Tracking Pseudo-Efficiency

New development and Future Plan

What is Pseudo-Efficiency ?

- It used to be called "SVT-based efficiency".
- Knowing tracks in SVT, measure DCH efficiency.

$$e = \frac{nGTL}{nGTVL}$$

  - GTVL (GoodTracksVeryLoose) does not require DCH hits.
  - GTL (GoodTracksLoose) require 12 DCH hits.
- Not really true any more.
  - SVT and DCH are not independent.
  - DchHitAdder and SvtHitAdder add tracks with each other.
- Then is it useful? – The answer is YES!!
  - Gives us good "Data/MC ratio" -> correction tables
    - R12/R14 : validated by the tau method.
  - Efficiency itself is useful for validation
    - Pseudo-efficiency was the only clue which lead us to G4 bug.

# Pseudo-Efficiency : R12/R14

○   Data

●   MC
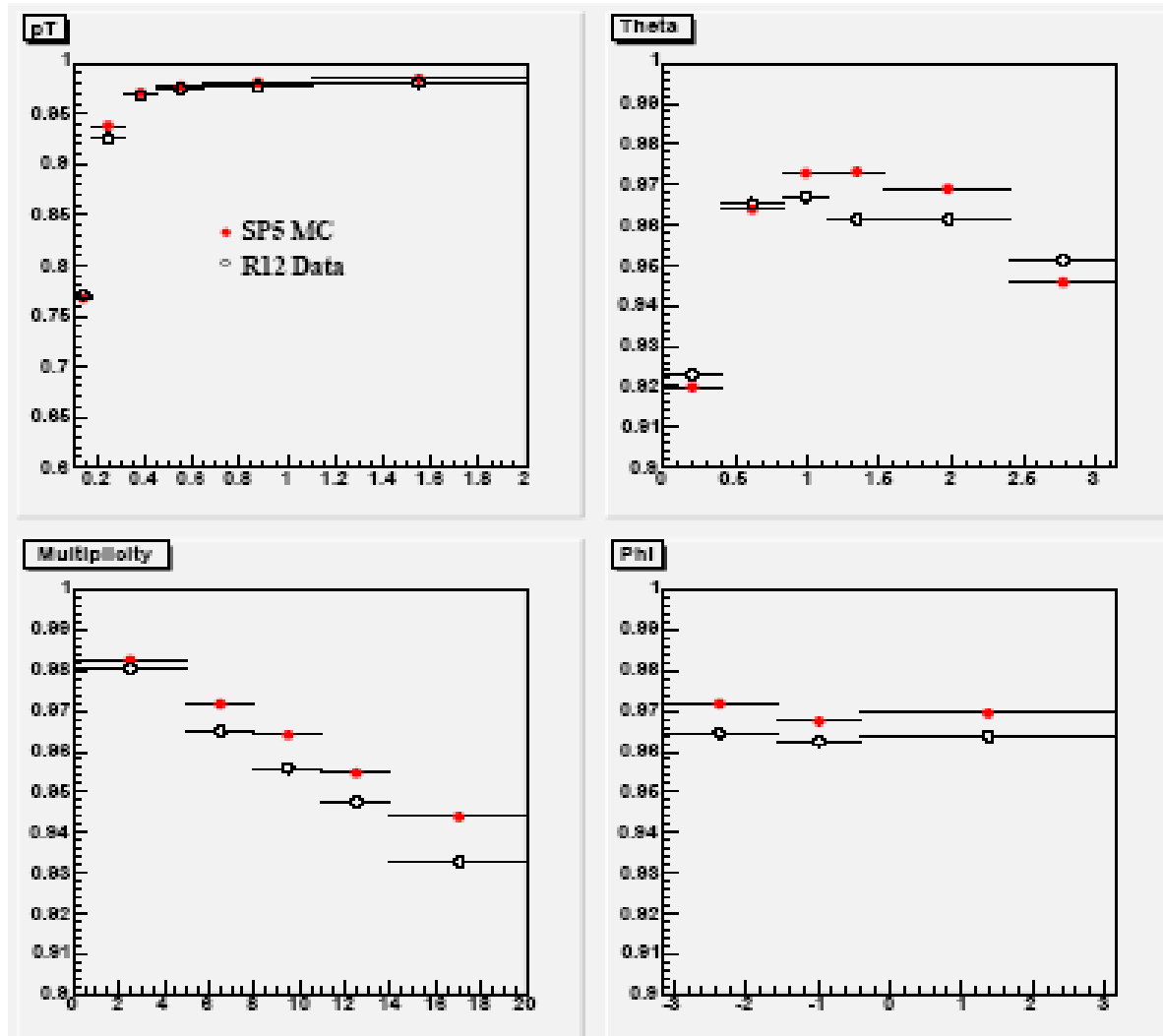
Systematic Uncertainty R12/R14

- What was done in R12/R14
    - Trk quality requirement (nSvt, Vertex) : 0.2 %
    - MC composition (selection bias) : 0.33 %
    - Track Hit Adders : 0.86 %
    - Consistency with tau method : 0.18 %

- We need to reconsider these…

New Development : new code

- TrkPseudoEff package
  - Create tables and plots for pseudo-efficiency.
  - Script to make plots are included.
  - Use ROOT.
  - No more Fortran.
  - More control
    - Can easily change binning.
    - Can easily change cuts.
    - Can make plots for validation.
      - Number of tracks per bin
      - nDch, nSvt, pT, nDch vs theta, etc…
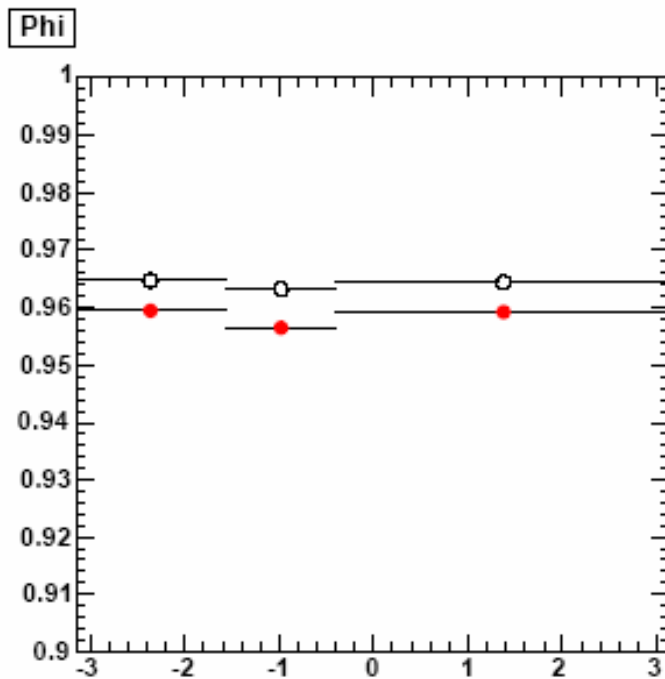   - Plots for pion tracks from BtaPidKsSamplePions list

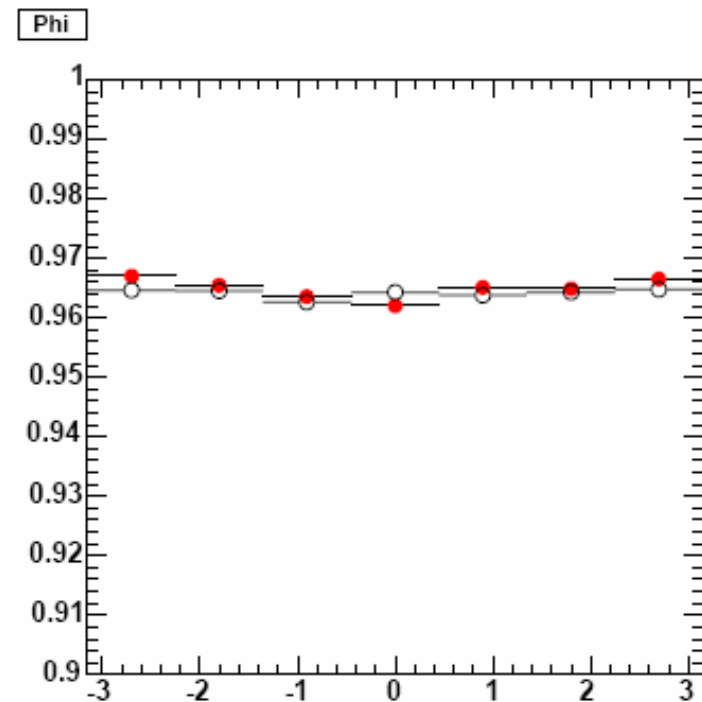# New Pseudo-efficiency plots: R16
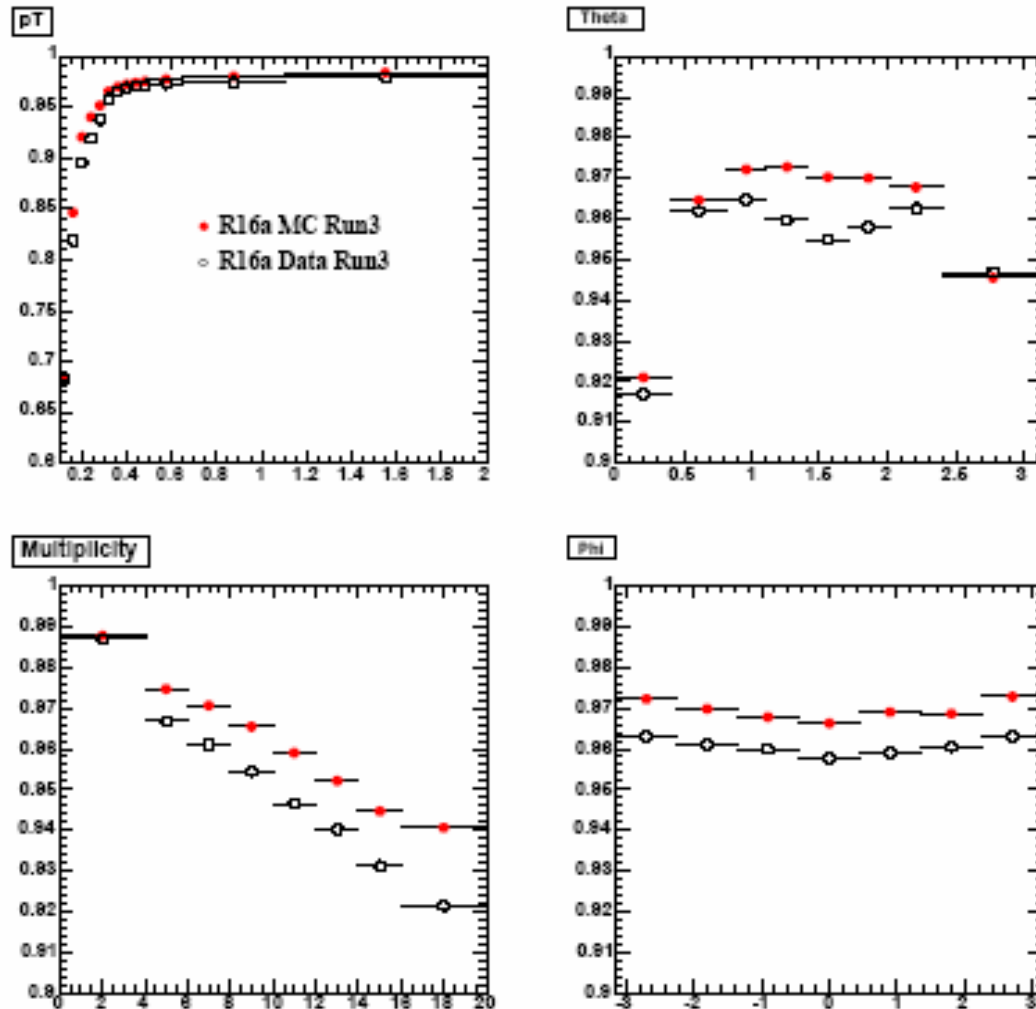
Use of Pseudo-Eff (1): SP8 tuning
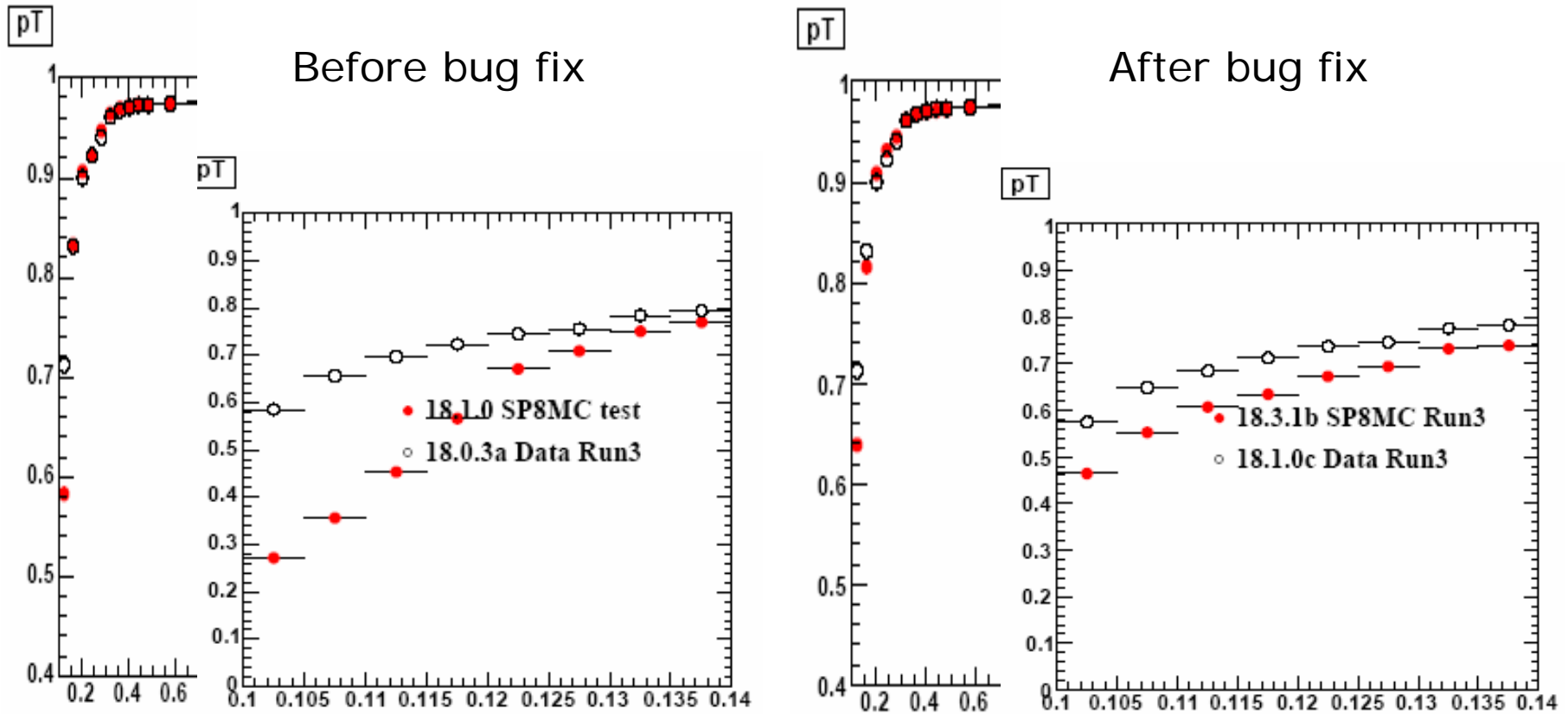
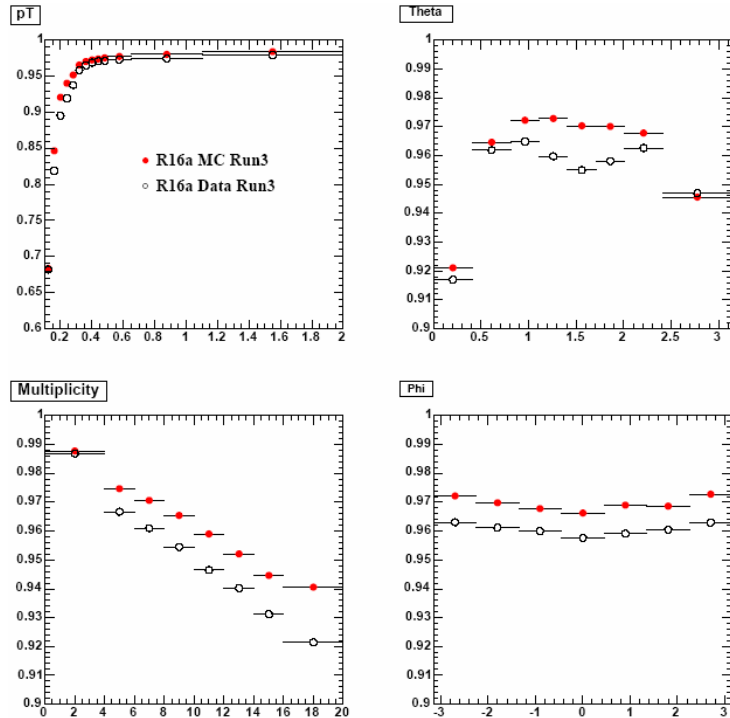- Tuning of DCH simulation parameters.

Before tuning

After tuning

Use of Pseudo-Eff (2): SP8 validation

- Low pT problem -> discovery of G4 bug.
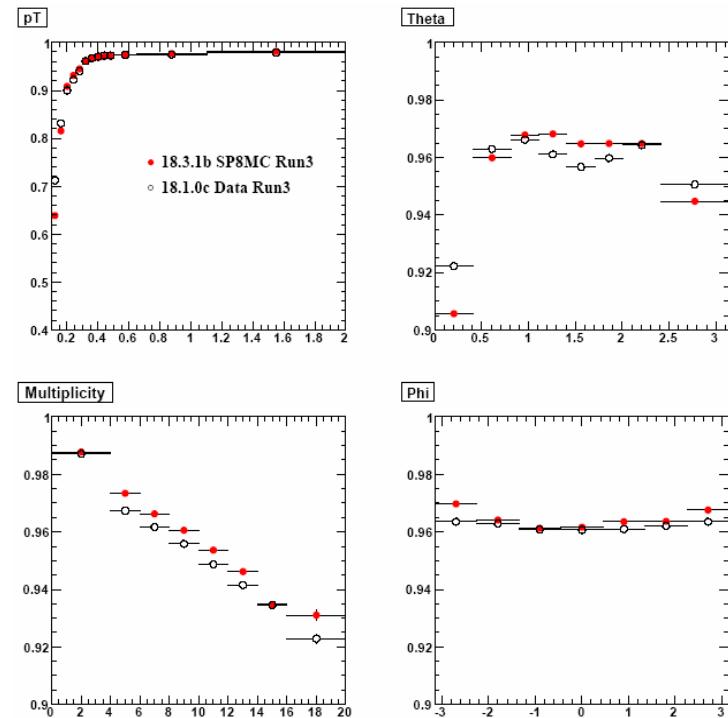- But Data-MC agreement is still not as good as SP5/6

Before bug fix

After bug fix

Comparison of R16 and R18

R16 (SP5/SP6)

R18 (SP8)

Data efficiency : 96.09%
MC efficiency : 96.98%
Data/MC ratio : 0.9908
          (1 % difference)

Data efficiency : 96.21%
MC efficiency : 96.45%
Data/MC ratio : 0.9975
          (0.3 % difference)

Future Plan

- R16 correction tables -> Re-use R12/R14 tables.

- New systematic study

  - How to deal with effect of HitAdders ?

  - Other systematic to be considered ?

  - Consistency with tau method is the key.

- New pseudo-efficiency?

  - Check the possibilities of

$$e = \frac{nGTL}{nCT} \qquad e = \frac{nGTVL}{nCT}$$

  - Use of track history?

    - SVT- efficiency?