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The estimation of individual and collective intervention doses for the LHC beam cleaning insertions

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The radiation protection of the personnel who will perform interventions in the beam cleaning insertions and install different phases of machine components is mandatory and includes the design of equipment and the establishment of work procedures. Dose rates are expected to reach values at which any maintenance has to be planned in advance and the design adopted in order to keep the accumulated dose as low as reasonably achievable (ALARA-principle). Three-dimensional maps of dose equivalent rates at different cooling times after operation of the LHC are available for IR7 and allow the calculation of individual and collective doses for different interventions. The latter would require information from the involved groups on intervention steps, duration and frequency.

The presentation summarizes the results of detailed FLUKA-simulations and sketches its potential for optimizing, in an iterative way, the design of components as well as the layout of the beam cleaning insertions. Examples are discussed for the dose estimation based on detailed intervention scenarios and a first attempt is given to infer from it the annual collective dose. The derived value is compared to design constraints as well as the collective doses accumulated during SPS interventions. It is also put into perspective with annual doses reported by other laboratories and the nuclear industry.

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