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# Analyzing Running Vacuum Energy and Viscous Dark Matter Models

*Friday 27 October 2023 16:15 (20 minutes)*

Running vacuum models and viscous dark matter scenarios beyond perfect fluid idealization are two appealing theoretical strategies that have been separately studied as alternatives to solve some problems rooted in the ΛCDM cosmological model. In this talk, I will explain the cosmological consequences of combining these two notions in a single cosmological setting, paying particular attention in the interplay between these two constituents in different cosmological periods. In particular, I will discuss a well-studied running vacuum model inspired by renormalization group, together with a recently proposed parameterization for the bulk viscosity [Eur. Phys. J. Plus (2023) 138:7381]. Further, by applying dynamical system analysis, I will explain the physical aspects of the new phase space that emerges from the combined models and derive stability conditions that ensure complete cosmological dynamics. It turns out, that four distinct classes of models arise, whose associated critical points are non-trivially renewed compared to the single scenarios. As a complementary strategy to dynamical system analysis, a detailed numerical exploration is performed to quantify the impact of both the running parameter and the bulk viscosity coefficient on the cosmological evolution.
Finally, I will present the conclusions including that for some values of the model parameters, the numerical solutions display qualitative differences from the ΛCDM model, which are phenomenologically appealing in light of cosmological observations.

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