

HAYSTAC Status and Future Plans

Monday, 8 July 2024 14:00 (17 minutes)

The HAYSTAC experiment (Haloscope At Yale Sensitive To Axion Cold dark matter) has operated for a decade both as a data pathfinder for the 4-12 GHz ($\sim 16-50 \mu\text{eV}$) range, and a testbed for new resonator and amplifier technologies. Final results will be presented for Run II which incorporated a Squeezed-State Receiver to circumvent the Standard Quantum Limit, the first dark matter experiment to do so. Runs III and IV will search at higher frequencies using tunable lattice resonators, and further accelerate the scan rate with a receiver based on two-cavity entanglement and state-exchange, for which an order-of-magnitude is projected. The development and operational experience of these innovations prepare for the larger ALPHA experiment to search for the post-inflation axion in the 10-20 GHz ($\sim 40-80 \mu\text{eV}$) range, currently under construction at Yale.

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