

## Quantum Phase-Slip Devices

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We theoretically propose novel devices to illustrate the coherent quantum phase-slips (QPS): the QPS oscillator, the QPS-box and QPS-transistor.

The QPS oscillator can be realized on the basis of a thin superconducting wire or a chain of Josephson junctions<sup>1</sup>. It proves that the experimental detection of quantum phase slips is achievable for small phase slip amplitudes, contrary to what is usually assumed. The responses of this damped-driven oscillator exhibit a cosine dependence on the charge induced by a gate electrode and very unusual oscillatory dependence on the drive/frequency.

The QPS-box and the QPS-transistor are derived from the Cooper-pair box and Cooper-pair transistor<sup>2</sup>. They exhibit sensitivity to a charge induced by a gate electrode, this being the main signature of Coulomb blockade. Experimental realization of such devices will prove the Coulomb blockade as an effect of coherence of QPS processes.

<sup>1</sup>A.M. Hriscu, Y.V. Nazarov, Phys. Rev. Lett. **106**, 077004 (2011).

<sup>2</sup>A.M. Hriscu, Y.V. Nazarov, Phys. Rev.B., *in print*.