



Track Reconstruction in the HLT

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- HLT-Tracking Liaison
 - Ensure better communication between Trigger and Tracking groups
 - Please talk to me if:
 - your work *might* affect the online tracking
 - you have ideas how to improve the trigger reconstruction

- Topics in this talk:
 - HLT tracking configuration
 - Early data tuning in HLT
 - HLT primary vertex / IP in data

- How things are:
 - HLT tracking configuration is defined in HLT packages
 - Offline tracking is defined in RecoTracking.py and algorithm packages
- What I would like to do:
 - Have in the algorithm package both online and offline configuration
 - Pick setting centrally in HltTracking
 - **Offline responsables have an eye on things that affect online**
- Rob modified RecoTracking and daughters to be nice python – also with HLT in mind
 - I will add the HLT configuration in the same way

- Idea: if affordable, keep pattern reco tuning equal to offline
 - Brought loose cuts to HLT:
<http://indico.cern.ch/getFile.py/access?contribId=4&resId=0&materialId=slides&confId=82202>
 - Time to review: is it still needed / necessary?
- Run Moore v9r2,
Physics_25Vis_25L0_2Hlt1_AllHlt2_Jun10
- Data:
 - Retention: long run 71805 (~6M events, use 100k)
compare routing bits 11 (“L0Physics”) and 46 (“HLT1Physics”)
 - HLT1 Efficiency (all data triggered by micro bias lines)
 - J/ψ sample, selection see
<http://indico.cern.ch/getFile.py/access?contribId=0&resId=0&materialId=slides&confId=92257>
 - $D^* \rightarrow D(K\pi)$ pi from P. Spradlin

	Retention factor	$\epsilon(J/\psi)$	$\epsilon(D^*)$
Default pattern reco	13	93.8%	70.5%
Early data pattern reco	11.7	94.5%	75%

- Early data tuning costs only ~10% of rate and brings significant improvement of signal efficiency

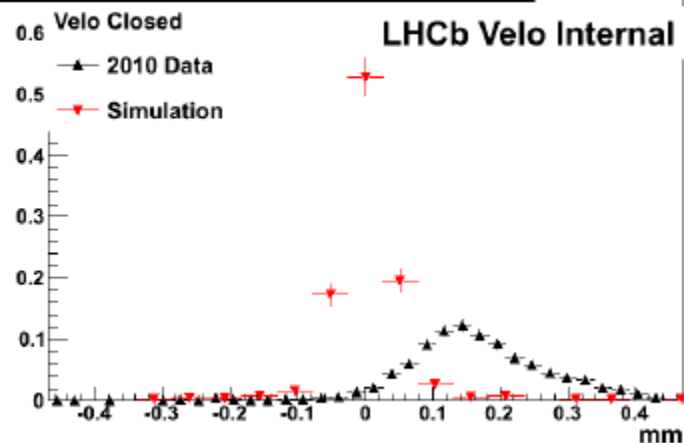
- With the first 2010 Velo closed data, we discovered that all PV distributions, IP, ... look odd
 - Affected were PV2D and PV3D
 - Apparently, offline was not affected ...

PatVelo before any data driven changes

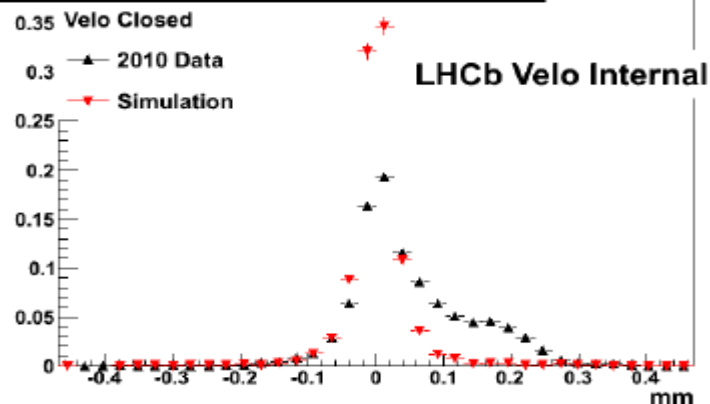
Unfitted tracks & PV2D

Unfitted tracks & PV3D

Resolution of IP_x for $0 < 1/p_T$ (c/GeV) < 0.5

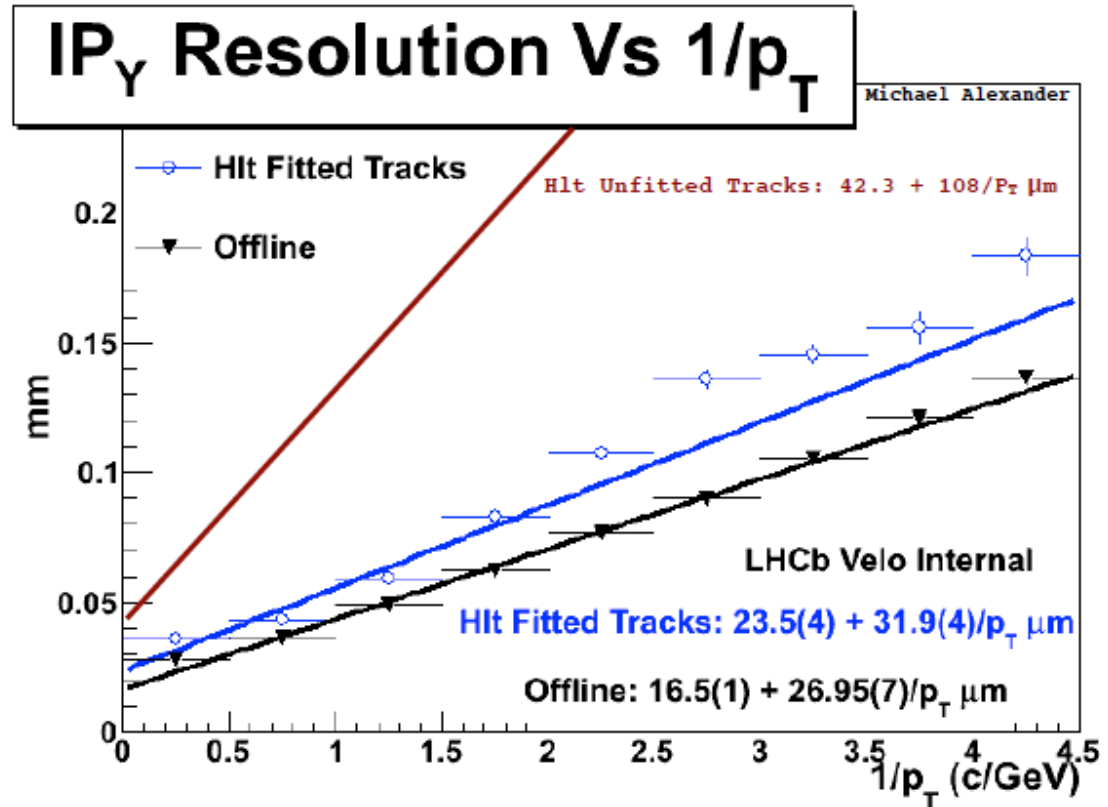


Resolution of IP_x for $0 < 1/p_T$ (c/GeV) < 0.5



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- Before data driven fixes:
 - Offline: ok'ish
 - Online w/ fitted tracks: ok'ish
 - Online w/ unfitted tracks: completely off



MOORE v9r1 now in the pit, fit 3D primary vertices for HLT1 and only cut on the impact parameters of fitted tracks

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- D. Hutchcroft fixed PatVelo
 - Unfitted PV3D now looks fine
 - PV2D still odd
 - We can afford to run without it
 - better anyways for physics

Reconstruction step	Time per L0-Hadron YES event
RZ Velo	0.42 ms
3D VeloSpace	1.62 ms
2D PV	0.21 ms
3D PV	0.71 ms

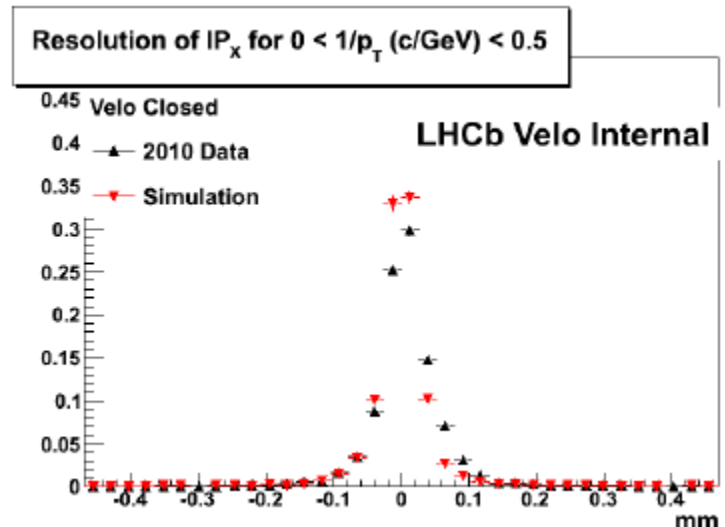
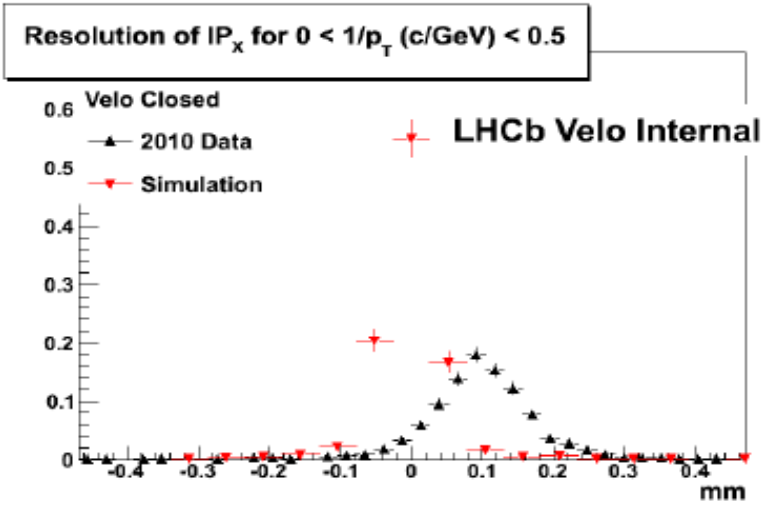
The extra cost of doing the 3D reco upfront = 2.1 ms per L0 Hadron event (avg. track multiplicity ≈ 33)

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Updated PatVelo

Unfitted tracks & PV2D

Unfitted tracks & PV3D

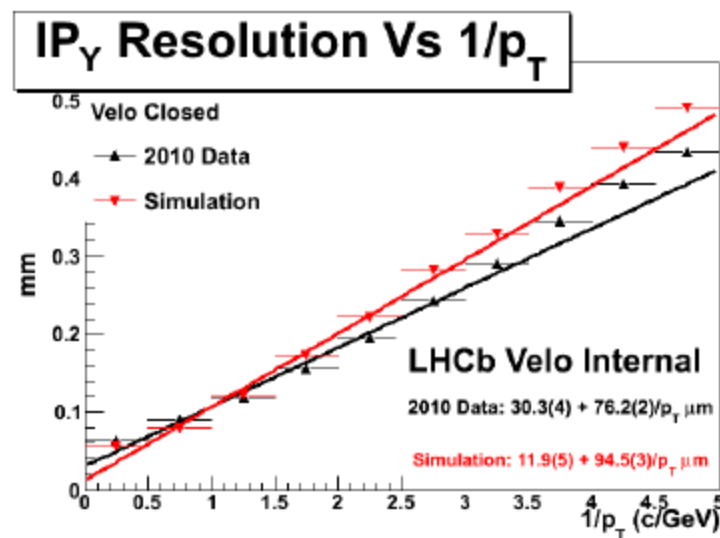
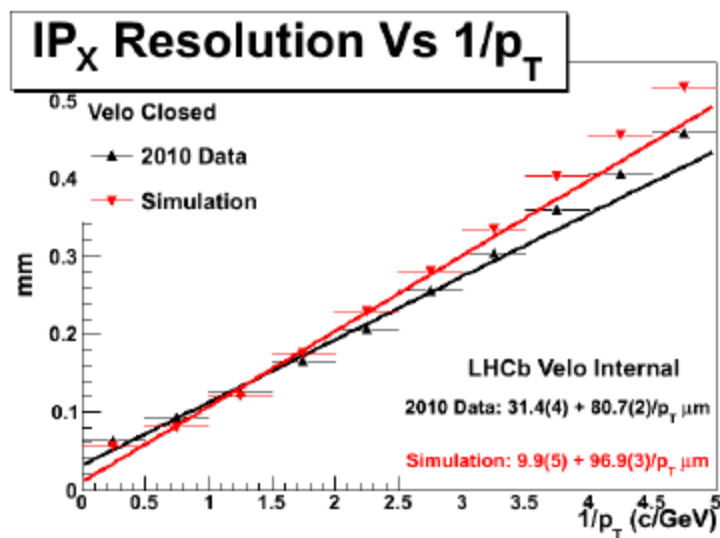


- Restructuring of HLT tracking configurations
 - Will be at the same place as offline configurations
→ please keep an eye on them
- Monitoring of online and offline tracking should go together
 - We made a first step with IP resolutions
 - Next: PV resolutions, general tracking monitoring
- Early data tuning of pattern recognition cuts
→ 10% less rate suppression, but significant efficiency gain
- PV problems in HLT understood
 - Use only PV3D, ~offline performance with unfitted tracks



Backup Slides

- Unfitted HLT trackswrt online PV3D



HTL1 Hadron Scheme

