

# Preliminary Study for a New Axion Dark-Matter Haloscope

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A collaboration between CAPP/IBS, KAIST in Korea and teams from CNRS/Université Grenoble Alpes, in France is studying the possibility of developing a new haloscope for Axion dark-matter search. The superconducting coil under construction at LNCMI-Grenoble will provide a magnetic field of 9 T in a cylinder of 800 mm diameter and 1 meter high. This large bore superconducting magnet can host various types of microwave cavity detectors for the Axion to photon resonant conversion via the inverse Primakoff effect following the Sikivie's detection scheme. These cavities, possibly superconducting, are presently under study at CAPP/IBS and will have a high quality factor  $Q$  in the range  $10^5$ - $10^7$ . Low-noise microwave amplification of the signal will be ensured by a DC superconducting quantum interference device (SQUID) or Josephson Parametric Amplifiers (JPA) cooled-down to 50 mK by a  $^3\text{He}/^4\text{He}$  dilution refrigerator. This new haloscope will be designed to probe QCD dark-matter Axions in the mass range of 1-100 micro-eV with diphoton coupling constant reaching the theoretical prediction of the Dine-Fischler-Srednicki-Zhitnitsky (DFSZ) model.

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