Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Searching for scalar dark matter with compact mechanical resonators[1] JACK MANLEY, Univ of Delaware, DALZIEL WILSON, Univ of Arizona, RUSSELL STUMP, Univ of Delaware, DANIEL GRIN, Haverford College, SWATI SINGH, Univ of Delaware — Ultralight scalars are an interesting dark matter candidate which may produce a mechanical signal by modulating the Bohr radius. Recently it has been proposed to search for this signal using resonant-mass antennae. Here, we extend that approach to a new class of existing and near term compact (gram to kilogram mass) acoustic resonators composed of superfluid helium or single crystal materials, producing displacements that are accessible with opto- or electromechanical readout techniques. We find that a large unprobed parameter space can be accessed using ultra-high-Q, cryogenically-cooled, cm-scale mechanical resonators operating at 100 Hz to 100 MHz frequencies, corresponding to $10^{-12} - 10^{-6}$ eV scalar mass range.

[1]This work is supported by the National Science Foundation grant PHY-1912480

Jack Manley
Univ of Delaware

Date submitted: 31 Jan 2020 Electronic form version 1.4