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Evolution Picture in Loop Quantum Cosmology

Abstract : In general relativity there is not a fixed time that leads to a fixed concept of physical evolution. As a consequence, in the particular case of quantum cosmology, in order to interpret the physical observables as evolving in time, the construction of a well-defined picture of unitary evolution is needed. Usually it is provided by a massless scalar field playing the role of the internal time. Rather than using that suitable clock, here we develop the concept of physical evolution in quantum cosmology when the internal time is one of the geometry degrees of freedom, both in the Wheeler-DeWitt quantization and in Loop Quantum Cosmology. For concreteness, we apply our analysis to the vacuum Bianchi I cosmologies.

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