LHCb VeloPixel fast simulation

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TIMESPOT meeting - WP4

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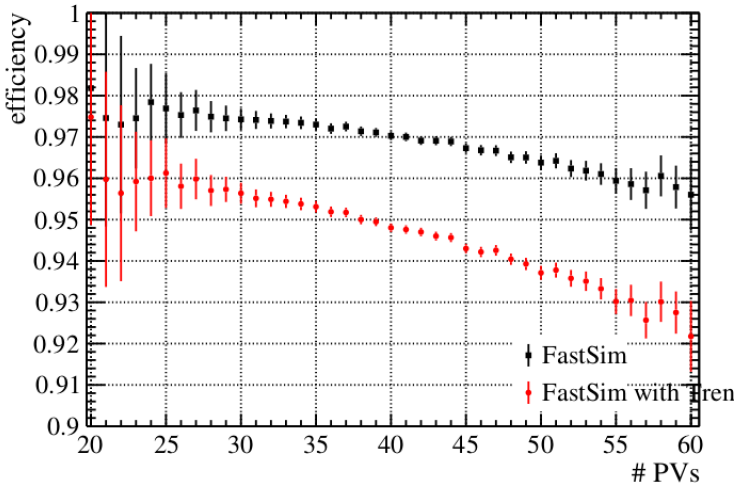
Performances

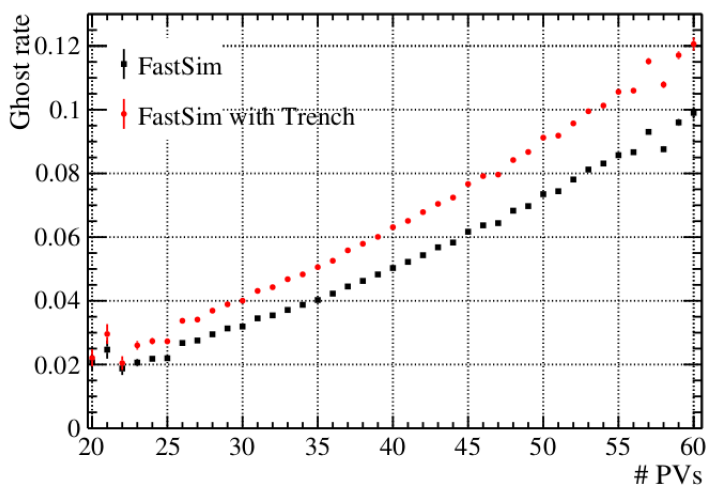
👆 = *optimistic scenario*
👇 = *pessimistic scenario*

Caveat:

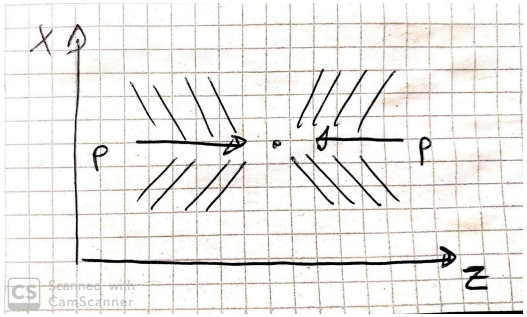
no DIFF in XY
no MS
no TIME
VP depth 👆
VP noise 👆
VP threshold 👆
Trenches not aligned 👇

- Preliminary results:





- How can we make them better?
  Explore new geometries where angles on the XZ (or YZ) plane are different from zero:



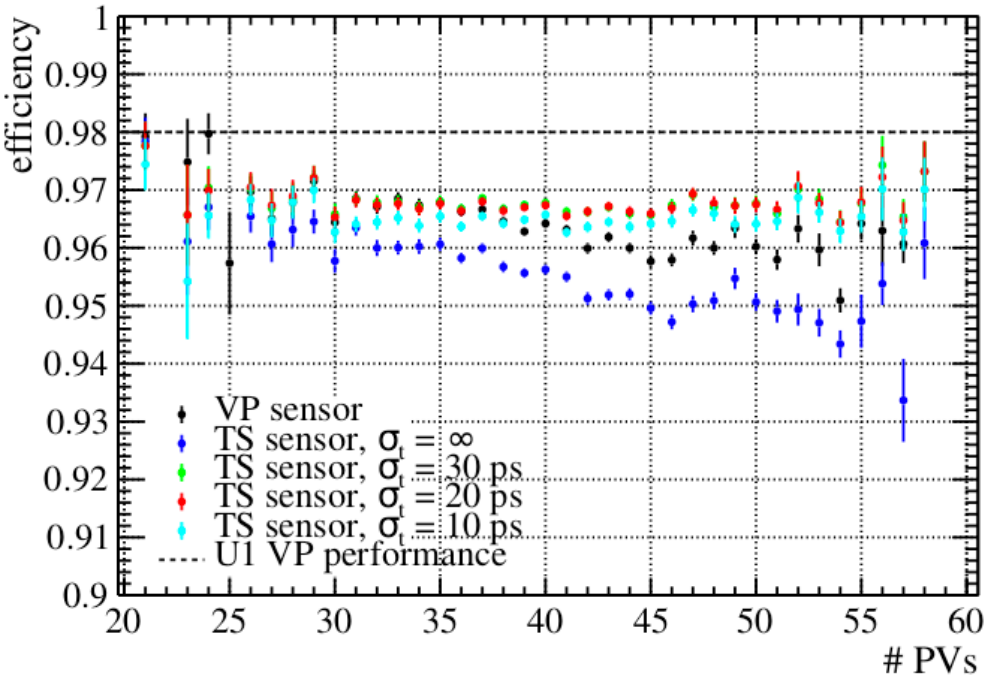
TIMESPOT sensor - simulation

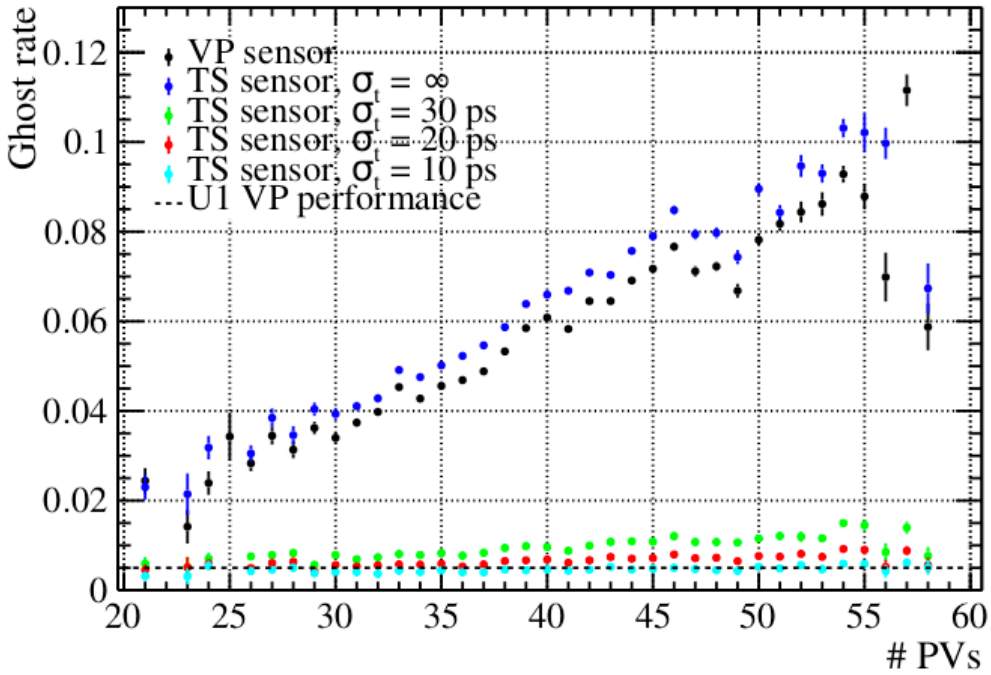
- Input: MChits from full simulation with VeloPixel (VP) where the Multiple Scattering is embedded

- Deposited charge taken from MCHit. Rescaled and distributed on the sensor pixels, and digitized considering the TIMESPOT (TS) sensor:
  - trench = 5x40 mum2 in XY (vs none in VP)
  - depth = 150 mum (vs 200 mum in VP)
  - noise = 300 e- (vs 130e- in VP)
  - threshold = 1500 e- (vs 1000e- in VP)
  - No diffusion in XY
  - Alignment of the thrench with the pixel position
  - time resolution = 10,20,30 ps

Performances

Upgrade I	εVELO(%)	PGHOST(%)
VP No timing	98.0	0.5





- Targeting Upgrade I VP performances
  Efficiency lower than U1
  Ghostrate comparable with U1

Upgrade II	εVELO(%)	PGHOST(%)
TIMESPOT σ_t = 10 ps	96.5	0.45
TIMESPOT σ_t = 20 ps	96.7	0.6
TIMESPOT σ_t = 30 ps	96.7	0.9
VP No Timing	96.4	5.6

Now exploring different angles

- Ongoing…