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Radiation field characterization for present LHC and future HL-LHC forward physics experiments

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In recent years, there has been an increasing interest for experiments in the LHC complex that aim to push the frontiers of Physics, in locations that do not interfere with the normal operation of the machine while guaranteeing an acceptable signal-to-background ratio. This is the case with the Forward Search Experiment (FASER), which was approved in 2018, followed by the approval of the Scattering Neutrino Detector (SND) of the SHiP experiment in 2021. During the High Luminosity era, FASER and SND will continue to record data, for which a re-evaluation of the signal and background levels is required to prepare for the installation of the new detectors. Furthermore, there is a proposal for the construction of a Forward Physics Facility (FPF) at more than 600 m from the ATLAS interaction point to house far-forward physics experiments. These would benefit from a very low background due to the distance from the LHC tunnel and the more than 100 m of rock and concrete that serve as shielding, allowing the study of rare and exotic processes. Extensive calculations of physics signals, radiation levels and background conditions were performed by FLUKA Monte Carlo simulations and are summarized in this paper.

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Footnotes

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Yes

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