

Abstract Submitted  
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**High Fidelity Universal Quantum Gates in Superconducting Qubit Systems Using Non-adiabatic Rapid Passage** FRANK GAITAN, RAN LI, Southern Illinois University — Recent theoretical work<sup>1</sup> has suggested that a class of non-adiabatic rapid passage sweeps first realized experimentally in NMR systems in 1991<sup>2</sup>, and which generate controllable quantum interference effects<sup>3,4</sup>, can be used to produce a high fidelity universal set of quantum gates. We show how this class of sweeps can be implemented in both superconducting charge and flux qubit systems. We discuss the current challenges facing the use of these sweeps to produce a universal set of high fidelity quantum gates in superconducting qubit systems.

<sup>1</sup>R. Li, M. Hoover, and F. Gaitan, *Quant. Info. Comp.* **7**, 594 (2007).

<sup>2</sup>J. W. Zwanziger, S. P. Rucker, and G. C. Chingas, *Phys. Rev. A* **43**, 3232 (1991).

<sup>3</sup>F. Gaitan, *Phys. Rev. A* **68**, 052314 (2003).

<sup>4</sup>J. W. Zwanziger, U. Werner-Zwanziger, and F. Gaitan, *Chem. Phys. Lett.* **375**, 429 (2003).

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