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Online Plenary — Eleonora Di Valentino: Cracks in the Standard Cosmological Model: Tensions, Robustness, and Hints of New Physics

Monday, 16 November 2026 16:30 (1 hour)

The Λ CDM model has been extraordinarily successful in describing the Universe, but increasingly precise observations are beginning to expose cracks in this remarkably simple picture. The Hubble constant discrepancy remains the most striking example, while recent measurements of the expansion and growth histories of the Universe, together with cosmological constraints on neutrino masses, are adding new pieces to the puzzle. But which of these tensions are robust, and which depend on our choice of datasets, methodology, or cosmological assumptions? In this talk, I will examine the evidence behind the main cosmological tensions and ask what remains when these choices are varied. I will then explore whether the surviving discrepancies can be accommodated by extensions of the standard model, including dynamical dark energy, new early-Universe physics, and interactions in the dark sector. The emerging picture may not yet tell us what lies beyond Λ CDM, but it is beginning to tell us where (and how) we should look.