25e Congrès Général de la Société Française de Physique

ID de Contribution: **119** Type: **Poster**

Variational neural network ansatz for steady-states in open quantum systems

The state of a Markovian open quantum system is completely determined by its density matrix which evolves according to a Lindblad master equation. When the system is composed by many interacting particles, the complexity arising from the many-body problem merges with the necessity to represent mixed states. In this work [1] we exploit a variational ans¨atz described by a neural network to represent a generic nonequilibrium density matrix [2]. By deriving a variational principle, we show that it is possible to define an iterative procedure where the network parameters are varied in order to minimize a cost function quantifying the distance from the asymptotic steady-state. Such a procedure, similar in spirit to supervised learning, can be performed efficiently by means of a Montecarlo sampling of the cost function [3]. As a first application and proof-of-principle, we apply the method to the dissipative quantum transverse Ising model [4].

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Choix de session parallèle

4.3 Simulateurs quantiques

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Classification de Session: Séance Poster