Pixel-only track properties in CMSSW_363

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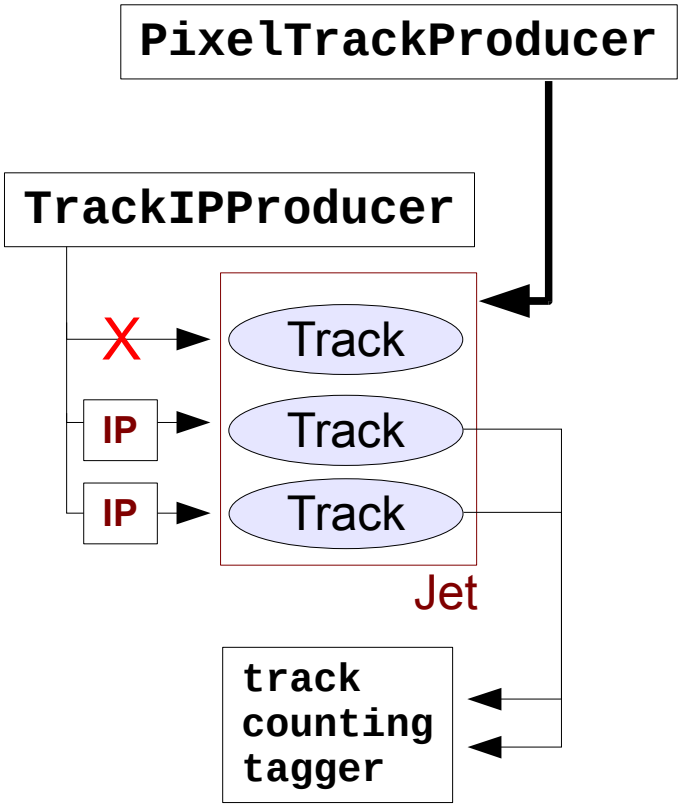
Pixel-only track properties

Setup -

- CMSSW_363 (**stdgeom triplets**) & CMSSW_363_SLHC1 (**phase1 quadruplets**)
- 4000 events TTbar (private)
- **both** phase1 & stdgeom with **new fit algorithms**
- using **MultiTrackValidator** for plotting

Two sets of tracks -

- **hltPixelTracks** from HLT_BTagIP 2.5 (all tracks)
- subset of hltPixelTracks as **selected by TrackIPProducer** for b-tagging



TrackIPProducer cuts:

```
track.pt() > 1.0 &&
track.hitPattern().numberOfValidHits() >= 3 &&
track.hitPattern().numberOfValidPixelHits() >= 2 &&
track.normalizedChi2() < 5.0 &&
std::abs(track.dxy(pv->position())) < 0.2 &&
std::abs(track.dz(pv->position())) < 17.0
```

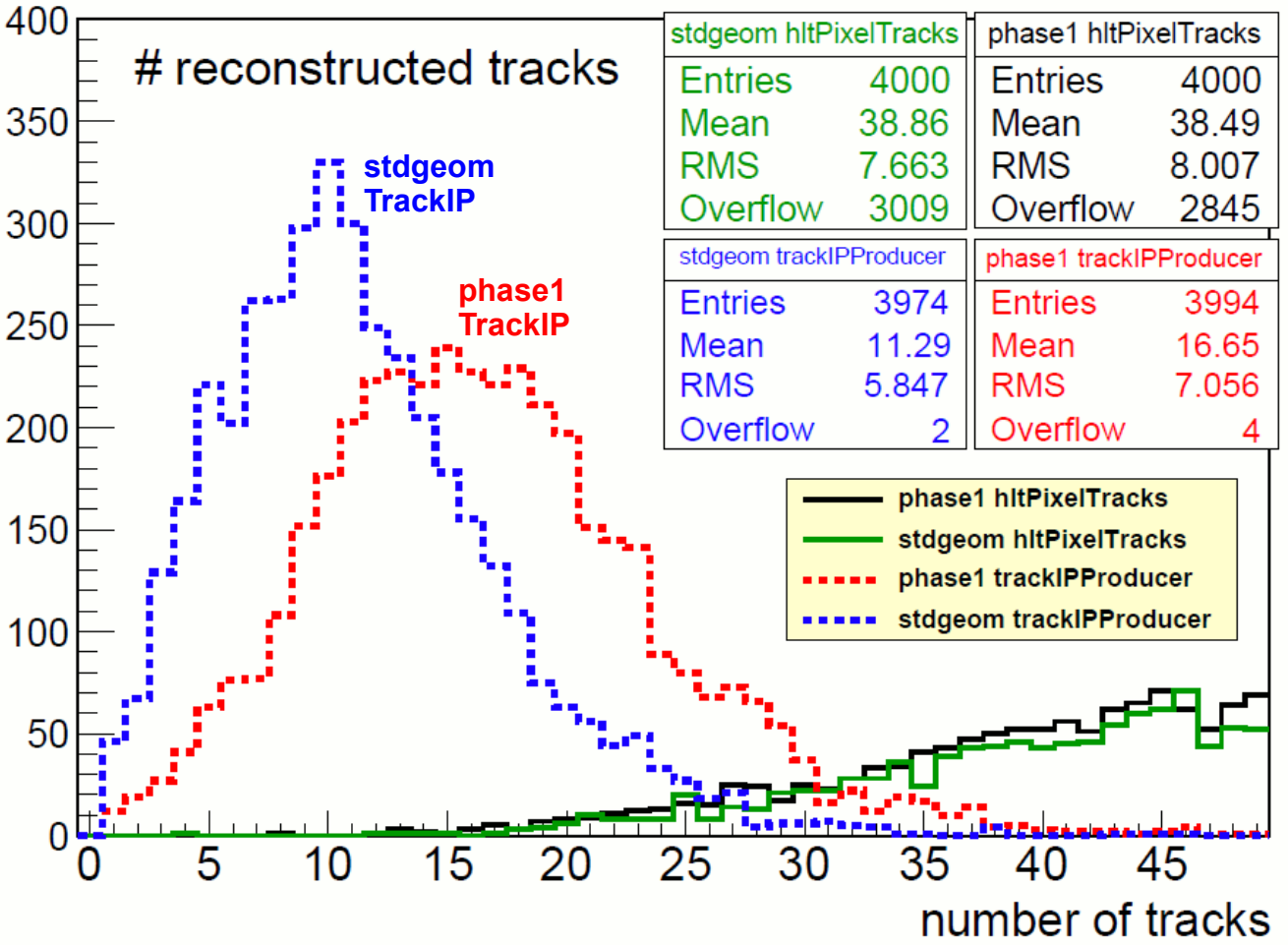
Total number of tracks / event

hltPixelTracks **stdgeom**

hltPixelTracks **phase1**

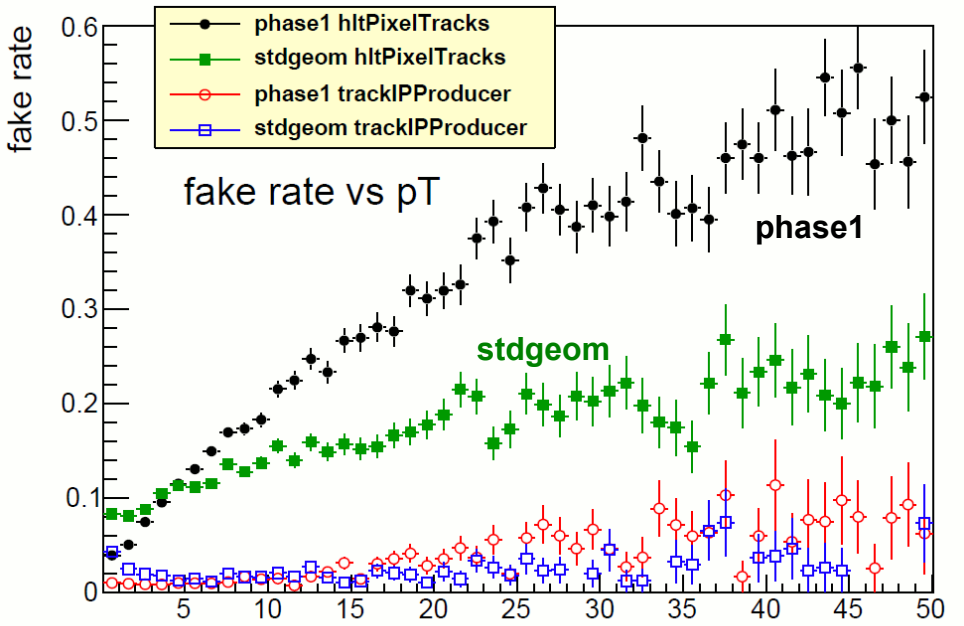
selected by TrackIPProducer (**stdgeom**)

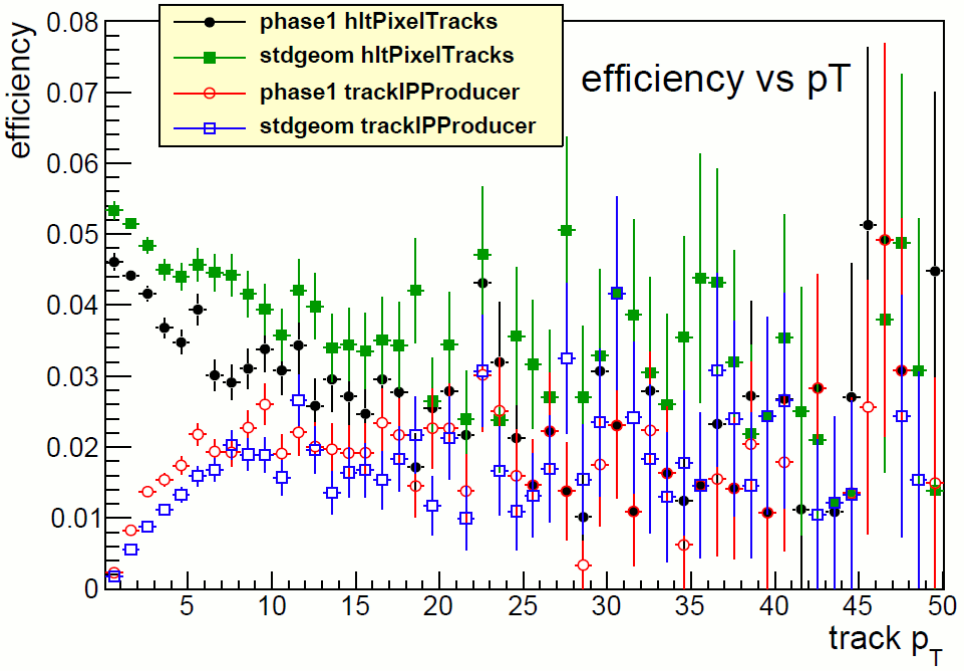
selected by TrackIPProducer (**phase1**)



- approx. same number of hltPixelTrack for stdgeom & phase1
- TrackIPProducer selection cuts reduce track subset for b-tagging
- **more selected tracks remaining in Phase1 (fakes?)**

track fakerate / efficiency





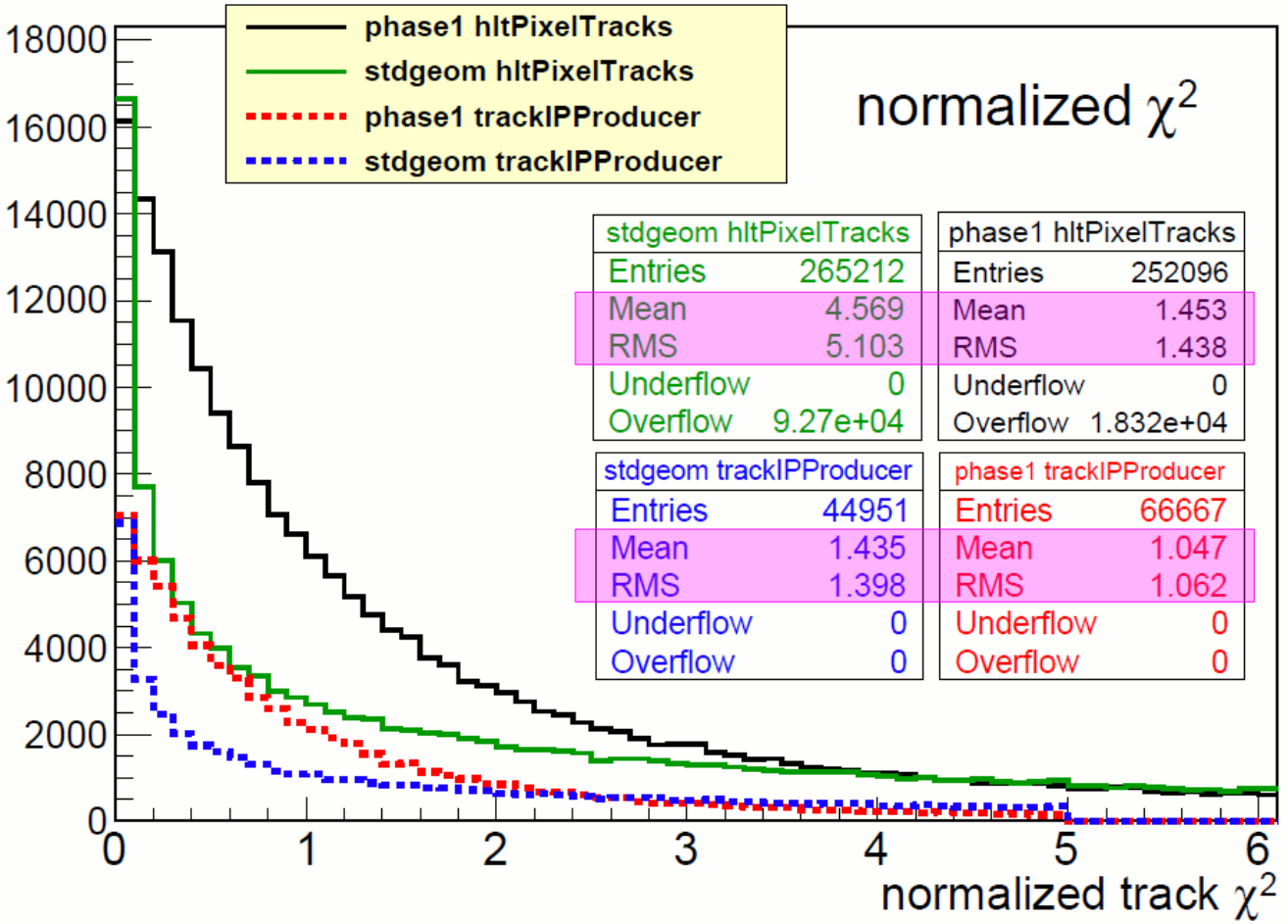
- **huge increase in fake** rate of phase1 wrt. stdgeom above ~5 GeV
  compare (black ↔ green)

- ironed out by TrackIPProducer cuts,
  compare (red ↔ blue)

- also **higher efficiency** of phase wrt. stdgeom

→ TrackProducer/Filter quality cuts need to be adapted?

Chisquare distributions



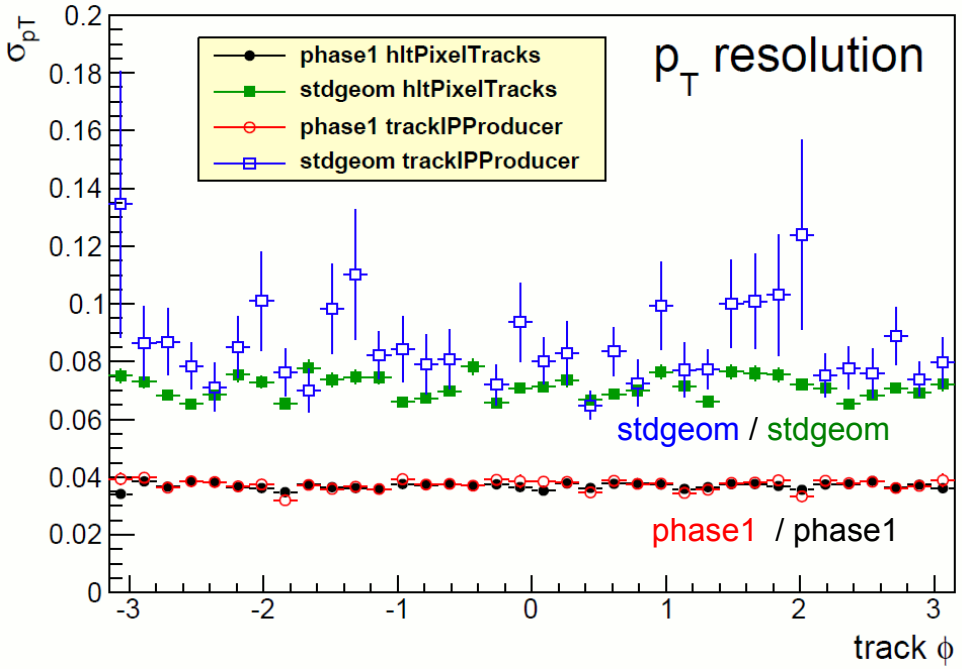
- chisquare distributions are different for phase1 wrt. stdgeom

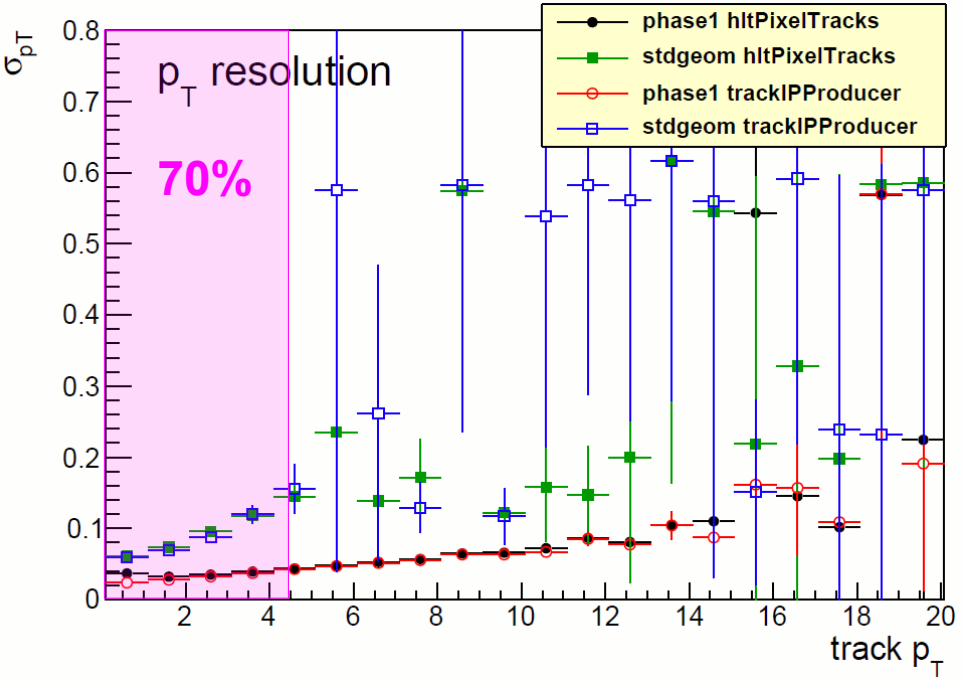
- RMS /mean much smaller for phase1 (effect reduced after selection cuts)

- cut on: **chi^2 < 5.0** in TrackIPProducer selection (→ no overflow)

p_T resolution

- **pT resolution** strongly **improving for phase1** wrt. stdgeom compare (black ↔ green) and (red ↔ blue)
- **no significant effect** from TrackIPProducer cuts seen here, compare (black ↔ red) and (green ↔ blue)
- b-tagging takes place in the low p_T region (70% of the tracks have p_T < 4.5 GeV)

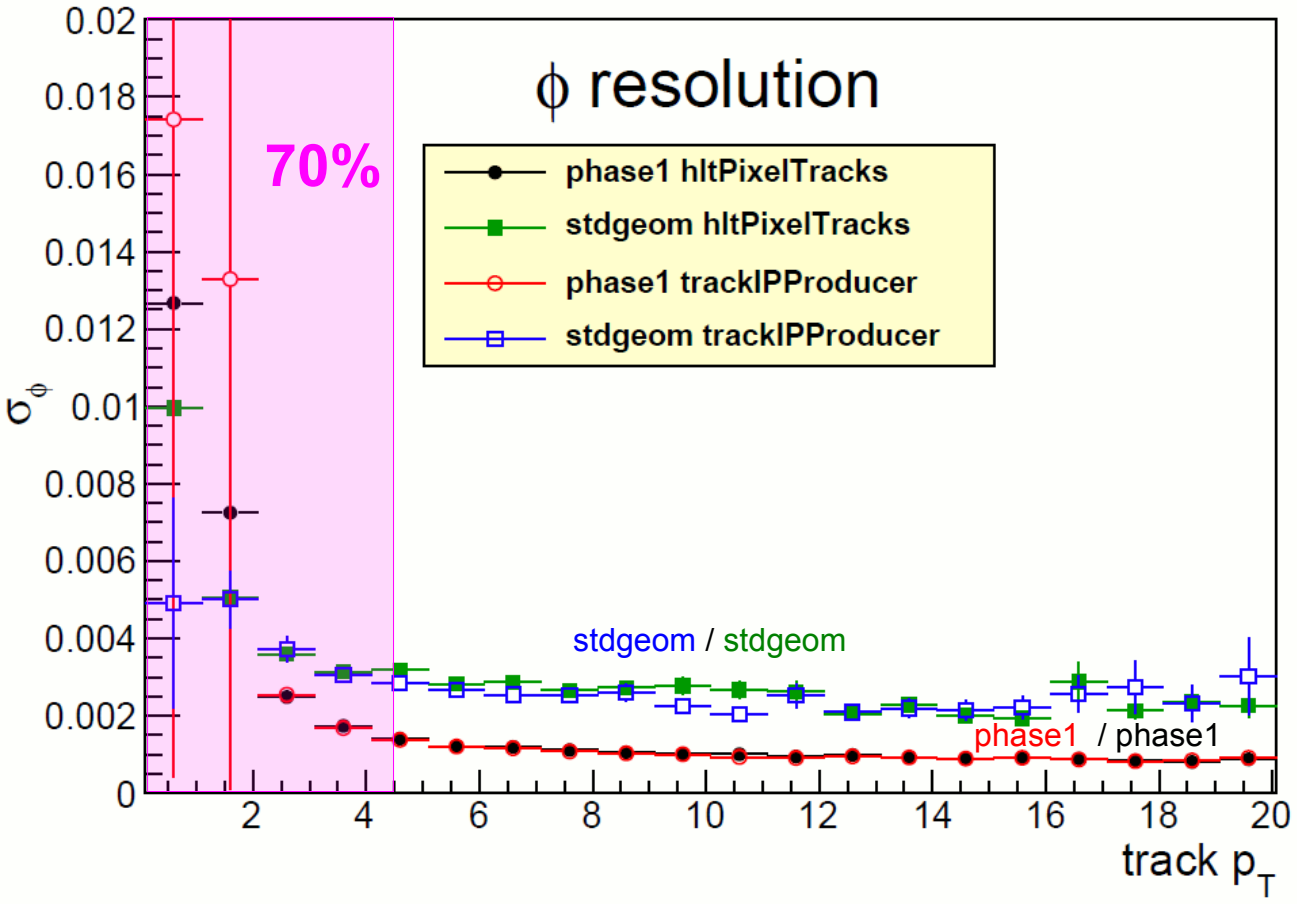




phi resolution

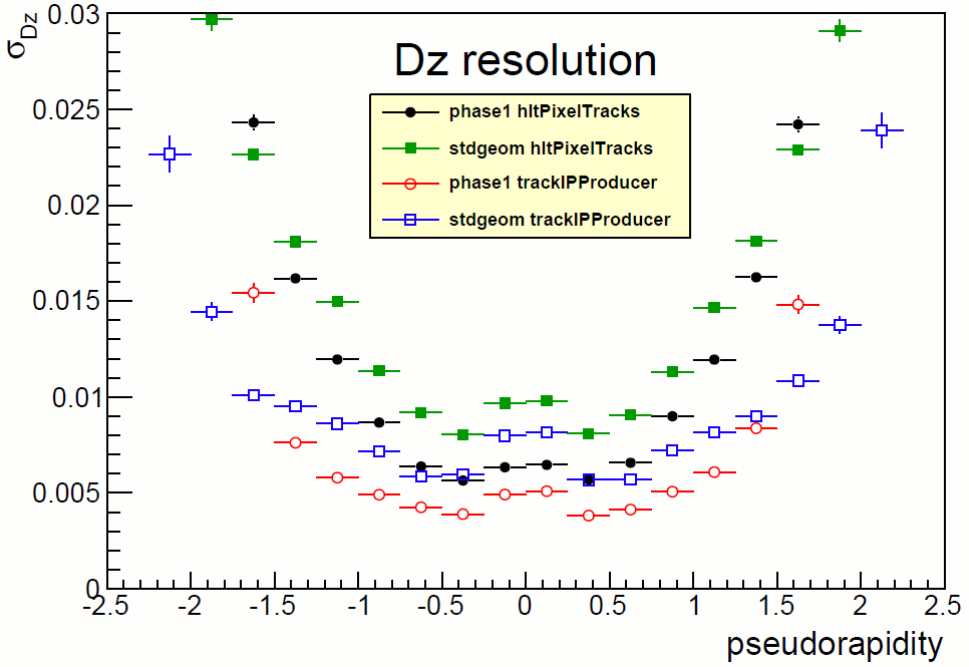
- track parameter resolution improves for phase1 wrt. stdgeom
- no effect from TrackIPProducer selection cuts,
  compare (black ↔ red) or (green ↔ blue)
- effect gets lost below ~3 GeV (MS)

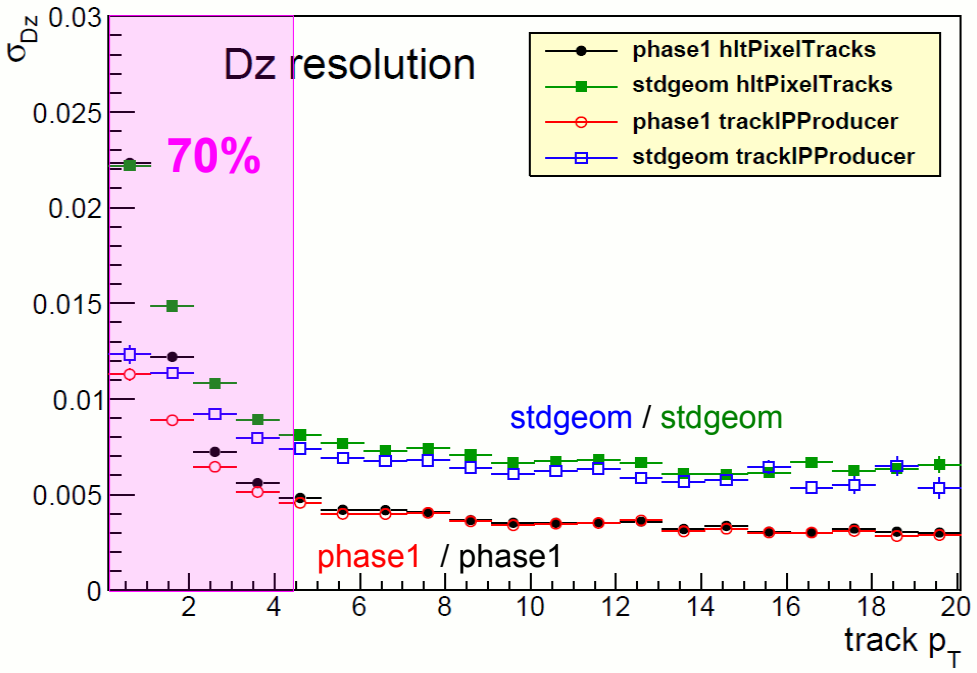
(not yet clear why so
low stats in 1-2 GeV bin)



Dz resolution

- Dz resolution improves for phase1 wrt. stdgeom
- no effect from TrackIPProducer selection cuts, compare (black ↔ red) or (green ↔ blue)
- again, effect gets lost below ~3 GeV (MS)

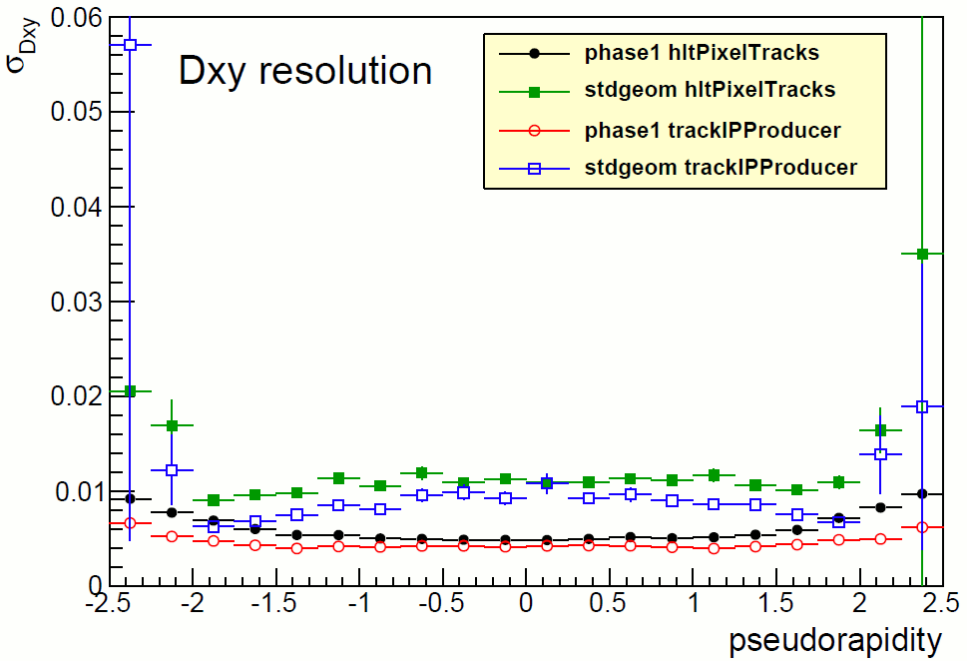


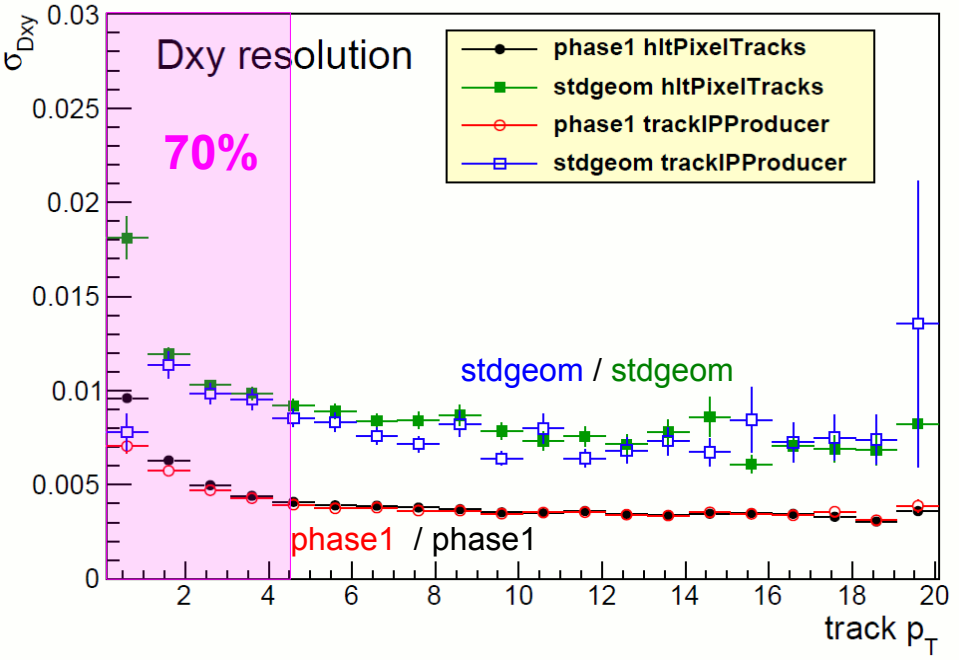


Not much gain in Dz resolution from phase1 in low p_T-region for b-tagging

Dxy resolution

- Dxy resolution strongly improves for phase1 wrt. stdgeom
- again, no effect from TrackIPProducer selection cuts, compare (black ↔ red) or (green ↔ blue)
- effect gets lost below ~1 GeV

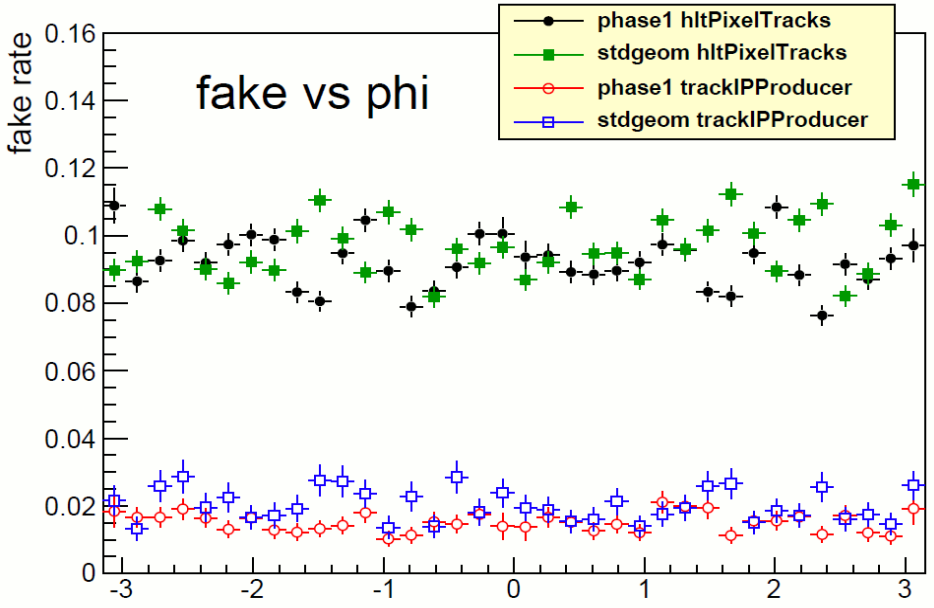


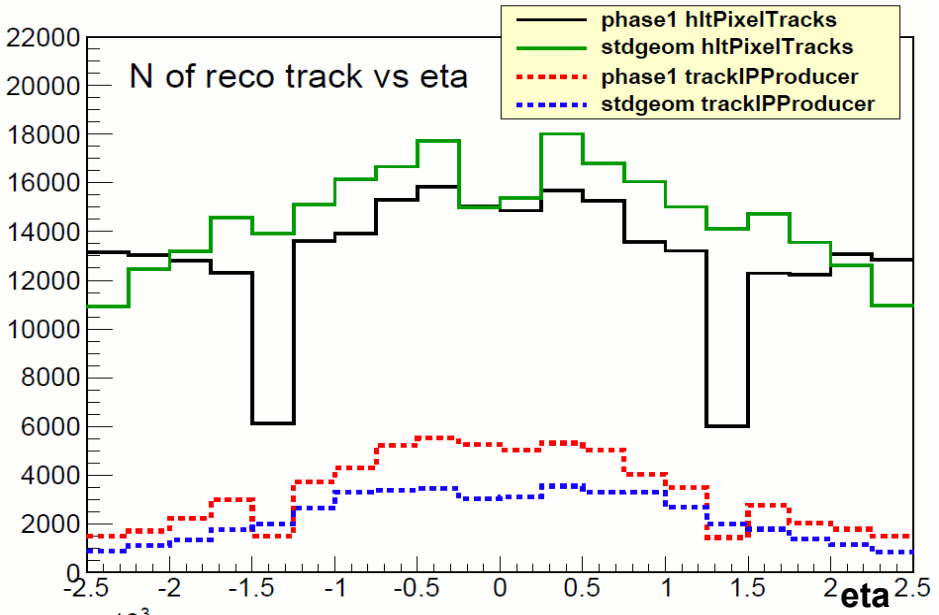


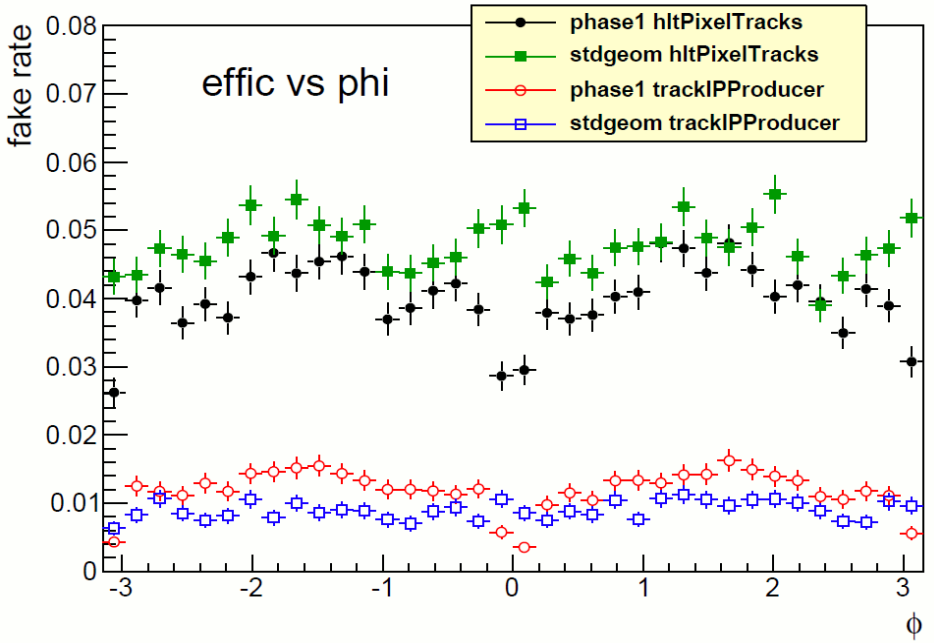
Good resolution gain from phase1
even in low p_T-region for b-tagging !

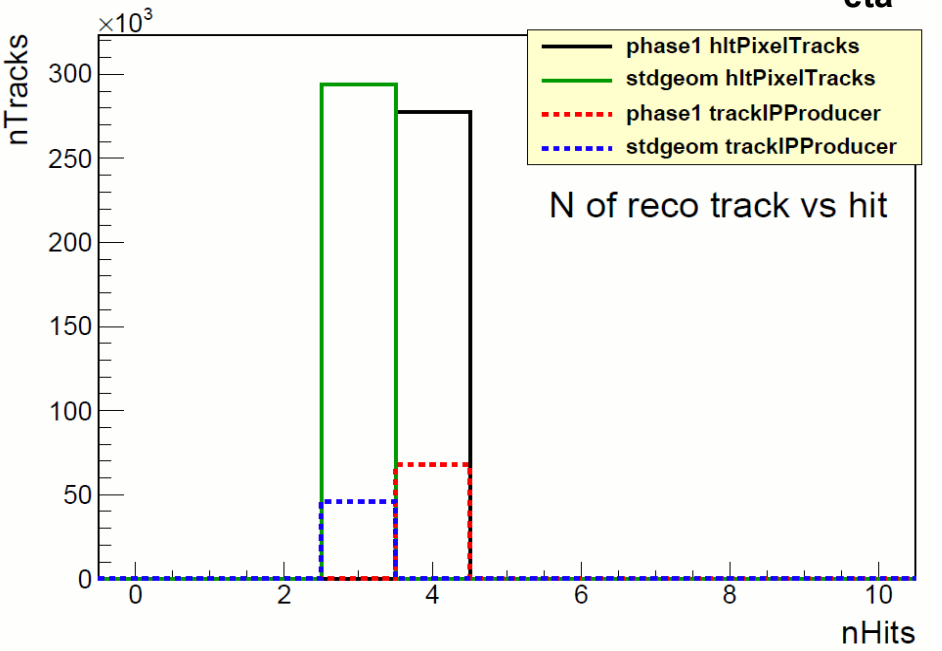
more plots

nTrack / fake rate / efficiency









IP & parameter related plots