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Simulating quantum Ising models using the Diffusion Monte Carlo method

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In our previous work [1], we showed that on continuous-variable systems the Diffusion Monte Carlo (DMC) method can be used as a heuristic optimization tool that mimics the imaginary-time dynamics of the Schrodinger equation and is competitive compared with, e.g., path-integral Monte Carlo simulations. In this work, we present an implementation of the DMC algorithm to simulate the ground state of transverse-field Ising models. The accuracy of the method is verified on the one-dimensional spin chain. We also present some preliminary results of quantum annealing simulations based on the DMC algorithm.

[1] E. M. Inack, S. Pilati, PRE 92, 053304 (2015)

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