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SUPAX - A Superconducting Axion Search Experiment

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SUPAX is one of the first RF cavity based experiments in Germany to search for axions. Axions could solve the well known strong CP problem and may explain the dark matter content of the universe.

Axions are expected to convert to photons in the presence of a strong magnetic field, where the photon frequency depends on the axions mass. For wavelengths in the microwave regime resonators are typically used to enhance the axion signal.

SUPAX is using such a resonator in form of an RF cavity. A cavity made of copper has already been produced and successfully tested at room and LHe temperatures, probing for Dark Photons in the absence of a magnetic field, whilst tunable and superconducting RF cavities are currently being developed to improve the quality factor. We are planning to coat the inside of the cavity with a superconductor which can maintain superconductivity in magnetic fields up to 14 T and has not been used in this context. With this innovative approach and by using an existing 14 T magnet at the Helmholtz Institute at the Johannes Gutenberg University in Mainz, the largely unexplored mass region between $20 \mu\text{eV}$ to $50 \mu\text{eV}$ could be tested.

In this talk I will cover the experimental setup, data acquisition, analysis and current results of the experiment as well as future ideas of the experiment beside the search for Dark Matter candidates like axions and dark photons.

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