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Single Event Upsets in the ATLAS IBL Frontend ASICs at the Large Hadron Collider at CERN

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ATLAS is one of the four major experiments at the Large Hadron Collider (LHC) at CERN. The tracking performance of the ATLAS detector relies critically on its 4-layer Pixel Detector, located at the core the ATLAS tracker.

During operation at instantaneous luminosities of up to $2 \cdot 10^{34} \text{cm}^{-2}/\text{s}$ the frontend chips of the ATLAS innermost pixel layer (IBL) experienced single event upsets affecting its global registers as well as the settings for the individual pixels, causing, amongst other things loss of occupancy, noisy pixels, and silent pixels. A quantitative analysis of the single event upsets as well as the operational issues and mitigation techniques will be presented.

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