

The Gravity of Particle Physics (Naturally)

Sunday 5 May 2024 09:00 (20 minutes)

UV Priors for Light Scalars (and how they might be screened)

The recent advent of gravitational-wave observations allows testing gravity in a strongly relativistic regime, but decoupling - which beautifully explains why low-energy measurements are largely insensitive to UV details - seems to thwart the extraction of fundamental insights about UV physics from astrophysical or cosmological observations. This talk argues that a few UV features can penetrate the fog of decoupling in interesting ways, but that for historical reasons the most likely interactions at low energies are not being explored in the new comparisons with observations. A key question when seeking new light particles asks whether macroscopic objects couple simply as the sum of the couplings of their microscopic constituents, and the black-hole no-hair theorems show that the generic answer is “no”. Such ‘screening mechanisms’ suggest that light particles might hide from present-day tests of gravity and this talk describes one such a mechanism that arises in the best-motivated class of low-energy interactions (that exclude standard screening mechanisms like Chameleons). If time permits I will more broadly explain how these ideas naturally emerge within the context of approaches to other problems like the Hubble tension and cosmological constant problem.

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