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The spatial Functional Renormalization Group and Hadamard states on cosmological spacetimes

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In this talk I will introduce a novel "spatial" variant of the Functional Renormalization Group (FRG) on Lorentzian signature globally hyperbolic spacetimes. The adaptation of the FRG technique (typically studied on Euclidean signature manifolds) to Lorentzian signature spacetimes features several new conceptual aspects, in particular that such a FRG must inevitably be quantum-state dependent and that it should be based on a Hadamard state. In this talk I will discuss a concrete implementation for scalar quantum fields on spatially flat Friedmann-Lemaitre spacetime, highlighting the universality of the renormalization group (RG) flow in the ultraviolet stemming from the Hadamard property, as well as the state-dependence of the flow in the infrared.

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