Quantum Computing without Entanglement

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It is widely believed that entanglement is the basic resource or one of the basic resources of the power of the quantum computation. We present a toy model, a simple quantum algorithm, where the system is not entangled but is known to be contextual. We show that the quantum algorithm solves the model problem faster than the classical one. Our example gives support to the recent claim that contextuality supplies the magic for quantum computation [1].

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[1] M. Howard, J. J. Wallman, V. Veitch, and J. Emerson, arXiv:1401.4174 [quant-ph].