

## Demonstration of 10k-gate-scale Adiabatic-Quantum-Flux-Parametron Circuits

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**Abstract** — Adiabatic quantum flux parametron (AQFP) is a very energy-efficient superconductor logic. In AQFP logic, dynamic energy dissipation can be drastically reduced due to adiabatic switching operations using ac excitation currents. In the present study, we evaluated circuit yields using a large-scale AQFP circuit composed of as many as 10,000 AQFP gates with approximately 20,000 Josephson junctions. We measured eleven chips from four wafers and obtained circuit yields of 48% for 1,000-gate circuits and 22% for 10,000-gate circuits, respectively. In all the circuits, which worked correctly, the margins of excitation currents were as wide as approximately  $\pm 20\%$ .

**Keywords (Index Terms)** — Adiabatic Quantum Flux Parametron, AQFP, flux biasing, adiabatic operation, circuit yield.