



Contribution ID: 29

Type: **not specified**

Radiation environment assessment in the Experimental Insertion Region

Wednesday, April 11, 2018 4:15 PM (20 minutes)

In the past years, a considerable amount of work has been performed in Radiation-to-Electronics (R2E) field for LHC. The CERN's R2E-project is currently involved in the study of the critical areas for electronics for FCC. Indeed, FCC will require a significant amount of electronic components in the accelerator tunnel and in the side galleries to control and monitor different systems, e.g. power converters, QPS, interlocks, etc. An "a priori" evaluation of the radiation environment, the technology that would be required, the failure rate and the possible mitigation actions become strategic for the design, the future operation and the long-term planning of such complex accelerator. Finally, the R2E-project has an important role in the coordination with all the other groups involved in the conceptual design study. In this work, the evaluation of the radiation levels in the Experimental Insertion Region (EIR) will be presented. FLUKA Monte Carlo simulation includes a detailed model of the detector, the inner triplet ($L^* = 40\text{m}$) and the D1-D2 region for a total geometry length of $\sim 500\text{m}$. The latest design of the civil infrastructures is considered for a realist description of the EIR tunnel. p-p collisions at IP are considered as a source term. Finally, the relevant quantities of interest in the R2E field, i.e. the Total Ionizing dose (Cumulative Effects), the High Energy Hadrons fluence (Single Event Effects) and 1MeV-neutron equivalent fluence (Displacement Damage), are evaluated in the tunnel.

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Session Classification: Infrastructure and operation

Track Classification: I&O