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Particle shower studies to tackle the FCC challenges

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The demanding goals of the FCC project require to address various aspects related to the impact of radiation on accelerators and detectors. For the FCC-hh machine, different sources have to be investigated: the 100 TeV cms proton collision debris, determining the radiation field in the experimental caverns and affecting the interaction region elements, in particular the final focus quadrupoles; the beam losses on absorbers, dumps and collimators, implying issues of protection effectiveness and robustness; the beam interaction with the residual gas along the beam line. On the other hand, in the lepton ring the synchrotron radiation represents a critical by-product in several respects.
An overview of studies carried out along these lines is given, together with a summary of the main results and first conceptual solutions, which look extremely encouraging, especially as far as shielding from the luminosity debris is concerned, opening to feasibility for effective detector and machine operation.

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