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The LHCb VELO Upgrade

The LHCb experiment is a forward spectrometer experiment dedicated primarily to study CP violation and rare decays of beauty and charm hadrons. The LHCb experiment will be upgraded to a trigger-less system reading out data at 40 MHz event rate. To cope with the higher data rates and increased occupancy, the detectors including the Vertex Locator (VELO) need to be upgraded. The VELO performs high precision track and vertex reconstruction. The upgraded detectors will be installed during the upcoming LHC long shutdown2 (LS2), currently scheduled to start at 2019-2020.

The upgraded VELO will be a hybrid pixel detector having pixels of dimensions $55 \times 55 \mu\text{m}^2$. Data from the pixel sensors will be read-out via VeloPix ASICs and transmitted through high speed serial links to the off-detector electronics. Low mass evaporative CO₂ cooling will be used with the coolant circulating within etched microchannels in the silicon substrate. The upgraded VELO will provide fast pattern recognition and track reconstruction to the software trigger. In this talk, I will discuss the design requirements, recent R&D results and the current status of the VELO upgrade.

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