"A cosmological open quantum system"

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Our cosmological observations today are limited to a finite volume of space, but models of the primordial universe predict a universe much larger than what we see. Those models also predict that quantum fluctuations are the origin of the structure in the universe. I will use this framework as motivation to construct the evolution equation for the density matrix of an infrared-limited set of co-moving momentum modes in two examples of nearly de Sitter universes. Including an interaction term from the gravitational action and tracing out long-wavelength modes, I will show that the nature of the resulting dissipation terms depends on how curvature fluctuations evolve on scales larger than the Hubble scale. The results are relevant for constructing effective quantum theories for early universe cosmology, as well as for other settings where usual UV effective field theory is not applicable.