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The International Axion Observatory (IAXO): case, status and plans.

The International Axion Observatory (IAXO) is a next-generation axion helioscope designed to search for solar axions with unprecedented sensitivity. IAXO holds a unique position in the global landscape of axion searches, as it will probe a region of the axion parameter space inaccessible to any other experiment. In particular, it will explore QCD axion models in the mass range from meV to eV, covering scenarios motivated by astrophysical observations and potentially extending to axion dark matter models. Several studies in recent years have demonstrated that IAXO has the potential to probe a wide range of new physics beyond solar axions, including dark photons, chameleons, gravitational waves, and axions from nearby supernovae. IAXO will build upon the two-decade experience gained with CAST, the detailed studies for BabyIAXO, which is currently under construction, as well as new technologies. If, in contrast to expectations, solar axion searches with IAXO “only” result in limits on new physics in presently uncharted parameter territory, these exclusions would be very robust and provide significant constraints on models, as they would not depend on untestable cosmological assumptions.

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