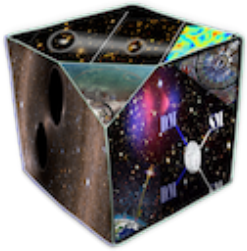

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An Analytic Approach to Cosmic Structures

Monday 20 August 2018 09:30 (30 minutes)

The non-linear, late-time evolution of cosmic structures is notoriously hard to tackle with analytic methods. While numerical simulations are highly successful and lead to impressive results, there are fundamental as well as pragmatic reasons for an analytic understanding to be sought. Conventional methods based on the hydrodynamic equations are limited mainly by the shell-crossing problem. In this talk, I shall review a novel approach based on kinetic field theory. It structurally resembles a non-equilibrium statistical quantum field theory and avoids the shell-crossing problem by construction. Suitably approximating particle interactions allows the derivation of a closed, non-perturbative, parameter-free expression for the non-linear cosmic-density power spectrum which reproduces numerical results to better than 10% up wave numbers of k ˜ 10 h/Mpc at redshift 0. The formalism can straightforwardly be generalised to mixtures of gas and dark matter, axionic dark matter, or modified gravity theories, for which I shall show first examples.

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