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Effective f(R) actions for modified Loop Quantum Cosmologies

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General Relativity is an extremely successful theory, at least for weak gravitational fields, however, it breaks down at very high energies, such as in correspondence of the initial singularity. Quantum Gravity is expected to provide more physical insights concerning this open question. Indeed, one alternative scenario to the Big Bang, that manages to completely avoid the singularity, is offered by Loop Quantum Cosmology (LQC), which predicts that the Universe undergoes a collapse to an expansion through a bounce. In this talk, I will discuss how, in a recent paper, we used metric f(R) gravity to reproduce the modified Friedmann equations which have been obtained in the context of modified loop quantum cosmologies. I will describe the order reduction method that was used and how this allowed us to obtain covariant effective actions that lead to a bounce, for specific models of modified LQC, considering matter as a scalar field.

Primary authors: RIBEIRO, Ana Rita (Faculdade de Ciências da Universidade de Lisboa); LOBO, Francisco (Science Faculty of the University of Lisbon); Dr VERNIERI, Daniele (University of Naples "Federico II")

Presenter: RIBEIRO, Ana Rita (Faculdade de Ciências da Universidade de Lisboa)

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