

Dr. Quentin Ficheux, University of Maryland

High-fidelity gates on fluxonium qubits

A promising path to reduce gate errors in transmon-based quantum processors consists in developing highly anharmonic circuits with some degree of protection from prevailing decoherence sources. At present, properly designed single fluxonium qubits can have over 1 ms coherence time via the trick of slowing down the qubit transition about tenfold or more compared to transmons. We describe recent progress in the implementation of high-fidelity single and two-qubit gates in fluxonium circuits. This includes a fast microwave-activated controlled-Z gate completed in less than 9 qubit Larmor cycles (about 60 ns) with a fidelity of 99.2%, which is on-par with the best microwave-activated gates reported on transmon qubits. Finally, we discuss the prospects of extending our two-qubit gates to large scale quantum processors.