

Abstract Submitted
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Single Photon Detection Using Optical Heterodyne Interferometry¹ ZACHARY BUSH, SIMON BARKE, HAROLD HOLLIS, Univ of Florida - Gainesville, AARON SPECTOR, DESY, AYMAN HALLAL, DAVID TANNER, GUIDO MUELLER, Univ of Florida - Gainesville — The coherent coupling between an electro-magnetic laser field and the axion or axion-like particle field inside a strong magnetic field is utilized by the ALPS collaboration to search for axions and axion-like particles. The proposed heterodyne detection method uses this coherence to search for a signal in a shot noise limited local oscillator field. This method has a high quantum efficiency and avoids typical limitations due to dark count rates and offers an improvement over classical photon counting detection methods. We built a testbed to study and develop this sensing scheme for ALPS. Our initial results of an equivalent dark count rate of better than $10^{-6}/\text{s}$ and successful test experiments detecting photons at a rate of $10^{-2}/\text{s}$ will be presented. We will also discuss potential future improvements.

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