

# Rapid Ballistic Readout for Flux Qubits

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I present a recent suggestion [1] of a new type of the magnetic flux detector which can be optimized with respect to the measurement back-action, e.g., for the situation of quantum measurements. The detector is based on manipulation of ballistic motion of individual fluxons in a Josephson transmission line (JTL), with the output information contained in either probabilities of fluxon transmission/reflection, or time delay associated with the fluxon propagation through the JTL. The detector should make possible non-trivial quantum measurement strategies, including demonstration of the wave-function reduction in a mesoscopic qubit [2] or synchronization of coherent quantum oscillations in two qubits. Demonstration of the wave-function reduction uses the transformation cycle which is designed to show that in the measurement process the qubit can tunnel through an infinitely large barrier, the behavior dictated by the probabilistic properties of the wavefunction and inconsistent with the dynamics of the Schrödinger equation. For solid-state qubits, such a transformation cycle would provide more direct illustration of the quantum state reduction than the non-locality of conventional Bell's inequalities.

[1] D.V. Averin, K. Rabenstein, and V.K. Semenov, Phys. Rev. B **73**, 094504 (2006).

[2] D.V. Averin, cond-mat/0603802.