3:30 pm • Friday February 7, 2014 • 2241 Chamberlin Hall • Coffee at 4:30 pm

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Quantum Optics with Microwave Photons

Department of Physics Colloquium

WISCONSIN

Recent experiments revealed the quantum nature of electromagnetic fields of superconducting circuits at microwave frequencies.

Individual quanta of these fields are photons with energy a few million times smaller than the energy of an optical photon and are extremely hard to detect. A promising device for microwave photon detection is based on Josephson junctions. Even a single microwave photon with tiny energy is sufficient to switch a junction from the superconducting to voltage state, and detection of a photon reduces to observation of voltage pulses across the junction.

In this talk, I will present a theoretical model of a Josephson junction interacting with a quantized electromagnetic field and show that such Josephson photon detectors have relatively high efficiency of detection of microwave photons. I will discuss application of such detectors to qubit readout for quantum information processing and to studies of photon emission statistics by quantum electronic devices.

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