High field on-chip SQUID measurement of spin quantum tunneling

LEI CHEN, Department of Physics & NHMFL, Florida State University, WOLFGANG WERNSDORFER, Institut Néel, CNRS, 38042 Grenoble, France, IRINEL CHIORESCU, Department of Physics & NHMFL, Florida State University — Experiments involving quantum spins [1] show that localized spins are candidates for implementation of quantum algorithms, but sensitive on-chip spin detection needs to be developed. In our setup at NHMFL, we placed a small magnetic sample in the vicinity of an on-chip Nb SQUID, and applied a magnetic field precisely parallel to SQUID plane. With SQUIDs only few nm thick, we can perform measurements in fields as high as 7 T, which is desirable to study a larger family of molecular magnets or diluted spin system. Landau-Zener quantum tunneling [2] in swept magnetic field reveals spin Hamiltonian information, like the anisotropy-induced tunneling gaps and entanglement of spin states. Successful SQUID measurements of the quantum tunneling of spins, in the presence of fields up to 5.5T, will be presented.
