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Searches of Axions/ALPS with (Baby)IAXO

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The International Axion Observatory (IAXO) is a new generation axion helioscope aiming at a sensitivity to the axion-photon coupling of $g_{a\gamma}$ a few $\times 10^{-12} \text{GeV}^{-1}$, i.e. 1-1.5 orders of magnitude beyond the one achieved by CAST, currently the most sensitive axion helioscope. The main elements of IAXO are a large superconducting toroidal magnet with eight bores, x-ray focusing optics and low background detectors. An intermediate helioscope on the way to IAXO, called BabyIAXO, with the aim of testing the new technology for the full scale experiment, is now being designed and will be located at DESY. The design of all components and assembly procedures is quite advanced. Due to the socio-political problems worldwide a delay has been accumulated for the fabrication of the magnet. We will discuss the strategy to perform important tests in the final BabyIAXO location at DESY on different instrumentation and mechanics in preparation to BabyIAXO while waiting for the magnet to be in place. Once completed, BabyIAXO will be able to test $g_{a\gamma}$ down to $2 \times 10^{-11} \text{GeV}^{-1}$. In addition, already with babyIAXO it will be possible to search for evidence of axion-electron and axion-nucleon coupling in the Sun. Moreover, installing cavities or antennas in the magnet bores will turn BabyIAXO into an axion haloscope, sensitive to dark matter axions in different mass ranges. We will discuss the physics reach of BabyIAXO and present the enhanced sensitivity for axion discovery which will be possible to obtain with the full scale IAXO.

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