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Measurement-Based Quantum Computation with Thermal States and Always-on Interactions YING LI, Centre for Quantum Technologies, National University of Singapore, DANIEL BROWNE, Department of Physics and Astronomy, University College London, LEONG CHUAN KWEK, Centre for Quantum Technologies, National University of Singapore and Nanyang Technological University, ROBERT RAUSSENDORF, Department of Physics and Astronomy, University of British Columbia, TZU-CHIEH WEI, CN Yang Institute for Theoretical Physics, Stony Brook University — Quantum computation can be achieved by single-qubit measurements on an initial entangled state. It is often implicitly assumed that the interactions between spins can be switched off so that the dynamics of the measured spins does not affect the computation. We propose a model spin Hamiltonian so that measurement-based quantum computation can be accomplished on a thermal state with always-on interactions. Moreover, computational errors induced by thermal fluctuations can be corrected and thus the computation can be executed fault tolerantly if the temperature is below a threshold value.

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