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Luminosity at LHCb in Run 3

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The LHCb detector optimised its performance in Run 1 and 2 by stabilising the instantaneous luminosity during a fill. This is achieved by tuning the distance between the two colliding beams according to the measurement of instantaneous luminosity from hardware-based trigger counters. The upgraded LHCb detector operates at fivefold instantaneous luminosity compared to the previous runs, and it has a fully software-based trigger. Consequently, a new approach to the luminosity measurement is adopted. New counters, with particular attention to maximum stability in time, and a new dedicated detector have been introduced for Run 3. Additionally, in order to verify linearity from calibration to data taking conditions, per-fill emittance scans are performed. In this talk an overview of the newly implemented methods for luminosity measurement is presented. The first results obtained using data collected during 2022 will also be shown, including the ghost charge fraction measurement using the beam-gas imaging technique.

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