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The fluxonium as a lambda system[1] U. VOOL, A. KOU, W.C. SMITH, K. SERNIAK, S. SHANKAR, S.M. GIRVIN, M.H. DEVORET, Department of Applied Physics, Yale University — A lambda system is a 3-level system in which two low-energy states can transition to a third higher-energy state by a coherent drive but not to each other. Lambda systems are commonly implemented in systems relying on atomic transitions. In the field of superconducting quantum circuits, the fluxonium qubit, an artificial atom consisting of a Josephson junction shunted by a super-inductance, is a unique artificial atom with highly non-linear energy levels. At half-flux quantum it has two low-energy states with a long energy lifetime, but it is difficult to perform fast quantum gates in this manifold. Employing the higher 2nd excited state as an intermediate level would be much more efficient. However, selection rules in the fluxonium qubit prohibit transitions between low-energy states and higher-energy states of the same parity. In this talk, we will introduce a way to create formerly forbidden transitions between levels of the fluxonium qubit - thus creating a more interesting artificial atom and a useful tool for future superconducting quantum circuits.

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