“Quantum State Measurement with the Josephson Bifurcation Amplifier”
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The Josephson junction is a unique electrical circuit element which can be simultaneously non-linear and non-dissipative. This combination makes it well suited for realizing a low-loss anharmonic oscillator. When the oscillator level spacing is large compared to temperature, the system is suitable for realizing quantum bits. In the opposite classical limit, the anharmonicity can be harnessed to realize high fidelity quantum measurement circuitry.

When a classical Josephson oscillator is biased with a purely ac microwave drive of sufficient strength, the system bifurcates into two metastable dynamical states. The occupation of these states can be used as a pointer for measuring the quantum state of a two level qubit. I will present results on quantum state measurement with a bifurcation amplifier. In these measurements, the oscillator amplitude is ramped at constant frequency to realize a measurement. I will also show recent results on accessing the metastable states of the Josephson oscillator using a constant amplitude, chirped frequency excitation.

Host: F. Wellstood