

Abstract Submitted
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Data analysis for HAYSTAC's Phase 2: the first quantum-enhanced run DANIEL PALKEN, JILA, KONRAD LEHNERT, JILA/NIST, HAYSTAC COLLABORATION — The Haloscope At Yale Sensitive To Axion Cold dark matter (HAYSTAC) is now capable of searching for axions against a noise background below the standard quantum limit, owing to the operation of a squeezed state receiver (SSR) apparatus [1]. HAYSTAC employs two Josephson parametric amplifiers and a classical readout chain. The goal of our data analysis is to maximize the axion signal while removing excess noise due to quantum and classical signal processing [2]. In this talk, I will discuss the new data processing and Bayesian-based analysis framework being developed by the HAYSTAC collaboration. The new framework accounts for the physical effects of the SSR and extracts more of the information content of the measurement than previous haloscope analyses. 1] M. Malnou, D. A. Palken, B. M. Brubaker, Leila R. Vale, Gene C. Hilton, and K. W. Lehnert, *Squeezed Vacuum Used to Accelerate the Search for a Weak Classical Signal*, Phys. Rev. X **9**, 021023 (2019).2] B. M. Brubaker, L. Zhong, S.?[U+2009]K. Lamoreaux, K.?[U+2009]W. Lehnert, and K.?[U+2009]A. van Bibber, *HAYSTAC axion search analysis procedure*, Phys. Rev. D **96**, 123008 (2017).

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