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Ultra-light cavities for CAPP-MAX

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The Main AXion Experiment (MAX) of the center for axion and precision physics research (CAPP) has achieved the DFSZ sensitivity in axion dark matter search by employing cutting-edge technology. The ultra-light cavity (ULC) of the experiment has a total weight of less than 5kg, even with a volume of 37 liters, and can achieve cavity temperatures below 30mK due to the use of a 0.5mm thick Oxygen-Free High-thermal Conductivity (OFHC) copper sheet for the cavity body and frequency tuning rod. CAPP has been gradually applying its advanced High-Temperature Superconducting (HTS) cavity fabrication techniques to the production of ULCs in order to expand the axion search range in CAPP-MAX. First, a cavity with a Q factor averaging 150k was produced by attaching HTS tape to the side of the tuning rod, and axion search experiments are currently underway at 1.18-1.53GHz. Next, a cavity with a Q factor of over 10^6 will be produced by internally coating the ULC with HTS tape, allowing for even better sensitivity in searching for axions at >1.5GHz compared to the DFSZ.

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