Contribution ID: **27** Type: **not specified**

Reducing Dark Counts and Backgrounds in Qubit Based Photon Detectors

Thursday, 23 August 2018 14:00 (20 minutes)

Two challenges in building useful single photon detectors are the detector dark rate and spurious background photons. Since the detector is agnostic to the source of the photons, background photons are indistinguishable from photons occupying the cavity from a axion-photon interaction. I will describe the aggressive line filtering used to reduce background photon probabilities to 1e-5 (@~10GHz). Dark counts of the detector are a result of spurious occupation a qubit used to perform the quantum non-demolition measurement (QND) of the photon. The probability of having a qubit dark count are a few percent (1-5%) and can vary from sample to sample. One possible technique to mitigate the errors resulting from qubit occupation is to actively cool the qubit before the detection protocol. Another option is to employ multiple QND detectors each independently measuring the same photon. With 4 detectors this may allow us to achieve dark count probabilities of 1e-8. I will describe the status and design of the experiment under construction to test joint measurement of a single photon.

Primary author: DIXIT, Akash (University of Chicago)

Co-authors: CHOU, Aaron (Fermilab); AGRAWAL, Ankur; Prof. SCHUSTER, David (U.Chicago)

Presenter: DIXIT, Akash (University of Chicago)