

**TUNNELING WITHOUT TUNNELING: WAVEFUNCTION REDUCTION IN
A MESOSCOPIC QUBIT**

Dmitri V. Averin

*Department of Physics and Astronomy,
Stony Brook University,
SUNY, Stony Brook, NY 11794-3800*

A transformation cycle and associated inequality are suggested for simple demonstration of the wavefunction reduction in a mesoscopic qubit. Violation of the inequality would show that in measurements with quantum-limited detectors the qubit state can change in a way dictated by the probabilistic properties of the wavefunction and inconsistent with the dynamics of the Schrödinger equation: the qubit tunnels through an infinitely large barrier. For solid-state qubits, the transformation cycle should provide more direct illustration of the quantum state reduction than the non-locality of conventional Bell's inequalities. Stability of the cycle to decoherence and detector non-ideality is estimated.