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Axion dark matter search with DFSZ sensitivity at CAPP

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The axion is a solution to two distinct puzzles in the universe. It was originally proposed by Peccei and Quinn to explain the CP conservation in strong interactions, and in a specific mass range it naturally becomes a dark matter candidate. The CAPP-12T experiment conducted at the Center for Axion and Precision Physics Research (CAPP) searches for axions in the mass range equivalent to 1 –2 GHz with Dine-Fischler-Srednicki-Zhitniskii sensitivity. The experimental setup includes a wet-type dilution refrigerator, a 12 T superconducting solenoid with 320 mm diameter, nearly quantum-limited noise Josephson parametric amplifiers, and a large volume (36.8 L) thin copper cavity. Following the first successful search in 2022, the second phase of the experiment with improvements including the readout circuit by three JPAs in series has successfully finished scanning up to 1.18 GHz. I will discuss the results from the first and second phases of this experiment, as well as our plans for the future.

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