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The Ins and Outs of Cosmological Correlators

Monday 7 April 2025 13:40 (1 hour)

By directly probing the initial conditions of our universe, cosmological surveys offer us a unique observational handle on quantum field theory in curved spacetime with dynamical gravity and might even allow us to glean information about a full theory of quantum gravity. Here I will report on recent progress in the study of the natural observables in the problem, namely cosmological correlators. To set the stage, I will review the four things that every physicist should know about cosmology. Then, I will review results from two different approaches. First, I will provide an executive summary of general properties that follow from symmetries, unitarity, causality and locality. I will describe how these properties can be leveraged to predict signals that might be hiding in cosmological surveys. Second I will present a new "in-out" formalism to compute cosmological correlators as an interesting alternative to the well-known in-in formalism and I will stress some of its advantages, such as a proposal for a de Sitter scattering matrix.

Presenter: Dr PAJER, Enrico (University of Cambridge)
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