

# Progress Towards the Direct Detection of sub-GeV Dark Matter Using a Superfluid He-4 Target

*Saturday, 2 December 2017 10:10 (20 minutes)*

We propose a new detector design based on superfluid helium sensitive to the sub-GeV mass WIMP-like dark matter parameter space. Our detector design reads out roton and phonon excitations in the superfluid by detecting the quantum evaporation of helium atoms with bolometers suspended in vacuum above the superfluid helium mass. The binding energy from helium absorption to the bolometer surface allows for the amplification of excitation signals, giving us to access new parameter space with a kilogram-scale experiment. Bolometers submerged in the superfluid enclose the rest of the active mass to read out scintillation photons as another signal channel for discrimination. We discuss simulation work for predicting the sensitivity reach of this detector concept and ongoing efforts towards two neutron scattering experiments to characterize helium scintillation response to nuclear recoils.

## Session

Works in Progress (15+5 min)

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**Session Classification:** Works in Progress