On the nature of tunneling two-level systems in amorphous solids, and the mitigation of their deleterious effects in superconducting circuits

Moshe Schechter

Ben-Gurion University of the Negev, -, Beer Sheva 84105, Israel

The generic existence of structural tunneling two-level systems (TLSs) in amorphous solids was postulated by the "Standard Tunneling Model" to explain the remarkable low temperature universality known by now to exist across the different classes of disordered solids. Being ubiquitous at low energies, TLSs dominate low energy noise, and as such restrict performance of quantum nanodevices including superconducting qubits, nanomechanical oscillators and photon detectors. Recently, the coupling of TLSs to superconducting qubits and microresonators has facilitated novel experimental studies of TLSs, including detailed studies of individual TLSs and studies of the TLS glass out of equilibrium. In this talk I will discuss some of these recent experiments, what insights they give with regard to the nature and characteristics of TLSs, and with regard to possibilities to mitigate the deleterious effects of TLSs in microresonators and qubits.