Non-Markovian Unruh effect

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ABSTRACT

We study memory effects as information backflow for an accelerating two-level detector weakly interacting with a scalar field in the Minkowski vacuum. This is the framework of the well-known Unruh effect: the detector behaves as if it were in a thermal bath with a temperature proportional to its acceleration. Here we show that, if we relax the usual assumption of an eternally uniformly accelerating system, and we instead consider the more realistic case in which a finite-size detector starts accelerating at a certain time, its dynamics may become non-Markovian. Our results are the first description of a relativistic quantum system in terms of information back-flow and non-Markovianity, and they show the existence of a direct link between the trajectory of the detector in Minkowski space and the presence or absence of memory effects.