

New Results from HAYSTAC's Phase II Operation with a Squeezed State Receiver

Saturday 1 April 2023 12:00 (15 minutes)

Data from astrophysics and cosmology point to the existence of Cold Dark Matter in the Universe, for which a light axion is a well-motivated candidate. The HAYSTAC Experiment (Haloscope At Yale Sensitive To Axion CDM) is a microwave cavity search for axions with masses above $10 \mu\text{eV}/c^2$. HAYSTAC, now in its second iteration, Phase II, employs squeezed state receiver to achieve sub-quantum limited noise. We will report on details of the design and operation of the experiment previously used to search for axions in the mass ranges $16.96\text{--}17.12$ and $17.14\text{--}17.28 \mu\text{eV}/c^2$ ($4.100\text{--}4.140$ GHz and $4.145\text{--}4.178$ GHz) as well as the new results from our search at higher masses between $18.44\text{--}18.71 \mu\text{eV}/c^2$ ($4.459\text{--}4.523$ GHz). We will also discuss upgrades currently under development for Phase III.

Primary author: HAYSTAC COLLABORATION

Presenter: JEWELL, Michael (Yale University)

Session Classification: SESSION 18: Direct detection: Light DM & Ultra-Light DM (Axions, ALPs, WISPs) searches-2 (CHAIR: Sebastian Baum- Stanford University)

Track Classification: Axions, Alps, Wisps as dark matter