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Search for the axion dark matter in CULTASK[1] JONGKUK KIM, Korea Adv Inst of Sci Tech — The strong CP problem, related to the lower bound of neutron EDM which is much smaller than expectations from theory, is solved by Peccei-Quinn mechanism. This mechanism invokes a new U(1) symmetry, the breakdown of which creates the axion field. When the axion mass range is below 1 meV, the hypothestical particle can also be a cold dark matter candidate. Its interaction with regular matter, other than gravitationally, is extremely weak. There have been developed a variety of methods to discover the invisible axion, and axion haloscope utilizing primakoff effect proposed by Sikivie is one of them. The CULTASK experiments are axion haloscope searches with various state-of-the-art techniques such low noise cryogenic amplifiers and strong magnetic fields that maximize the sensitivity. In this presentation, an axion search experiment in CULTASK dedicated to the axion mass range of 6.62-7.03 μeV (1.6-1.7 GHz) is presented, where the experimental key parameters are the magnetic field of 8 T, the cavity volume of about 3.5 L and the HEMT based system noise temperature of below 2 K. The upgrade plan with quantum-noise- limited superconducting amplifiers is also to be discussed.

[1]KAIST/IBS-CAPP

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