

JOINT TUFTS/MIT COSMOLOGY SEMINAR

Cosmic tension phenomenology

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My talk will begin by summarising key observables and their physical and parametric sensitivities. Using this framework, I will present my work dissecting the low S_8 value from weak-lensing data and the DESI preferences for evolving dark energy and negative neutrino masses. Data from DESI, supernovae and the CMB are mildly discrepant on the Λ CDM value of Ω_m , which can manifest as a preference for evolving dark energy, and my work finds that this preference for $w_0 w_a$ is not a prior-volume effect. On the neutrino side, freedom in the optical depth τ to reionisation, lensing amplitude A_{lens} or $w_0 w_a$ dark energy can restore consistency between cosmology and terrestrial experiments on the sum of neutrino masses. Finally, I will present a new framework for a model-independent reconstruction of the scale-dependent matter power spectrum $P(k)$ from lensing data. This can reveal the physical scales where the data prefer deviations from Planck Λ CDM. By mapping observables to the parameters they constrain and the scales they probe, we can see more clearly where Λ CDM continues to succeed, where it strains against the data, and how those stress points can guide the search for new physics.

Tuesday, October 28, 2025, 2:30 pm

574 Boston Ave, Room 316

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Refreshments at 2:00 outside room 304