

Appendix 4

Accelerating Axion Search at CAPP in Korea

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Abstract:

It is extremely challenging to build an axion dark matter search experiment that could explore the wide range of plausible masses with enough sensitivity. However, thanks to recent technological advances in superconducting material research, physicists are now embarking on the most sensitive search yet for axions. For the last six years, IBS/CAPP has established the state-of-the-art axion detector facility in Korea with six dilution refrigerators, of which three axion detectors are running and taking data in parallel now. The new and powerful 12 T big bore (32 cm) Nb₃Sn superconducting magnet will be added to the line-up by the end of this year. CAPP is now standing at the critical time of moving forward with improvements from R&Ds, raising the axion-to-photon conversion power, lowering the system noise and eventually increasing the scanning speed to cover more ranges in less time. The critical R&Ds include the development of quantum noise limited amplifiers in collaboration with the Nakamura group at the U. of Tokyo and the superconducting YBCO cavity that sustains high Q-factor even at 8 T. We are now preparing an axion data run with quantum amplifiers and a superconducting cavity within this year. I will present the status of CAPP's axion search and R&D efforts, including future plans.