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Search for axion dark matter at IBS/CAPP

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Summary

The axion, a consequence of the PQ mechanism proposed to solve the strong-CP problem of particle physics, has been considered as a compelling candidate for cold dark matter. The Center for Axion and Precision Physics Research (CAPP) of the Institute for Basic Science (IBS) has been establishing state of the art axion search experiments in Korea since 2013. Relying on the haloscope technique, where axions are resonantly converted into microwave photons in a strong magnetic field, our strategy is to run multiple experiments in parallel to explore a wide space of the axion parameter space. The ultimate goal is to probe axion dark matter in the mass range up to $100 \mu\text{eV}$ with sensitivities of the QCD axion models. The current approaches to achieve this goal are in two folds –1) utilizing well-advanced technologies, including high field superconducting (SC) magnets, cryogenic dilution refrigerators, quantum-limited noise amplifiers, and 2) developing unique features, such as high-Q SC cavities under high magnetic fields, and efficient cavity design for high-frequency axion search. We present the status and future prospects of the experiments and discuss the R&D activities at IBS/CAPP.

Primary authors: YOUN, Sung Woo (Institute for Basic Science); Prof. SEMERTZIDIS, Yannis (IBS/CAPP and KAIST in Republic of Korea (South Korea))

Presenter: YOUN, Sung Woo (Institute for Basic Science)

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