

JOINT TUFTS/MIT COSMOLOGY SEMINAR

Primordial Origin of Supermassive Black Holes

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JWST observations have uncovered a surprising abundance of supermassive black holes (SMBHs) and enigmatic "Little Red Dots" at high redshift, sharpening a long-standing puzzle: how did such massive objects form so early in cosmic history? In this talk, I present two complementary scenarios in which new physics naturally provides massive seeds. First, I show that dissipative dark matter can undergo rapid gravothermal collapse at halo centers, seeding SMBHs whose mass function and high black-hole-to-stellar mass ratios are in good agreement with high-redshift observations. Second, we propose a domain-wall-catalyzed phase transition scenario to produce supermassive primordial black holes and show that conventional first-order phase transitions cannot form black holes at this mass while remaining consistent with experiments. Together, these mechanisms connect the seeding of the earliest SMBHs to the microphysics of the dark sector and the early Universe.

Tuesday, October 6, 2026, 2:30 pm

574 Boston Ave, Room 310

Tufts University

Refreshments at 2:00 outside room 304