

Metallic Magnetic Calorimeters for the BabyIAXO experiment

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The next generation helioscopes BabyIAXO and IAXO will search for evidence of axions and axion-like particles (ALPs) produced in the center of the Sun. In the helioscope a strong magnetic field would convert ALPs via the generic ALP-photon coupling into photons. A very promising candidate for the focal plane X-ray detectors are low temperature metallic magnetic calorimeters (MMCs). Combining good energy resolution and high quantum efficiency, MMC-based detectors would allow to investigate the solar axion spectrum and derive information on axion models beyond discovery. Furthermore, by analyzing the resulting X-ray spectrum, details about the interior of the Sun could be deduced.

In this contribution, we present the 8x8 pixel detector array maXsIAXO which was specifically optimized for the needs of BabyIAXO. This detector features an absorber area of 1 cm² with a filling factor of 94.4 % to match the focal spot size of the X-ray optics. The X-ray absorbers have a thickness of 10 μm and are made of gold to ensure a high stopping power over the complete energy range of interest up to 8 keV as well as around 14 keV where a strong line is expected. The expected energy resolution is about 11 eV (FWHM). At the light of a background characterization of similar MMC arrays, we conclude discussing the advantages of using this X-ray detector system for BabyIAXO and IAXO.

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