Karlsruher Institut für Technologie

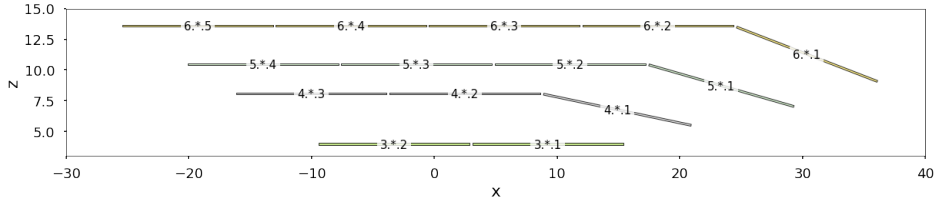
F2F Tsukuba 2018

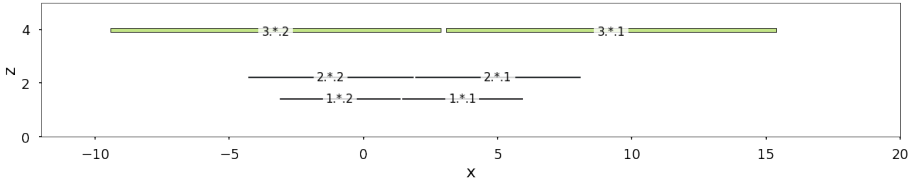
PHASE 2 TRACKING SETUP WITH CKF

03.02.2018

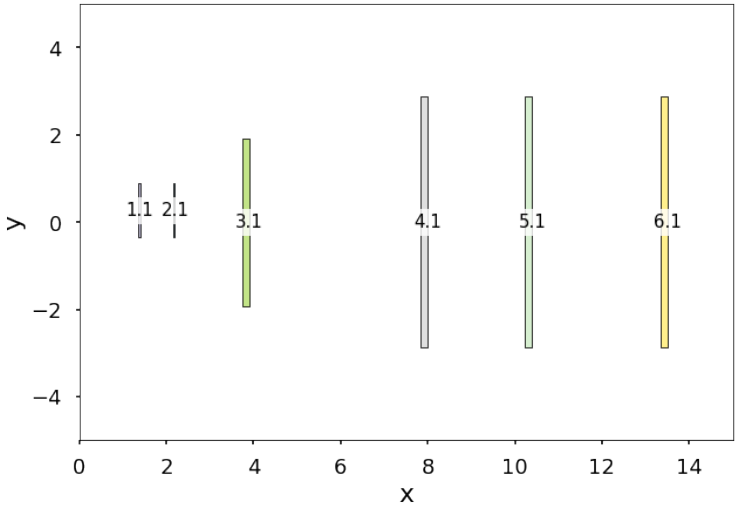
Nils Braun | IETP - KIT

GEOMETRY SETUP





GEOMETRY SETUP



SETUP

- I have generated and reconstructed $\Upsilon(4S)$ events with overlay background campaign 15 using the current master (plus some tweaks for the CKF).
- I have shown the results without background last time, so I will focus on background cases here. I am always only using events, which have at least one SVD or PXD cluster.
- The tracking setups are:

  current is the default tracking reconstruction with VXDTF2, CDC tracking, normal merger, PXD CKF.

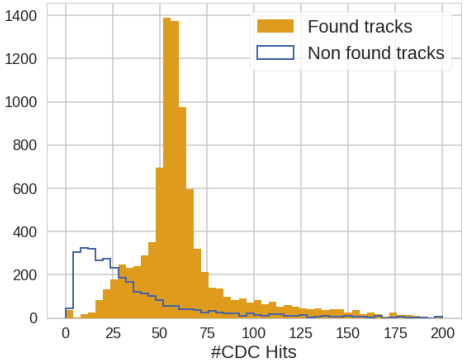
  ckf is CDC tracking, SVD CKF, VXDTF2 (on remaining hits), CKF merger, PXD CKF.
- I will compare to a Phase 3 setup (with background) using the ”best” CKF setup (although there is no large difference).

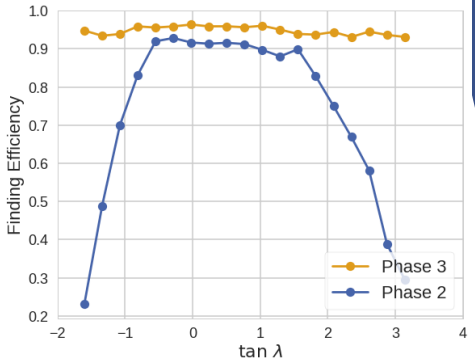
RESULTS

	Phase 2 current	Phase 2 ckf	Phase 3 ckf
finding efficiency (prim)	0.8879	0.8905	0.9591
hit efficiency (prim)	0.8878	0.8945	0.8077
mc no pxd hits at all	0.5775	0.3470	0.1176
mc no svd hits at all	0.4814	0.2830	0.0439
pxd hit eff (prim)	0.4263	0.6574	0.8793
pxd hit eff (has svd)	0.7377	0.8922	0.8892
svd hit eff (prim)	0.5219	0.7202	0.9418
fake rate	0.0246	0.0155	0.0190
clone rate	0.0451	0.0399	0.0573
pxd hit purity	0.9913	0.9802	0.9555
svd hit purity	0.9767	0.9845	0.9903

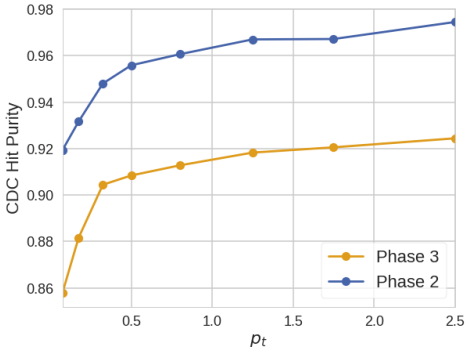
The rest will be shown using the ckf setup.

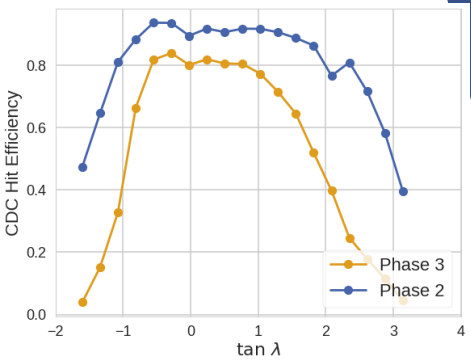
OVERALL PERFORMANCE



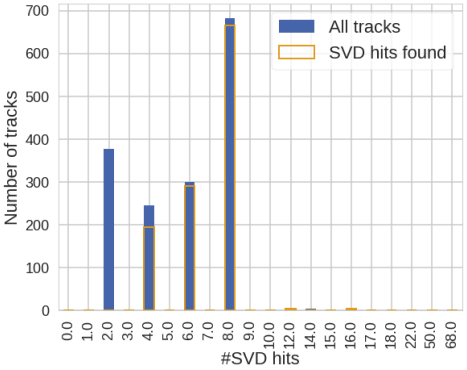


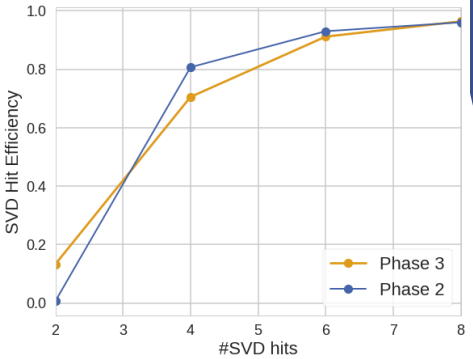
FOCUS ON CDC PART





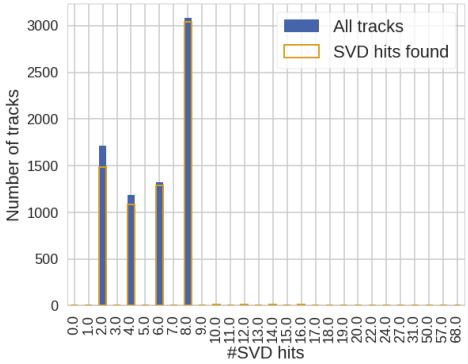
FOCUS ON SVD PART

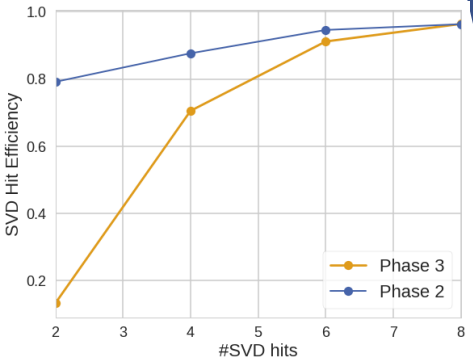




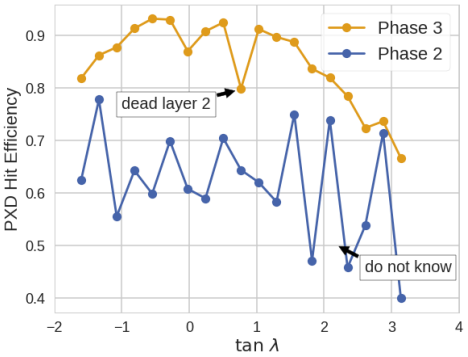
FOCUS ON SVD PART - FIX

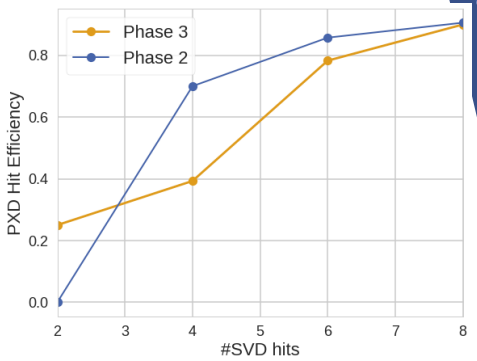
Theoretically, I allow for larger jumps in phase 2, but the QE throws away those cases. I have introduced a looser cut, to also allow for them:



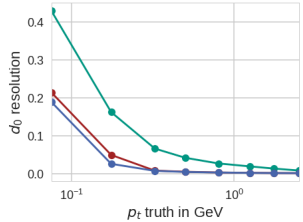


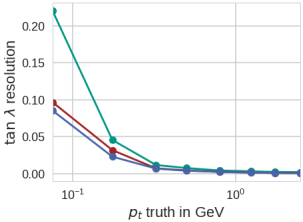
FOCUS ON PXD PART

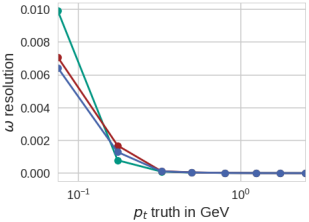


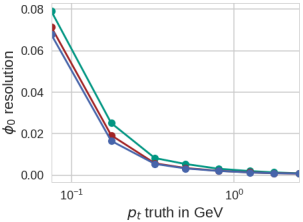


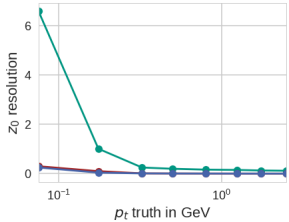
RESOLUTION

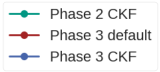

d_0 resolution
0.4
0.3
0.2
0.1
0.0
10^{-1}
10^{0}
p_t truth in GeV


tan λ resolution
0.20
0.15
0.10
0.05
0.00
10^{-1}
10^{0}
p_t truth in GeV

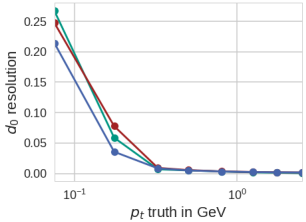

ω resolution
0.010
0.008
0.006
0.004
0.002
0.000
10^{-1}
10^{0}
p_t truth in GeV

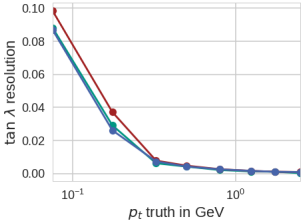

ϕ_0 resolution
0.08
0.06
0.04
0.02
0.00
10^{-1}
10^{0}
p_t truth in GeV

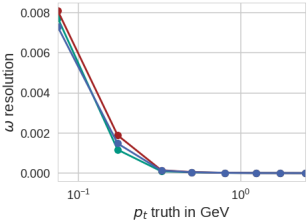

z_0 resolution
6
4
2
0
10^{-1}
10^{0}
p_t truth in GeV

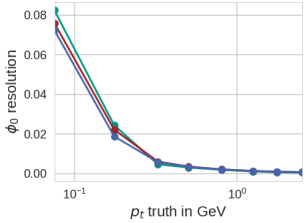

Phase 2 CKF
Phase 3 default
Phase 3 CKF

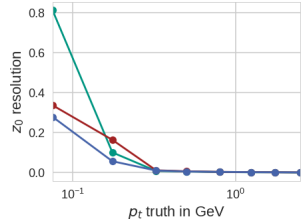
RESOLUTION (# MC SVD $>$ 2)

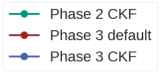












FINAL WORDS

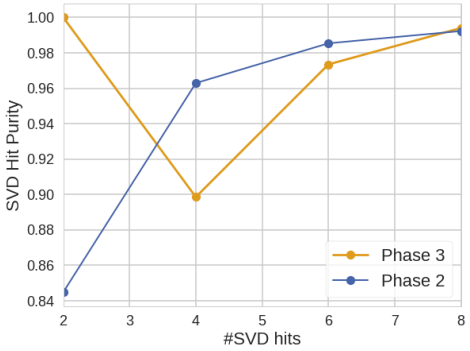
- CKF (and the rest of the tracking) is ready for phase 2.
- Although we should settle our features and the steering files for the release, we still have some time until real data taking – if we would really need to tune things.
- Now we have to make sure, that we run smooth and without errors.

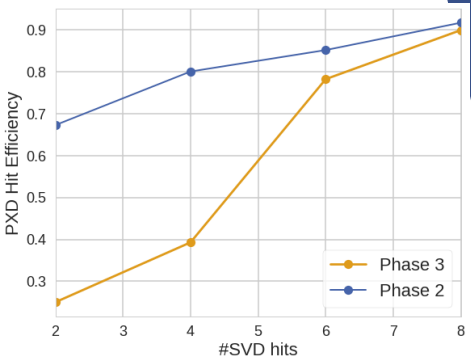
Backup

PERFORMANCE AFTER FIX

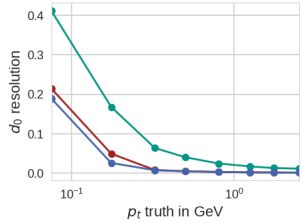
	Phase 2 ckf with fix	Phase 3 ckf	Phase 2 ckf
finding efficiency (prim)	0.8854	0.9591	0.8905
hit efficiency (prim)	0.8993	0.8077	0.8945
mc no pxd hits at all	0.276	0.1176	0.3470
mc no svd hits at all	0.0803	0.0439	0.2830
pxd hit efficiency (prim)	0.7307	0.8793	0.6574
pxd hit efficiency (has svd)	0.8760	0.8892	0.8922
svd hit efficiency (prim)	0.9003	0.9418	0.7202
fake rate	0.0167	0.0190	0.0155
clone rate	0.0402	0.0573	0.0399
pxd hit purity	0.9782	0.9555	0.9802
svd hit purity	0.9516	0.9903	0.9845

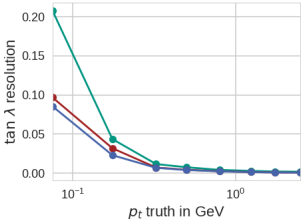
PERFORMANCE AFTER FIX

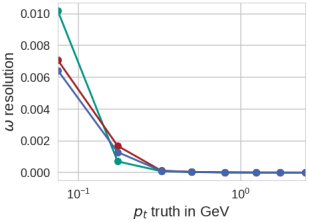


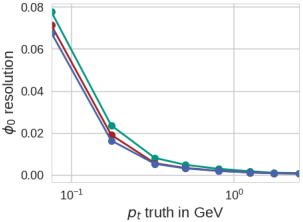


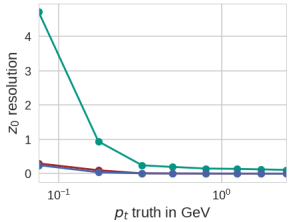
RESOLUTION AFTER FIX

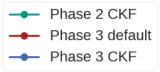












RESOLUTION (# MC SVD $>$ 2) AFTER FIX