Abstract Submitted for the APR20 Meeting of The American Physical Society

Accelerating the search for axions with entangled cavity states¹ KELLY WURTZ, DANIEL PALKEN, KONRAD LEHNERT, JILA / University of Colorado, Boulder, HAYSTAC COLLABORATION — Haloscopes are tunable microwave-cavity devices used to search for axionic dark matter by resonantly converting it to fluctuations in the electromagnetic field. While haloscopes have already successfully excluded several ranges of possible axion masses, a comprehensive search is hindered by noise at or near the standard quantum limit. Here, we present design, simulations, and initial tests of a novel haloscope concept utilizing entangled states between two microwave cavities, capable of increasing the rate at which haloscopes can search for the axion by 20x.

¹This document was prepared using the resources of the Fermi National Accelerator Laboratory (Fermilab), a U.S. Department of Energy, Office of Science, HEP User Facility. Fermilab is managed by Fermi Research Alliance, LLC (FRA), acting under Contract No. DE-AC02-07CH11359.

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Date submitted: 06 Jan 2020

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