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Using Quantum Annealing Correction to Differentiate between Candidate Models TAMEEM ALBASH, University of Southern California, KRISTEN PUDENZ, Lockheed Martin, DANIEL LIDAR, University of Southern California — We study how the quantum annealing correction (QAC) strategy proposed by Pudenz et al.[1] allows us to distinguish between the final time statistics of the D-Wave device (DW2) and the classical rotor model (SSSV) proposed in ref.[2]. The SSSV model has been successful in reproducing the ground state probabilities for many Ising instances studied, setting a high bar for genuine quantum effects. Studying 1000 random instances using the QAC strategy with 112 logical qubits (448 physical qubits) [3], we show that the energy penalty term of the QAC strategy results in qualitatively different results for SSSV and DW2, with SSSV showing a clear separation in statistics for different penalty values while DW2 does not. While these results do not amount to a proof of quantumness, they support the notion that quantum effects play a relevant role in separating the SSSV model from the DW2 results observed.

[1] K. L. Pudenz, T. Albash, and D. A. Lidar, Nat Commun 5 (2014).
[2] S. W. Shin, G. Smith, J. A. Smolin, and U. Vazirani, arXiv:1401.7087 (2014).
[3] K. L. Pudenz, T. Albash, and D. A. Lidar, arXiv:1408.4382 (2014).

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