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The Upgrade of LHCb VELO

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The Vertex Locator (VELO), surrounding the interaction region of the LHCb experiment, reconstructs the collision points (primary vertices) and decay vertices of long-lived particles (secondary vertices). The upgraded VELO will be composed of 52 modules placed along the beam axis divided into two retractable halves. The modules will each be equipped with 4 silicon hybrid pixel tiles, each read out with by 3 VeloPix ASICs, glued onto a thin silicon plate with embedded micro-channels that allow the circulation of liquid CO_2. The silicon sensors must withstand an integrated fluence of up to 8×10^{15} 1 MeV n_{eq}/cm^2, a roughly equivalent dose of 400 MRad. The highest occupancy ASICs will have pixel hit rates of 900 Mhit/s and produce an output data rate of over 15 Gbit/s.

The design of the VELO upgrade will be presented with the results from the latest R\&D and detector construction.

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Primary authors: COLLINS, Paula (CERN); CARVALHO AKIBA, Kazuyoshi (Nikhef)

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