Seminar Invitation

An irreversible qubit-photon coupling for the detection of itinerant microwave photons

Abstract

Single photon detection is a key resource for sensing at the quantum limit and the enabling technology for measurement-based quantum computing. Photon detection at optical frequencies relies on irreversible photoassisted ionization of various natural materials. However, microwave photons have energies 5 orders of magnitude lower than optical photons, and are therefore ineffective at triggering measurable phenomena at macroscopic scales. Here, we report the observation of a new type of interaction between a single two-level system (qubit) and a microwave resonator. These two quantum systems do not interact coherently; instead, they share a common dissipative mechanism to a cold bath: the qubit irreversibly switches to its excited state if and only if a photon enters the resonator. We have used this highly correlated dissipation mechanism to detect itinerant photons impinging on the resonator. This scheme does not require any prior knowledge of the photon waveform nor its arrival time, and dominant decoherence mechanisms do not trigger spurious detection events (dark counts). We demonstrate a detection efficiency of 58% and a record low dark count rate of 1.4 per millisecond. This work establishes engineered nonlinear dissipation as a key enabling resource for a new class of low-noise nonlinear microwave detectors.

- Speaker: Dr. Emmanuel Flurin (CEA Saclay)

- Date: July 2, 2020 (Thursday)

- Time: 4:00 PM, KST

- Venue: Zoom Video Conference Seminar (Click the link below)
https://us02web.zoom.us/j/81107993080?pwd=M2w5S2tCanJhdm1nSGdnTjhtY1Rsdz09
(Passcode: 619310)

- Contact: 042) 350-8166 (CAPP Administration Office)

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Poster Image from NASA's Spitzer Space Telescope