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Background Simulations of the Wide Field Imager aboard the International X-ray Observatory

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The International X-ray Observatory (IXO) is a planned high sensity next-generation X-ray telescope, jointly built by ESA, NASA and JAXA, which is projected to be launched in the 2020 timeframe. The main scientific goals of IXO include the study of AGN, the diffuse x-ray background as well as accretion discs around black holes and neutron stars which will aid the understanding of cosmic evolution and the physics of matter under extreme conditions. In order to achieve these goals IXO will need to surpass currently flighing or operating x-ray missions by at least an order of magnitude in terms of sensitivity while simultaneously extending the energy range for imaging observations up to 40 keV.

One of the main instruments aboard IXO will be the Wide Field Imager (WFI), which will employ DePFET technology for high resolution spectral imaging (1 arcsec, energy resolution of < 150 eV (FWHM) at 6 keV) in the 0.1-15 keV energy range, while at the same time achieving the low background rate of approx. 10E-4 cts/cm²/s/keV required for high sensitivity observations of faint sources.

A prerequiste for these low background rates is an optimized shielding concept which makes use of a graded-Z shield. As is common for many new satellite projects the Geant4 Monte Carlo tool kit was used for simulating the expected particle and background flux and optimizing shielding and other background reduction measures.

We present our current estimates of the IXO WFI cosmic proton induced background as well as an analysis of its constituents. We also present our current shielding design and background reducing postprocessing algorithms. Finally we point out problems within the simulation which have come to our attention while modelling a realistic WFI entrance window, which requires an accurate treatment of particle and photon interactions in material layers with a thickness of a few nanometers.

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