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Why quantum field theory in curved space–time is very far from being well understood

Tuesday, 6 July 2021 10:45 (20 minutes)

We discuss equilibration process in expanding universes as opposed to the thermalization one in Minkowski space–time. The goal is to answer the question: Does the equilibrium reached before the rapid expansion stops and has negligible effect on the background geometry? Or stress–energy fluxes in a universe of GUT scale curvature have strong effects on the expansion rate and the equilibrium is reached only after the drastic decrease of the space–time curvature? We discuss the notion of observables in highly curved space–times. We argue that consideration of more generic non–invariant Hadamard states in theories with invariant actions is a necessary ingredient to understand quantum field dynamics in strongly curved backgrounds. The reason for the consideration of such states is the presence of secular memory effects in generic time dependent backgrounds, which are totally absent in equilibrium.

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