


L2 BeamLines

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The Problem

- b-tagging and possibly B physics will need knowledge on the PV position at L2
- Current assumption in most L2 studies: PV=(0,0,0)
- Mechanism to get beamlines in L2 not yet clear. Two possiblities

	Compute elsewhere	Compute in L2
Pro	•Algorithm can be as complicated as we want •Consistent BeamLine across L2 PU •Full offline performance can be achieved	•BeamLine readily available, fast update •Quasi-offline performance •Partially compensating for non-final detector alignment •Can use all L1A: less bias, more statistics!
Con	•message-passing mechanism limited, if at all viable •update frequency could be too low	•Beam position not identical across PUs - is however statistically consistent - needs to be stored with event info •May require some (not much though) CPU time

The Solution

We solved the same problem in the CDF/ SVT in real-time with an algorithm which is:

- Fast
  - typically update every 5 seconds
- Accurate
  - Offline-like resolution
- Robust
  - No minimization algorithms used
- Simple
  - Track based
  - Just need to accumulate few track parameters

This page updates automatically every 5 seconds

Last update : 2008/02/20 04:46:08

Coordinates are in microns

z	ntrks	x	y	sigma	err x	err y	corr	width x	width y
0:	5354	-1629.44	1269.44	71.29	1.347	1.464	-0.000	44.49 + 1.44	40.30 + 1.57
1:	11108	-1540.65	1249.96	67.34	0.900	0.908	-0.000	35.04 + 1.19	30.17 + 1.28
2:	25164	-1441.89	1233.19	65.18	0.578	0.586	0.000	25.37 + 0.96	30.45 + 0.80
3:	25278	-1358.36	1228.84	61.13	0.564	0.526	-0.000	23.78 + 0.86	29.35 + 0.70
4:	14759	-1260.43	1210.22	65.12	0.738	0.805	-0.000	26.19 + 1.58	36.67 + 0.96
5:	8121	-1177.61	1192.04	67.19	1.084	1.027	0.000	38.11 + 1.58	38.06 + 1.66

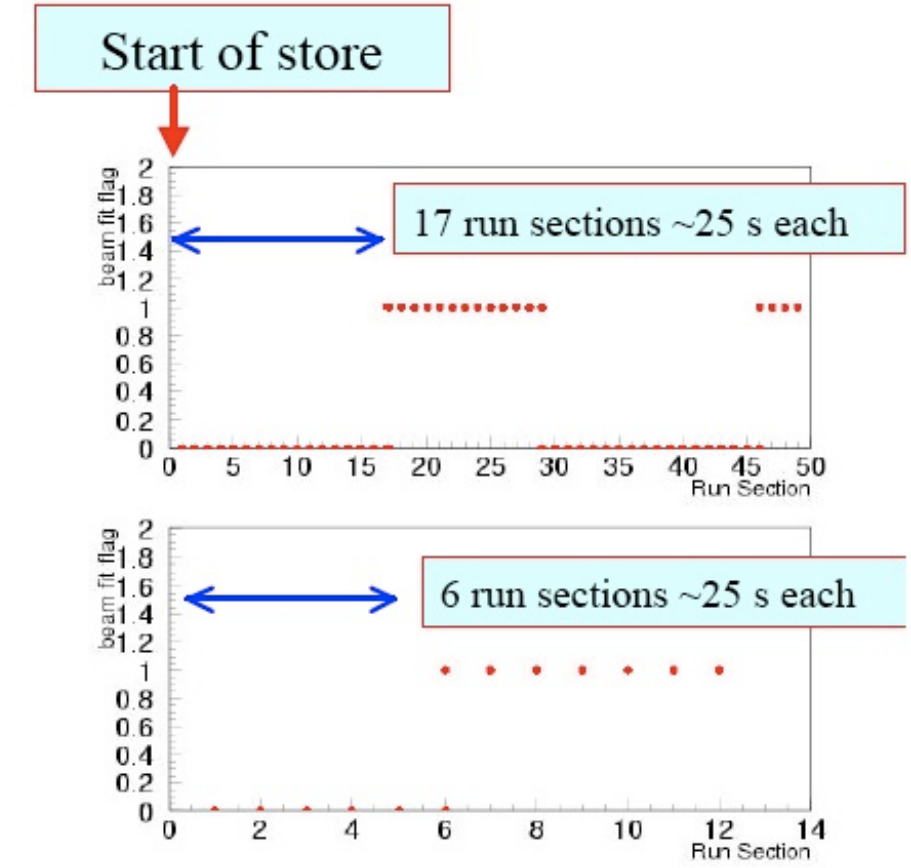
Strategy:

- Exact xy fit, with z binning
- Robustness improved with:
  - Tail removal
  - Pipelined iterations

Performance

- O(1M tracks/second) on a 3GHz machine
- err(xy) ~ BeamWidth/ Sqrt(Ntracks)

  [1 um @ BW=50um and 10000 tracks]
- 1 Hz update costs <2% CPU



How often does the beam move?

Beam center at beginning of store normally stable within 20 microns.

Drift during the duration of a store of 20 to 30 microns in x,y (often correlated)

Beam slope more stable (variation <20 microradians)