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**Fluxon readout for superconducting qubits** KIRILL FEDOROV, Walther Meissner Institute, ANASTASIA SHCHERBAKOVA, ALEXEY USTINOV, Karlsruhe Institute of Technology — We demonstrate an experiment on coupling of a single Josephson vortex (fluxon) in a long annular Josephson junction (AJJ) with a flux qubit. Using a possibility to measure the microwave radiation induced by a fluxon oscillations in the AJJ, the interaction of a current dipole generated by the flux qubit and the propagating fluxon was studied. We discuss relativistic dynamics of the Josephson vortex scattering on the current dipole. We detected specific periodic variations of the fluxon oscillation frequency versus magnetic flux through the qubit. We found that quantum states of the flux qubit can be distinguished by measuring small frequency shifts of the coupled fluxon oscillations. The fluxon readout for the superconducting flux qubit was experimentally performed by measuring of a characteristic energy spectrum of the latter. The demonstrated approach is compatible with the existing low-temperature digital RSFQ (Rapid Single Flux Quantum) electronics and may be useful as a scalable interface between classical computers and respective quantum counterparts.

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