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Hidden Gravitons Phenomenology

Thursday, October 2, 2025 9:30 AM (45 minutes)

Ultralight bosonic fields are well-motivated candidates for explaining dark matter, dark energy, and other open problems in cosmology. While scalars are the standard approach, higher-spin fields—including vectors and spin-2 gravitons—can exhibit similar behavior with distinctive phenomenology. This talk explores the cosmological evolution of such fields, emphasizing the isotropy theorem that ensures an isotropic average energy–momentum tensor for rapidly evolving configurations. We focus on ultralight massive spin-2 fields ("hidden gravitons") as wave-like dark matter, discussing their background evolution, cosmological perturbations, and their impact on small-scale structure formation. We also review key experimental and observational constraints from fifth-force searches, astrophysical data, and collider analyses. Particular attention is given to the potential generation of stochastic gravitational wave backgrounds, which could serve as a powerful probe of these scenarios.

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