

A lightweight algorithm to model radiation damage effects in Monte Carlo events for High-Luminosity LHC experiments

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Radiation damage significantly impacts the performance of silicon tracking detectors in Large Hadron Collider (LHC) experiments such as ATLAS and CMS, with signal reduction being the most critical effect. While adjusting sensor bias voltage and detection thresholds can help mitigating these effects, generating simulated data that accurately mirrors the performance evolution with the accumulation of luminosity, hence fluence, is crucial.

The ATLAS and CMS collaborations have developed and implemented algorithms to correct simulated Monte Carlo (MC) events for radiation damage effects, achieving impressive agreement between collision data and simulated events.

In preparation for the high-luminosity phase (HL-LHC), the demand for a faster ATLAS MC production algorithm becomes imperative due to escalating collision, events, tracks, and particle hit rates, imposing stringent constraints on available computing resources. This article outlines the philosophy behind the new algorithm, its implementation strategy, and the essential components involved. The results from closure tests will be presented; some preliminary results on computing performance will be commented too.

Type of presentation (in-person/online)

online presentation (zoom)

Type of presentation (scientific results or project proposal)

Presentation on scientific results

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