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Macroscopic Resonant Tunneling through Andreev Interferometers JEFF WEISS, University of Arizona, MARLIES GOORDEN, University of Geneva, PHILIPPE JACQUOD, University of Arizona — We investigate the conductance through and the spectrum of ballistic *Andreev interferometers*, chaotic quantum dots attached to two s-wave superconductors, as a function of the phase difference ϕ between the two order parameters. A combination of analytical techniques – random matrix theory, Nazarov's circuit theory and the trajectory-based semiclassical theory – allows us to explore the quantum-to-classical crossover in detail. When the superconductors are not phase-biased, $\phi = 0$, we recover known results that the spectrum of the quantum dot exhibits an excitation gap, while the conductance across two normal leads carrying N_{N} channels and connected to the dot via tunnel contacts of transparency Γ_{N} is $\propto \Gamma_{\mathrm{N}}^2 N_{\mathrm{N}}$. In contrast, when $\phi = \pi$, the excitation gap closes and the conductance becomes $G \propto \Gamma_{\mathrm{N}} N_{\mathrm{N}}$ in the universal regime. In the tunneling regime, $\Gamma_{\mathrm{N}} \ll 1$, resonant contributions induce an order-of-magnitude enhancement of the conductance towards $G \propto N_{\mathrm{N}}$ in the short-wavelength limit. We relate this to the emergence of a giant peak in the density of states at the Fermi level. Our predictions are corroborated by numerical simulations.

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