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Improving time resolution of silicon pixel detectors using correction algorithms

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The LHCb detector will be upgraded during Long Shutdown 4 of the LHC (2033-2035) to increase the average number of visible proton-proton interactions per bunch crossing from 5 to 40. The current detector will not be able to match any secondary vertex with a primary with such pile-up. This is problematic for the detection and identification of short lived particles. Among the upgraded subdetectors is the third iteration of the VErtex LOcator (VELO); a silicon pixel detector close to the interaction point. One of the milestones for this upgrade is to have a 30 ps time resolution for each hit, compared to 25 ns at the current VELO. This study is focused on which corrections are needed to achieve such resolution and where such corrections can be executed during data-taking. Avenues to compress the data during such corrections is also considered to decrease the required bandwidth.

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