

# A new upper limit on the axion-photon coupling with an extended CAST run with a Xe-based Micromegas detector

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Solar axion searches with helioscopes have been ongoing for decades, with CAST (CERN axion solar telescope) being the state of the art of this kind of experiment. CAST has been running for more than 20 years. The last solar axion data taking campaign happened during 2019-2021 and is the subject of this talk. The CAST potential was boosted by using the IAXO-pathfinder system, consisting of an ultra-low background Micromegas detector coupled to an X-ray telescope optimized for solar axion searches. This setup provides a high SNR thanks to the optics, which focus the axion signal in a very small area of the readout, and background levels below  $2 \times 10^{-6} \text{ keV}^{-1} \text{ cm}^{-2} \text{ s}^{-1}$  in the energy region of interest. Xe-based gas mixtures have been successfully used for the first time, an important achievement both in terms of higher absorption efficiency and lower background as compared to Ar. The aim of the data analysis is to search for an X-ray excess when pointing towards the Sun, as solar axions are expected to be produced in the Sun via the Primakoff effect. The analysis of the new body of data and its result in the search for solar axions will be presented in this talk.

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