

Abstract Submitted
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Experimental demonstration of enhancement in sensitivity to axionic dark matter using a squeezed state receiver¹ DANIEL PALKEN, MAXIME MALNOU, JILA, LEILA VALE, GENE HILTON, NIST, KONRAD LEHNERT, JILA, HAYSTAC COLLABORATION — D. A. Palken, M. Malnou, L. R. Vale, G. C. Hilton, and K. W. Lehnert \Squeezed states of the microwave field can be used to reduce the noise in haloscope-based axion detection of the type performed by HAYSTAC [1, 2]. Using a Josephson parametric amplifier (JPA), we generate a squeezed state, inject it into an overcoupled dummy axion cavity, and, upon readout with a second JPA, observe significant improvement in the contrast of a pseudo-axion tone above a background of vacuum noise. We then characterize the time to infer the presence or absence of a weak pseudo-axion signal, and how this time is reduced with squeezing. \[1] Zheng, H. *et al.* Preprint at <https://arxiv.org/abs/1607.02529> (2016).2] Brubaker, B. *et al.* First Results from a Microwave Cavity Axion Search at 24 μeV . *Phys. Rev. Lett.* **118**, 061302 (2017).

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Daniel Palken
Univ of Colorado - Boulder

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