Pure dephasing from quasiparticle tunneling in superconducting qubits GIANLUIGI CATELANI, Yale University — Quasiparticles tunneling across Josephson junctions provide an intrinsic decoherence mechanism in superconducting qubits. The quasiparticle current spectral density $S_{qp}(\omega)$ determines both the relaxation rate and the pure dephasing rate. The latter is in general proportional to the spectral density evaluated at zero frequency. In the case of quasiparticle, however, $S_{qp}(\omega)$ diverges logarithmically as frequency goes to zero, potentially leading to very fast dephasing. Here we show how to regularize this divergence in a self-consistent way. This enable us to estimate the dephasing rate due to quasiparticle tunneling and to study its magnetic flux dependence for various qubit designs.