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Towards a reduced phase space quantization in loop quantum cosmology with an inflationary potential

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In this talk we discuss three different models for a reduced phase space quantization of loop quantum cosmology (LQC) for a spatially flat Friedmann-Lemaître-Robertson-Walker (FLRW) universe filled with reference fields and an inflaton field in a Starobinsky inflationary potential. All three models are two-fluid models and they differ by their choice of global clock which are chosen to be either Gaussian dust, Brown-Kuchař dust or a massless Klein-Gordon scalar field. Although two-fluid models are more complicated than models involving the inflaton only, it turns out that some of the technical hurdles in conventional quantum cosmological models can be bypassed in these models. Using the effective dynamics resulting from the reduced phase space quantization we discuss some phenomenological implications of these models including the resolution of the big bang singularity via a quantum bounce and in addition address the question whether different choices of clocks can leave an imprint on the inflationary dynamics.

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