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The Hubble Tension as the Signature of a New Phase Transition

Wednesday 25 June 2025 09:00 (40 minutes)

In this talk, I will argue that the Hubble tension points to new physics in the early universe, between big bang nucleosynthesis and recombination. Specifically, I will propose that it might be the signature of a new phase transition in the dark sector. The latent heat released during the phase transition provides a sizeable energy injection into the cosmic fluid, shortening the sound horizon and raising the early-universe inferred value of the Hubble parameter. I will present two concrete microphysical realizations of this idea: Cold New Early Dark Energy is a triggered vacuum phase transition that occurs shortly before matter-radiation equality and shares phenomenological features with other early dark energy models. Hot New Early Dark Energy, by contrast, is a supercooled phase transition that occurs at higher redshift and heats the dark sector, providing a concrete realization of a (stepped) dark radiation model.

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