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CAPP's pilot axion experiment with a target mass range around 10 µeV

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CAPP's flagship axion experiment, CULTASK, employs dilution refrigerators to lower the physical temperature of resonant cavities to less than 40 mK - the coldest ever for axion search. We prepared a complete experimental setup (CAPP-PACE) equipped with an 8 T superconducting magnet with 12 cm inner bore in order to search for axions with mass around 10 µeV. The frequency tuning system installed in a split-design resonant cavity with a high Q-factor utilizes piezoelectric actuators with interchangeable sapphire and copper rods and performs flawlessly in searching a wide range of axion mass. The feeble signal (~10^-24 W) from the cavity is amplified and transmitted through the RF receiver chain, specially designed to minimize the noise temperature of the system employing an 1 K HEMT or a quantum-limited SQUID (Superconducting Quantum Interference Device) amplifier, which eventually raise the sensitivity and speed up the axion search. I will present the results from the CAPP's first physics data in the axion mass range from 9.83 to 11.38 µeV and discuss our future plans.

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