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Geant4 simulation of the Low Earth Orbit radiation environment on the NHXM prompt X-ray background

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The X-ray background minimization is a science-driven necessity in order to reach deep sensitivity levels, which is one of the key scientific requirements for the New Hard X-ray Mission. As a first, fundamental step in the background evaluation, we developed a Geant4-based simulator that allows to evaluate the impact of the Low Earth Orbit radiation environment on the prompt background count rate. The Geant4 model is composed by an hybrid focal plane completely surrounded by a simplified passive and active shield. The trapped electrons and positrons result to be the major source of background and active shield count rate. The total prompt background level, without the triggered events, is 1.5×10^{-4} and 3.8×10^{-4} cts $\text{cm}^{-2} \text{s}^{-1} \text{keV}^{-1}$ in the 0.5-20 keV and 5-100 keV energy range, respectively. They are mainly produced by photonic (>60%) and electronic (>20%) interactions.

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