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Title: “The Analysis of the Semiclassical Einstein-Klein-Gordon System”

Abstract: “The semiclassical approximation of the Einstein–Klein–Gordon system is a framework where gravity is treated as the curvature of a Lorentzian manifold, while matter is modeled by a quantum field. The backreaction of matter on the geometry is implemented by equating the Einstein tensor with the expectation value of the quantum stress-energy tensor in a suitable quantum state. In this talk, we focus on the linearized problem around Minkowski spacetime. Using the Møller operator, the system decouples into two distinct Cauchy problems, where the metric perturbations are governed by a higher-order, nonlocal hyperbolic PDE. By relegating the nonlocal contributions to subleading order, we establish the well-posedness of this Cauchy problem. Furthermore, we provide a rigorous asymptotic analysis for physically admissible choices of the renormalization constants, demonstrating late-time exponential growth. This instability ultimately drives a clear transition from a Minkowski to a de Sitter geometry. This is joint work with S. Galanda, P. Meda, N. Pinamonti and G. Schmid.”