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Background model studies for IAXO using the REST-for-Physics framework

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The International AXion Observatory (IAXO) is an axion helioscope that will look for axions and axion-like-particles produced in the Sun. BabyIAXO is an intermediate stage to be hosted in DESY (Germany) which will already probe previously untapped regions of the parameter space. The baseline detection technology for IAXO are the microbulk Micromegas detectors, capable of achieving the ultra-low background conditions necessary to detect the soft X-rays produced in the conversion of the axion into photons via the Primakoff effect.

Given the stringent demands for background rejection, a detailed background model is required. Extensive Geant4 simulations have been performed in order to characterize contributions such as from detector components (contamination, cosmogenic activation) and ambient radiation or cosmic ray-induced background - a notable challenge due to detector operation at surface level.

These Geant4 simulations have been performed using the REST-for-Physics framework, which provides an interface to Geant4 as well as an analysis pipeline which enables the production of experimental-like data which has been key in the development of the background model and design of the detector and veto systems.

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