

JOINT TUFTS/MIT COSMOLOGY SEMINAR

X-ray femtolensing probes asteroid-mass black holes

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The asteroid-mass regime is the key remaining window in which primordial black holes could constitute all of dark matter. I will present a new method to probe a substantial portion of this window using X-ray femtolensing. While photometric microlensing requires long observations of very stable compact sources, the energy-dependent features imprinted onto X-ray spectra furnish a clean target with relatively little in the way of astrophysical backgrounds. I will demonstrate that that per-event fringe detection is straightforward for asteroid-mass objects lensing bright compact Galactic sources, meaning that the only bottleneck is the lensing event rate. Remarkably, the ~ 35 megaseconds of archival data already in hand from RXTE and NICER are sufficient to probe PBH dark matter at masses of order 10^{19} g with existing data. I will further explain how upcoming data can make these bounds substantially more robust even without any dedicated searches.

Tuesday, November 3, 2026, 2:30 pm
574 Boston Ave, Room 310
Tufts University
Refreshments at 2:00 outside room 304