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Mach-Zehnder-type Interferometry in a Strongly Driven Persistent-Current Qubit[1] WILLIAM OLIVER, MIT Lincoln Laboratory, YANG YU[2], MIT EECS Department, JANICE LEE, MIT EECS Department, KARL BERGGREN, MIT EECS Department, LEONID LEVITOV, MIT Physics Department, TERRY ORLANDO, MIT EECS Department — We have demonstrated Mach-Zehnder-type interferometry with a niobium superconducting persistent-current qubit. The qubits ground and first-excited states exhibit an anti-crossing. Driving the qubit with a large-amplitude harmonic excitation sweeps it through this anti-crossing two times per period. The induced Landau-Zener (LZ) transitions act as coherent beamsplitters, and the accumulated phase between LZ transitions varies with the driving amplitude. We have observed quantum interference fringes as a function of the driving amplitude for 1 to 20 photon excitations. We present and discuss these results.

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