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Decoherence of cosmological perturbations

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Abstract:

Cosmological perturbations (primordial gravitational potentials) are believed to be generated as a result of amplification of matter vacuum fluctuations during inflation. This means that the amplified primordial gravitational potentials have quantum character: they appear as a coherent sum of primordial potentials on cosmological scales. In my talk I shall discuss a simple mechanism based on which cosmological perturbations decohere already during inflation, resulting in an approximately classical state at late times. For our mechanism to work at least two scalar fields are needed during inflation. I shall argue that, quite generically, one of the fields (the isocurvature perturbation) decoheres the other field (the adiabatic perturbation) during inflation. I propose the entanglement entropy as a natural quantitative measure for decoherence and I show how it grows during inflation.

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