

Abstract Submitted
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Entanglement and quantum computational speed-up GUIFRE VIDAL, Caltech — I will discuss recent results on the role of entanglement in quantum computation [G. Vidal, Phys. Rev. Lett. 91, 147902 (2003)] and in the efficient numerical simulation of quantum many-body dynamics [G. Vidal, Phys. Rev. Lett. 93, 040502 (2004)]. A pure-state quantum computation can be efficiently simulated with a classical computer provided that only a restricted amount of entanglement is involved. More generally, an upper bound on the computational speed-up offered by a quantum computation can be given in terms of its amount of entanglement. These results follow from an explicit simulation algorithm that can also be applied to efficiently simulate quantum dynamics in one spatial dimension, including spin chain dynamics.

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