

Abstract Submitted  
for the DAMOP19 Meeting of  
The American Physical Society

**Search for light scalar dark matter using optomechanical systems**

SWATI SINGH, University of Delaware — Although the existence of dark matter (DM) has been indisputably proven by a range of cosmological and astronomical measurements, there is no viable candidate for dark matter in the Standard Model. In this talk, we will explore optomechanical resonators as detectors of scalar dark matter in the  $10^{-12}$ – $10^{-6}$  eV regime. Light DM particles have large occupation numbers and can be phenomenologically described as a classical field. Irrespective of the model used to produce them, such a classical field can have consequences that can be measured by precision measurement setups, such as varying  $\omega$  or  $m$  at the frequency associated with DM mass. This effect is enhanced in a solid, and variations in the size of an elastic medium lead to a new force just like the tidal force due to a passing gravitational wave. Moreover, the resonant enhancement over a localized frequency provided by these devices enhances sensitivity to such fields. We will discuss the scalar field parameter space that can be explored by current and future optomechanical devices. Finally, we will comment on how these searches can complement the existing precision measurement based searches based on atomic clocks, spin precession or equivalence principle tests.

Swati Singh  
University of Delaware

Date submitted: 01 Feb 2019

Electronic form version 1.4