



Pt Track Discriminator

L1Sim Readiness Review

August 1st, 2005

SLAC

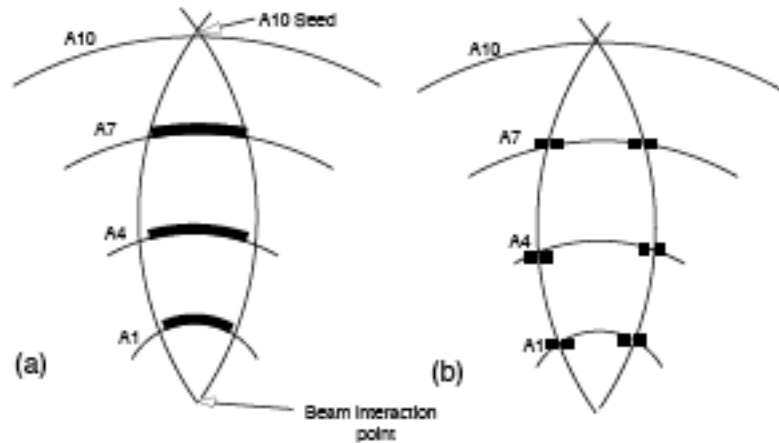
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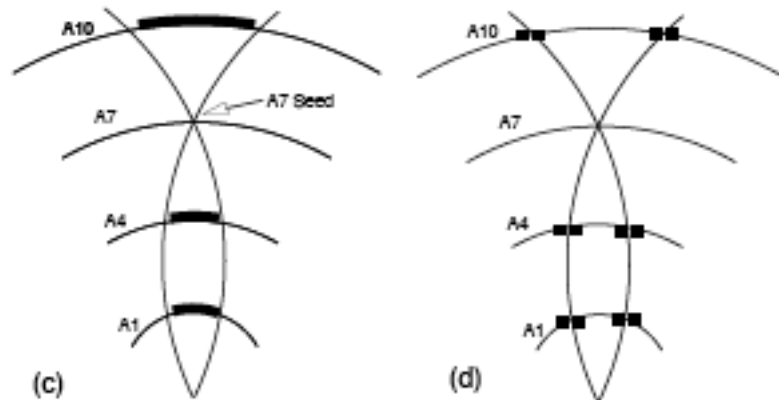
PTD Algorithm



A10 Seed



A7 Seed



- Input stretched TSF segments (axial only)
- Start with seeds in A10 or A7
- Define track envelope ($pt > 0.8$ GeV)
- Need 3/4 layers with segments inside envelope
- Final product: A' tracks
- To GLT: 16 bit word each $clk4$
Each bit is 1/16th in phi at seed SL

Fast binary algorithm rather complex



PTD Simulation Code



<u>Module</u>	<u>Input</u>	<u>Output</u>
L1DPtdReducer	vec<L1DTsfSimDigi>	L1DPtdHitMap

Reduce TSF segments clk8->clk4 (non-trivial OR)
Store axial segments in helpful HitMap class
Actually part of the physical TSF board

L1DPtdSimModule	L1DPtdHitMap	d_ULong
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Core algorithm, find seeds, search for segments within envelope
Create A' tracks in 32 phi bins by seed layer
create single phi map (32-bit word) per clk4 tick

L1DPtdPrePost	d_ULong	d_ULong
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Pre-post (stretch) phi maps by +/- 1 tick
Reduce 32 bins -> 16 bins in phi (trivial)



PTD Configuration



PTD LUT

- File pointer for hardware
- Hardcoded in trgDC

New simulation doesn't use LUT at all, but hardcodes basic algorithm based on geometry

Much simpler to write and understand...

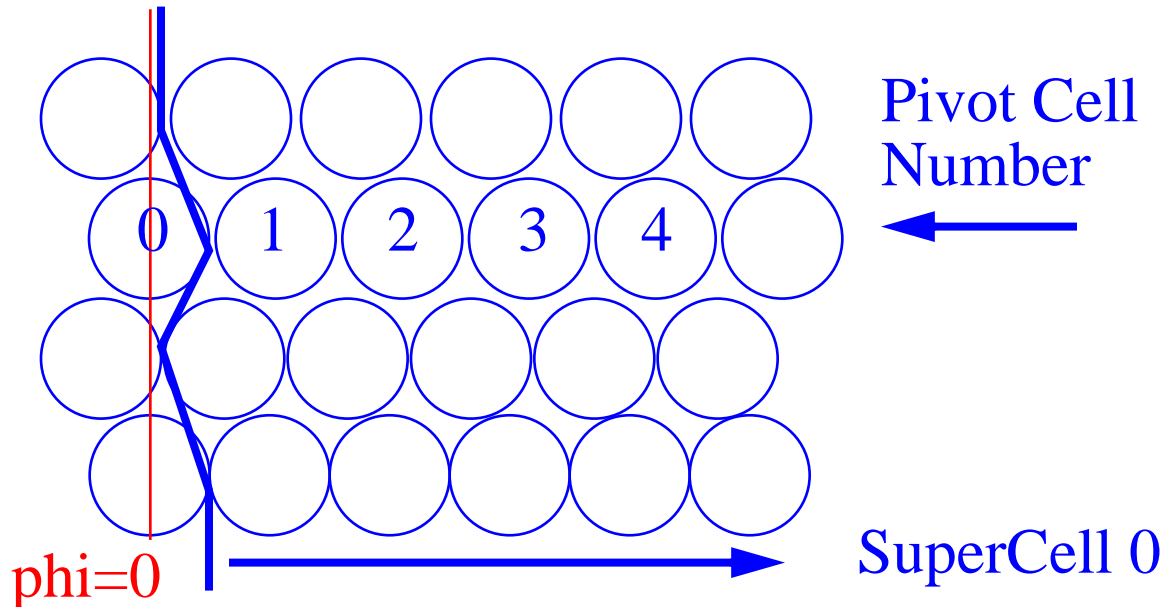
PTD Latencies

- Were hardcoded in trgDC
- Use tcl parameters now

No need to do any more here!



Wire 0 Issue



- Cell 0 ($\phi=0$) pivot cells aligned for all SL
- PTD starts SC0 at **pivot cell 1**

SC = Trigger card, overall rotation, OK

- PTD thinks Cell 1 centers are at $\phi=0$

Relative orientation of wires in different layers
NOT ϕ independent due to DCH geometry

The fundamental PTD algorithm is wrong in hardware, and code to translate from cell number to ϕ to supercell are often wrong in the BaBar code...

Horrible hacks (subtract 1 from MC cell) used



PTD HadronicBScript Comparison



trgDC vs newSim

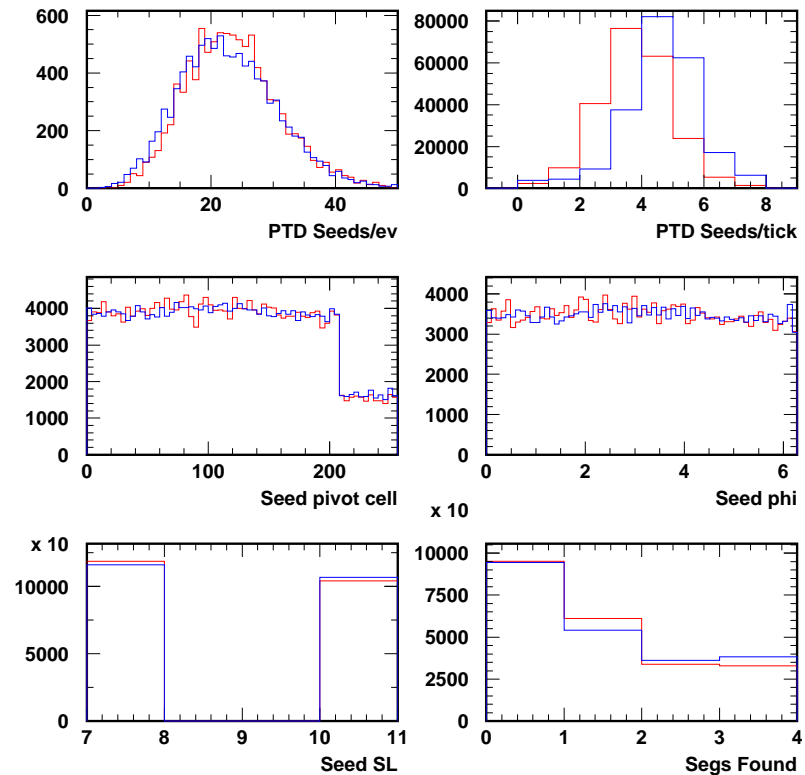
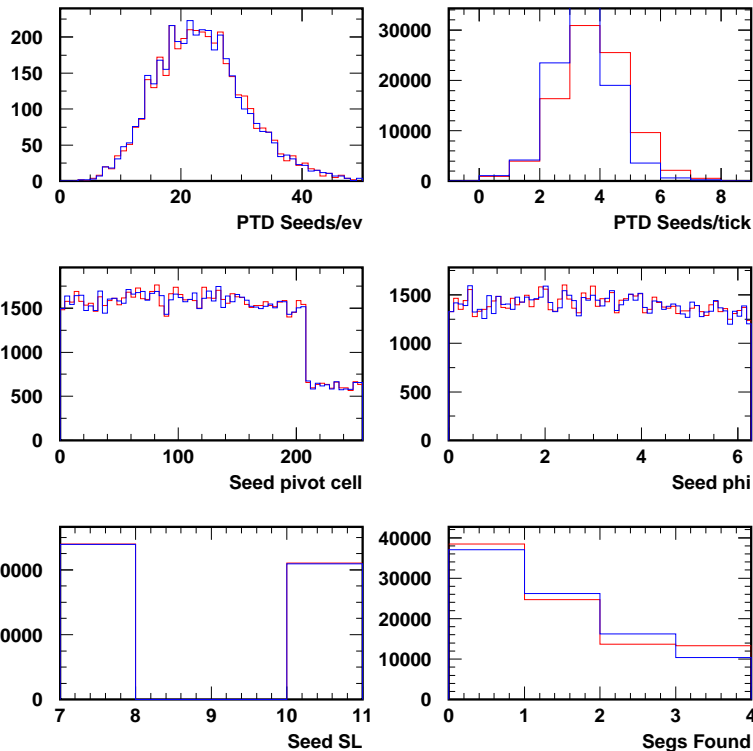
r48145 vs newSim

trgDC-L1Sim BBbar

2005/07/31 17.57

r48145-L1Sim BBbar

2005/07/31 17.57



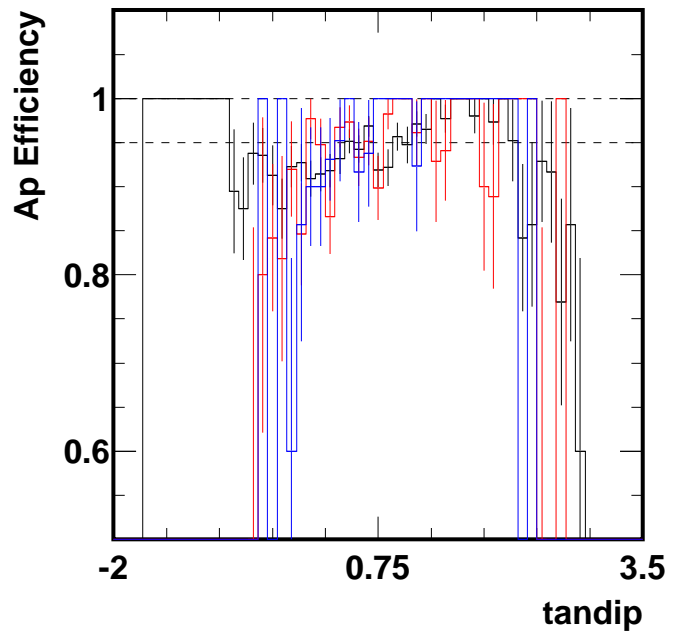
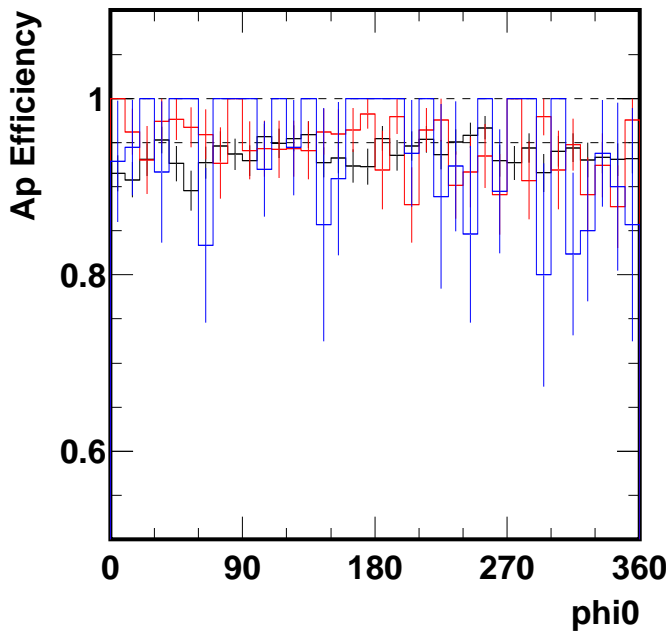
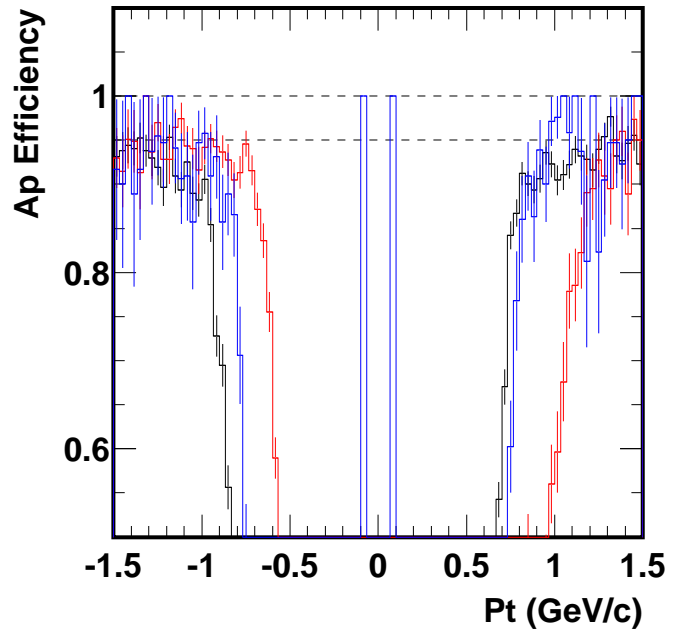
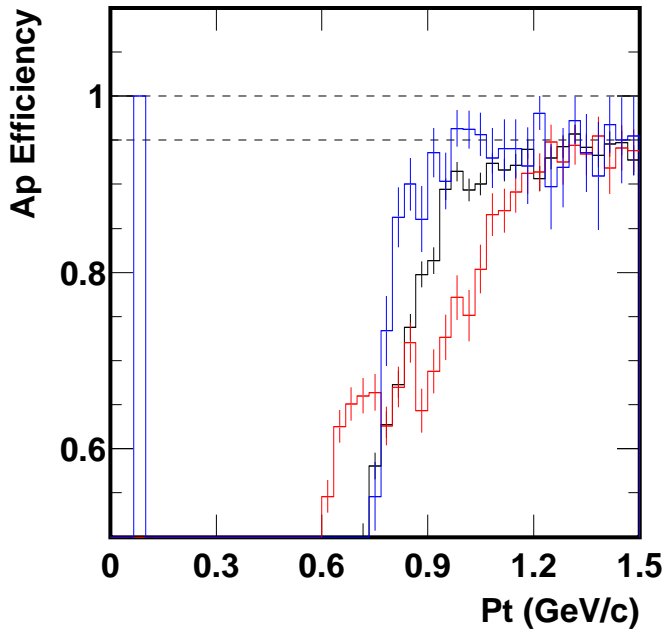
PTD A' Tracks

PTD A' Tracks

see <plots/ptd/ptdHadStudy.ps> for more



BBbar OprMon Comparison



r48145 vs **trgDC** vs **newSim**

Not perfect, but better.

Could probably solve this with a week's work...



PTD Simulation Status



New simulation is not perfect,
but I believe is more accurate than trgDC

Could probably improve this with a week's work

I am not terribly motivated to pursue this currently

This is certainly no worse than trgDC...