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We believe that in general both macroscopic quantum tunneling (MQT) and quantum activation processes may take place in a junction biased just below the critical current. As emphasized in our Letter, our Langevin approach was intended to describe the overdamped limit in which MQT is greatly reduced; it seems likely that MQT dominates in the underdamped limit.

We wish to reply briefly to the comment that "the phase draws energy from the \((h\omega/2)\) zero-point reservoir." In the usual analog of a resistively shunted junction as a particle moving in a tilted washboard potential, the average slope of the washboard is determined by the bias current, while the noise current generated by the shunt resistor causes the slope to fluctuate. If a fluctuation is large enough to reduce the downhill potential barrier momentarily to zero, the particle rolls into the next well, the ensuing dissipated power being provided by the bias current rather than by the noise current. Alternatively, one can view this process in the activation picture indicated in Fig. 1 of the Comment. The use of the current noise spectral density \(2h\nu/R\) (\(\nu\) is the frequency, and \(R\) is the shunt resistance) implies that a pulse of energy \(\Delta E\) supplied to the particle by the resistor in a time \(\Delta t\) represents a virtual fluctuation, satisfying \(\Delta E\Delta t/\hbar\) (by contrast, in the thermal limit \(\Delta E\Delta t\gg k_BT\Delta t\).

We expect our use of the Langevin equation to be a reasonable description of the junction only when the width of the wave packet describing the phase is small compared with the width of the potential. When the wave packet has a relatively large spread, one must resort to a full quantum-mechanical description of the junction, and the use of the Langevin equation at \(T=0\) is likely to lead to unphysical results, for example, \(\Delta E\Delta t\gg\hbar\).
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