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Fate of quarkonium in a quark gluon plasma via a Lindblad equation

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What is the dynamics of heavy quarks and antiquarks in a quark gluon plasma? Can heavy-quark bound states (quarkonia) dissociate? Can they (re)combine?

These are the questions that this paper aims to address by investigating a Lindblad equation that describes the quantum dynamics of the heavy particles in the medium.

The Lindblad equations for a heavy quark and a heavy quark-antiquark pair are derived from the gauge theory after a chain of well defined approximations. In this exploratory work the attention is restricted to the case of an abelian plasma, but the extension to the non-abelian case is feasable.

A one-dimensional simulation of the Lindblad equation for a heavy quark-antiquark pair is performed to extract information about bound-state dissociation, recombination and quantum decoherence. All these phenomena strongly depend on the imaginary part of the inter-quark potential appearing in the Lindblad formulation.

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