



# Physics colloquium

## Accelerated Expansion of the Universe: Problems and Progress

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Date: **2/15/19**

Time: **10:30 AM**

Location: **COB2 170**

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**Abstract:** The accelerated expansion of the universe demands a more complete framework for quantum gravity, and offers new observational handles on high energy physics. After summarizing the basic observations and theoretical implications, I will explain some recent developments. In string theory, metastable accelerated expansion plausibly results from an interplay of highly structured energy sources. The resulting de Sitter geometry contains horizons, which play a key role in seeding structure, while raising basic conceptual questions. The anti-de Sitter/conformal field theory duality, which formulates quantum gravity in terms of quantum field theory, does not directly apply. We show how it can be upgraded in a way that preserves some essential features, leading to a statistical interpretation of the Gibbons-Hawking horizon entropy in terms of an entanglement entropy in the dual description. Moving from thought experiments back to empirical observations, we provide some new examples of observational probes of high energy physics in the early universe, taking into account the potential landscape and strong nonlinearities that can build up in cosmology.

**Bio:** Eva Silverstein's research connects the mathematical structure of string theory to predictions for cosmological observables, leading to broader lessons in primordial cosmology. She has also made extensive contributions to the fundamentals of string theory and quantum field theory, with implications for dualities, space-time singularities and black hole physics.