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Reexamining classical and quantum models for the D-Wave One processor TAMEEM ALBASH, University of Southern California, TROELS RØNNOW, MATTHIAS TROYER, ETH Zurich, DANIEL LIDAR, University of Southern California — We revisit the evidence for quantum annealing in the D-Wave One device (DW1) based on the study of random Ising instances. We consider measures that account for ground state degeneracy and the distributions of excited states, and present evidence [1] that for these new measures neither SQA nor the classical rotor model correlate perfectly with the DW1 experiments, despite both models correlating very well with the DW1 ground state success probabilities[2,3]. We thus provide evidence that SQA and the classical rotor model, both of which are classically efficient algorithms, do not satisfactorily explain all the DW1 data.

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- [2] S. Boixo, T.F. Rønnow, S.V. Isakov, Z. Wang, D. Wecker, D.A. Lidar, J.M. Martinis, M. Troyer, Nat. Phys. 10(3), 218 (2014).
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