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Primordial perturbations in kinetically dominated regimes of classical and quantum cosmology

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There is an increasing interest in very early stages of the Universe in which the energy density of the inflaton could be dominated by its kinetic part. This includes classical inflationary scenarios with deviations from slow-roll regimes that can introduce modifications to the power spectra of the primordial fluctuations. Another example are quantum bouncing cosmologies. For instance, this is the typical situation in loop quantum cosmology if quantum corrections may leave observable traces in the power spectra. In models of this type, we discuss the leading-order effects of an inflaton potential on the primordial perturbations. These effects are of two kinds, referred to the case without potential. First, there are changes in the effective mass appearing in the dynamical equations of the perturbations in conformal time. Second, away from conventional slow roll, a Bunch-Davies vacuum may no longer be natural, and possible new choices depend on the potential.

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