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Monte Carlo simulations of the radiation environment for the CMS Experiment

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FLUKA and MARS radiation transport codes are used by the Beam Radiation Instrumentation and Luminosity project (BRIL) of CMS to simulate the radiation levels due to proton-proton collisions. Results are used by the CMS collaboration for various applications: Comparison with detector hit rates, pile-up studies, predictions of radiation damage based on various models (Dose, NIEL, DPA), shielding design, estimations of residual dose environment. A description of the simulation parameters, the maintenance of the input files and key results are presented.

Futhermore, an overview of additional programs developed by BRIL to meet specific to the needs of CMS community are described. These include a python based web plotting framework developed to efficiently share FLUKA results of common interest with collaborators and a method for determining the decay radiation environment during interventions, when parts of the CMS detector are brought into open configuration.

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