

JOINT TUFTS/MIT COSMOLOGY SEMINAR

Searching for Ultralight Dark Matter with Mechanical Quantum Sensors

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Many well theoretically motivated scalar, pseudoscalar and vector models of ultralight dark matter are expected to give rise to feeble oscillatory forces or torques on macroscopic objects. Optically trapped sensors have high force and torque sensitivities but have remained relatively unexplored in this context. In this talk we will discuss new proposals of tunable, optically trapped sensors and strategies specifically designed to detect such forces or torques. We will also discuss how these sensors can also detect 5th forces. We notably discuss how both levitated and suspended sensors can be used complementarily to look for signals at the standard quantum limit both on and off-resonance with current off-the-shelf technologies. We demonstrate that these sensors can offer unique access to large regions of uncharted parameter space, with projected sensitivities that could advance existing limits by several orders of magnitude over a broad range of frequencies.

Tuesday, September 22, 2026, 2:30 pm

574 Boston Ave, Room 310

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Refreshments at 2:00 outside room 304