

BREAD: Broadband Reflector Experiment for Axion Detection - Towards GHz and Infrared Pilot Experiments

Wednesday 10 August 2022 11:50 (20 minutes)

BREAD is a novel dish antenna for broadband $\sim\mu\text{eV}$ -eV axion and wave-dark matter detection, which allows to utilize state-of-the-art high-field solenoidal magnets. Axions are converted non-resonantly to photons on a cylindrical metallic wall parallel to an external magnetic field. These photons are then focused using a novel reflector geometry onto a state-of-the-art high-sensitive photon detector. We recently demonstrated [PRL 128 (2022) 131801] that this concept using a $\sim 10\text{ m}^2$ conversion area in a $\sim 10\text{ T}$ solenoidal magnet has the potential to discover QCD axions spanning multiple decades in mass range. In this talk we will also show progress towards first stage hidden photon and axion pilot experiments for two distinct frequency ranges - GigaBREAD and InfraBREAD - with expected sensitivities to unexplored coupling strengths. We detail R&D on reflector characterization, horn antenna & sensor testing and signal readout. We also outline sensitivity estimates for future large-scale versions.

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Session Classification: Contributed talks