**QSIT Talk at ETH Zurich, 10. July 2018**

**Speaker:** Dr. Alexander Grimm, Yale University, New Haven, USA

**Title:** Dissipative stabilization and manipulation of Schrödinger cat states for quantum error correction.

**Abstract:**

In recent years, circuit QED has seen considerable efforts towards protecting quantum information from unwanted sources of decoherence through quantum error correction. Independent of the implementation, this is based on encoding a logical qubit into a stable manifold within a larger Hilbert space, whose symmetries restrict the number of independent errors and make them detectable and correctable.

A superconducting microwave cavity exchanging pairs of photons with its environment exhibits a stabilized manifold spanned by even and odd superpositions of coherent states (so-called Schrödinger cat states), which can be used to encode partially protected quantum information. This phenomenon corresponds to a generalization of the quantum Zeno effect to a manifold of states inside which motion remains possible. In this talk, I will present experimental results demonstrating this stabilization at a rate that exceeds the main source of decoherence (cavity decay) by two orders of magnitude.

In the presence of this stabilization, an external drive that would otherwise move the state of the cavity out of the manifold is projected so that it acts solely within it. Using this effect, we show controlled coherent oscillations between Schrödinger cat states. Such oscillations are analogous to the Rabi rotation of a qubit protected against phase-flips.

I will also discuss ideas for the stabilization of fully protected encodings and present our current experimental progress towards this goal.