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Timepix3 Radiation Monitor applications

Monday 9 December 2024 10:20 (1 hour)

The characterisation and the usages of a Timepix3 Radiation Monitor within the Radiation to Electronics (R2E) community are summarised in this presentation. The Timepix technology presents several capabilities that are of interest for R2E monitoring activities at CERN accelerators, among which are: (i) the measurement of single-particle hits with good timing resolution, and (ii) the pixel-by-pixel measurement of the deposited energy. The detector has been calibrated using charged particles (protons and alphas), and irradiated with neutrons from meV to the MeV range, in order to better understand the detector response. By exploiting the features of the Timepix3 detector, the foreseen usage at CERN accelerators includes the existing standard monitoring of the Total Ionizing Dose (TID) and the flux measurement of high energy hadrons. Moreover, it could also be used to measure charged particles, as well as a possible tool to identify the spatial origin of the losses by exploring the directionality information from the pixel array. In all cases, the good timing resolution and the low threshold of the Timepix3 detector can enable the prompt detection of beam losses even in lower radiation areas such as the shielded alcoves of the accelerators, where electronics are typically located.

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