

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Programmable flux DACs in a Quantum Annealing Processor

EMILE M. HOSKINSON, FABIO ALTOMARE, ANDREW J. BERKELEY, PAUL BUNYK, RICHARD HARRIS, MARK W. JOHNSON, TREVOR M. LANTING, ELENA TOLKACHEVA, ILYA PERMINOV, SERGEY UCHAIKIN, JED D. WHITTAKER, D-Wave Systems — Programming the D-Wave Two processor to solve a given problem involves adjustment of thousands of independent flux biases. This is accomplished with an array of 4480 on-chip digital-to-analog converters (DACs), addressed using 56 external lines. Each DAC comprises a superconducting loop and control circuitry that allows injection of a deterministic number of flux quanta, up to a maximum value determined by the device parameters and the addressing scheme. In-depth characterization is performed to determine DAC transfer-functions and the addressing levels needed for fast and reliable programming. In contrast with traditional single-flux-quanta (SFQ) circuitry, zero static power during programming is dissipated on-chip, allowing efficient operation at mK temperatures.

Fabio Altomare
D-Wave Systems

Date submitted: 15 Nov 2013

Electronic form version 1.4