

## 7th Beam Telescopes and Test Beams Workshop



Contribution ID: 58

Type: not specified

### mini-VeloPix telescope

The upgrade of the LHCb experiment will transform the experiment to a trigger-less system reading out the full detector at the LHC collision rate and up to  $2 \times 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$  instantaneous luminosity. The Vertex Locator (VELO) is the silicon detector surrounding the interaction region. The upgraded VELO is based on a hybrid pixel system equipped with data driven electronics and designed to withstand a radiation dose up to 370 MRad or  $8 \times 10^{15} \text{ 1 MeV neq cm}^{-2}$ . The detector will be composed of silicon pixel sensors with  $55 \times 55 \mu\text{m}^2$  pitch, read out by the VeloPix ASIC which is being developed based on the TimePix/MediPix family.

In the upgraded VELO, the ASIC with the highest occupancy is expected to be crossed on average by 8.5 charged particles in one pp collision event, corresponding to a peak hit rate of 900 million hits / s. In order to measure the hit finding efficiency as a function of the track (or particle) rate, a small beam telescope comprised of five planes of hybrid pixel detectors ( $200 \mu\text{m}$  thick n-on-p silicon sensors with an active area of  $1.4 \times 1.4 \text{ cm}^{-2}$ , bump-bonded to VeloPix ASICs) was constructed and installed in the high-rate area of the Fermilab Testbeam Facility. In this talk, first results from this testbeam area presented.

Timewalk is another important requirement to minimise the number of hits assigned to a wrong LHC bunch crossing. The most recent results on the VeloPix timewalk studies will also be shown.

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**Session Classification:** Beam Telescopes