good kinematic matching to low mass dark matter with several channels for reading out nuclear recoils. The main idea of this detector design is that superfluid helium allows long-range ballistic propagation of phonon and roton excitations which, at the liquid-vacuum interface, can produce quantum evaporated single 4He atoms then sensed via their adsorption energy onto large-area low-threshold calorimetry. I will describe the R&D of this technique and I will discuss its capability of reaching recoil energy thresholds below 10 eV along with the sensitivity projections for a small scale detector ($\sim 1\text{Kg}$) and its possibility of exploring new parameter space.

Less than 5 years of experience since completion of Ph.D

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Student (Ph.D., M.Sc. or B.Sc.)

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