Title: Recent Progress on the Cosmological Bootstrap

Abstract: In this talk, I will review the (boostless) cosmological bootstrap approach to the study of cosmological correlators from inflation, in which symmetries and general physical principles such as causality, unitarity and locality substitute the traditional model-building and lead to a variety of general results and new predictions for primordial signals. The object of study is the field theoretic wavefunction and its wavefunctions coefficients, from which all correlators can be (perturbatively) derived. Wavefunction coefficients are the close analog of amplitudes in flat space and many results for amplitudes have avatars in the cosmological bootstrap.
In the first part of the talk, I will review a few core results: (i) Causality implies that "off-shell" wavefunction coefficients (a.k.a. cosmological "in-out" Green's function) are analytic functions of off-shell energies (non-perturbatively) in the lower-half complex plane, whose singularity on the negative real axis are classified. (ii) Unitarity implies an infinite set of relations between higher and lower order contributions in perturbation theory known collectively as the cosmological optical theorem. (iii) Manifest locality constrains wavefunction coefficients in the form of analytically-continued soft limits.
In the second part of the talk, I discuss four phenomenological results recently derived with these techniques: (1) The tree-level scalar bispectrum to all orders in derivatives both assuming scale invariant and oscillations (resonant non-Gaussianity); (2) The only three possible tree-level shapes of the parity-odd tensor bispectrum; (3) a no-go theorem for the parity-odd trispectrum and some yes-go examples and (4) the graviton trispectrum in general relativity.

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