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Tunneling Spectroscopy of Two-level Systems Inside Josephson Junction IVAR MARTIN, LEV BULAEVSKII, Los Alamos National Laboratory, ALEXANDER SHNIRMAN, Institüt für Theoretische Festkörperphysik — We consider a two-level (TL) system with energy level separation $\hbar\Omega_0$ inside the Josephson junction. The junction is shunted by a resistor R and is current I (or voltage $V = RI$) biased. If the TL system modulates the Josephson energy and/or is optically active, at the resonance condition $2eIR = \hbar\Omega_0$ the resistor voltage oscillates with the Rabi frequency determined by the strength of the coupling between the TL system and the phase difference. This effect provides the option to fully characterize the TL systems and to find the TL's contribution to the decoherence when junction is used as a qubit for quantum computation.

Ivar Martin
Los Alamos National Laboratory

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