Driving the fluxonium qubit

Angela Kou
Aayam Bista, Matthew Thibodeau, Ke Nie, Kaicheung Chow, Wolfgang Pfaff, Bryan K. Clark

University of Illinois at Urbana-Champaign, Urbana, IL, USA 61802

akou@illinois.edu

The fluxonium qubit has garnered significant interest recently due to its high gate fidelities and strongly anharmonic spectrum. These valuable features have resulted in the fluxonium being proposed as the basis for a quantum processor, for use in transducing between microwave and optical signals, and as a nonlinear element for manipulating long-lifetime linear cavities. The capabilities of the fluxonium qubit for such schemes can be significantly improved under the application of a microwave drive. Here we discuss our recent experimental efforts demonstrating the benefits of applying a microwave drive for initializing and reading out a fluxonium qubit. We will conclude by discussing prospects for improving multiple-fluxonium devices through the application of a microwave drive [1].

Figures

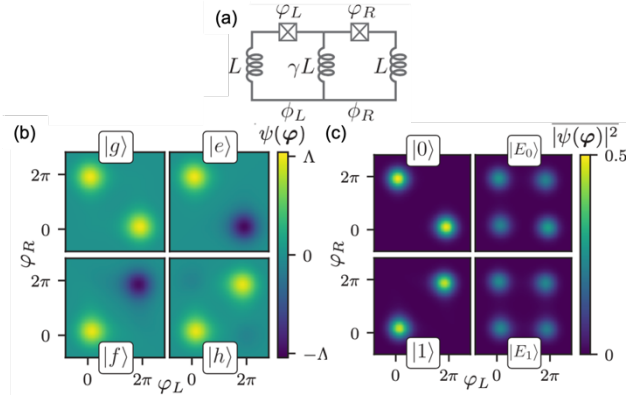

Figure 1: (a) Circuit diagram for a fluxonium molecule [2]. The energy eigenstates of the fluxonium molecule in the static (b) and driven (b) cases. The application of a microwave flux drive creates qubit states that are completely disjoint in phase for both the left and right fluxonium.

References

[1] Matthew Thibodeau, Angela Kou, Bryan K. Clark, arxiv: 2401.08762 (2024)

[2] A. Kou, W. C. Smith, U. Vool, R. T. Brierley, H. Meier, L. Frunzio, S. M. Girvin, L. I. Glazman, M. H. Devoret, Phys. Rev. X 7, 031037 (2017)