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LHCb RMS-R3 —new radiation hard system for on-line monitoring of beam and background conditions in Run 3

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During Run 3, the LHCb experiment will collect data at a higher luminosity with respect to the previous decade of data taking. The Radiation Monitoring System (RMS-R3) will display the interaction rate of the LHC's beams along with its background in LHCb. The RMS-R3 comprises four detector modules based on the Metal-Foil Detectors radiation hard technology that can withstand fluences up to 10^{20} MIPs/cm^2 or radiation doses of up to a GGy, during its entire lifespan. The modules are placed symmetrically around the beam pipe very close to the Interaction Point at LHCb at a distance of about 2.2 m, while covering a backward acceptance of 7–14 degrees. The readout electronics provide a continuous relative luminosity measurement for LHCb and observations of background evolutions during the various stages of the beam preparation towards collisions. The RMS-R3 detector's performance has shown good response reproducibility of about 1% and excellent linearity.

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