College | Physical Sciences

UCLA Physics & Astronomy

Colloquium

Thursday, November 12th, 2026 at 4 p.m.
Physics & Astronomy Building (PAB) 1-434

Sydney Erickson

(UCLA)

Time-Delay Cosmography Beyond ΛCDM

Tension between measurements of the present-day expansion rate of the Universe (the Hubble constant, H_0), along with hints of potential time-evolution in the dark energy equation of state, may indicate physics beyond the cosmological standard model, ΛCDM. A decisive understanding will require independent measurements of both the Universe's current expansion rate and its expansion history. Time-delay cosmography from strongly lensed quasars provides an independent measurement of late-Universe expansion through the distance-redshift relation. Current analyses use ~10 time-delay lenses to produce high-precision measurements of H_0. The Vera Rubin Observatory's Legacy Survey of Space and Time (LSST) is forecasted to deliver cosmological time-delay measurements for O(100-1000) strongly lensed quasars. By growing the sample of time-delay lenses, the distance relation can be constrained across redshifts, increasing sensitivity to other cosmological parameters. I demonstrate how a large sample of lenses with LSST time-delay measurements can be used to constrain both H0 and the dark energy equation of state parameters (w_0,w_a). I also investigate how machine learning can be used to scale up strong lens modeling techniques to handle larger samples, applying neural posterior estimation to model Hubble Space Telescope observations of lensed quasars. This work demonstrates the growing capability of time-delay cosmography to contribute as a probe of the Universe's expansion in beyond-ΛCDM cosmologies.

Hosted by Dolores Bozovix

Refreshments at 3:30 p.m. on the 3rd floor patio