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Title: Feynman--Kac formula and asymptotic behavior of the minimal energy for the relativistic Nelson model in two spatial dimensions

Abstract:

We consider the renormalized relativistic Nelson model in two spatial dimensions for a finite number of spinless, relativistic quantum mechanical matter particles in interaction with a massive scalar quantized radiation field. We present a Feynman--Kac formula for the corresponding semigroup and discuss some of its implications, such as the ergodicity of the semigroup. Our analysis entails two-sided bounds on the minimal energy when the Pauli principle for the matter particles is ignored. In the translation invariant case these bounds permit to compute the leading asymptotics of the minimal energy in the three regimes where the number of matter particles goes to infinity, the coupling constant for the matter-radiation interaction goes to infinity and the boson mass goes to zero.

The talk is based on a recent preprint, jointly written with Benjamin Hinrichs, that is available at <https://arxiv.org/abs/2211.14046>