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Searching for axions and dark photons with superconducting nanowire single photon detectors (SNSPDs) in the BREAD experiment

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The BREAD (Broadband Reflector Experiment for Axion Detection) experiment searches for axions and wave-like dark matter using a novel dish resonator which allows to utilize state-of-the-art high-field solenoidal magnets. The axion target mass extends from $\sim 10^{-5}$ eV to eV, this large mass range makes it difficult to scale traditional resonator setups to the required volume. However, metallic surfaces in a high magnetic field dark matter axions can convert to photons regardless of axion mass. These photons can then be focused by a parabolic focusing reflector onto a low noise single photon counting detector. One of the single photon counting detectors that can be used for the BREAD experiment is superconducting nanowire single photon detectors (SNSPDs) that are sensitive to 0.1 to 1 eV axions and dark photons, due to its sensitivity to 1-10um photons.

In this talk, we present the progress towards a first stage dark photon pilot experiment with a focus on SNSPDs. We show the progress on characterizing the SNSPDs for the pilot experiment and outline the sensitivity estimates for BREAD with SNSPDs and other single photon counting detectors.

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