Tracking Pseudo-Efficiency

Correction Tables for R18

Pseudo-Efficiency

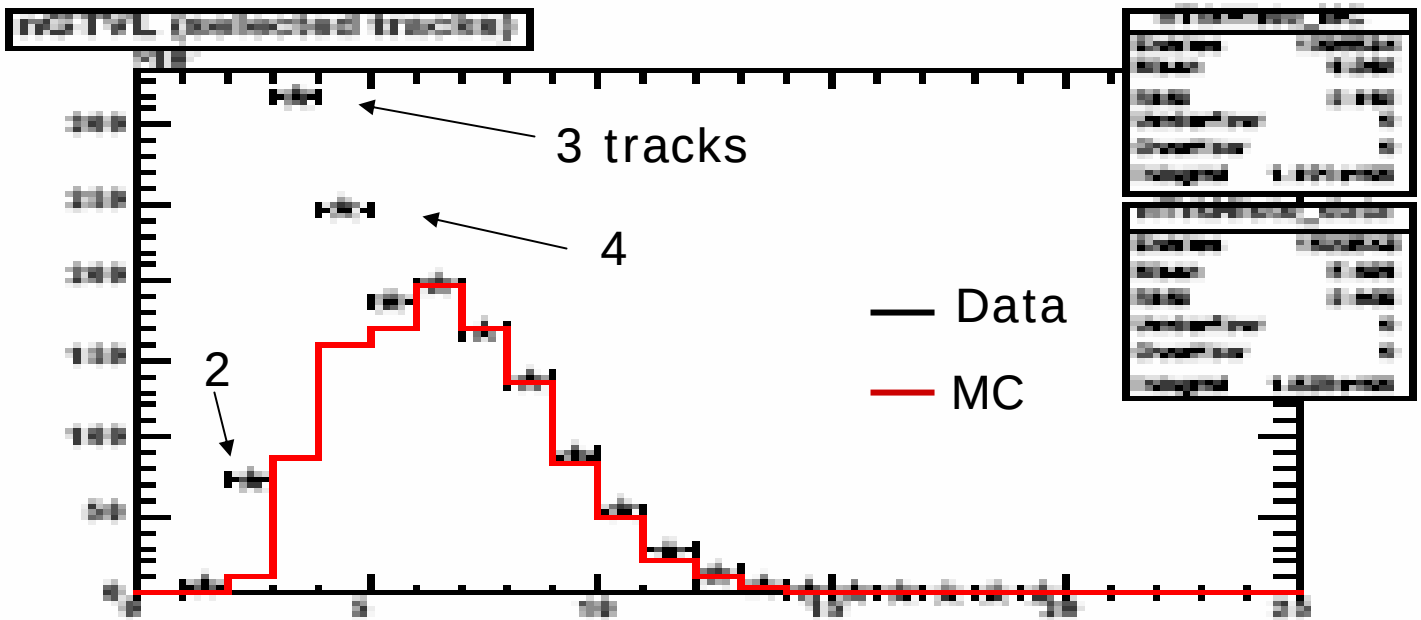
- Two usage of pseudo-efficiency.

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

- Make Correction Tables.
  - Today's topic
  - Correction factors for physics analysis.
    - Make conditions as close as typical physics analysis.
    - Event selection, fake correction, etc.
- Validation of DCH.

Event Selection – Bhabha veto

- Use standard Bhabha veto
  - Typical physics analysis uses Bhabha veto.
  - Correct the discrepancy between the numbers of selected tracks at low multiplicity.



Fake correction

- What was done

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

  - SVTFakes = tracks which have SVT hits only.
- Go without fake correction : reasons
  - Used Bhabha events to calculate Fake Rates, but
    - Bhabha events and multi-hadron events are different.
    - Especially, at low pT, this does not give us reliable numbers because of low statistics of Bhabha tracks.
  - In physics analysis, they do not do this kind of fake correction. Majority does not do fake corrections at all.
  - DCH is not independent from SVT --> this correction does not have original meaning any more.
  - Fake Rates are small : average 0.1 %

Systematic Uncertainty

- What was done in R12/R14
  - Trk quality requirement (nSvt, Vertex) : 0.2 %
  - MC composition (selection bias) : 0.33 %
  - Consistency with tau method : 0.18 %
  - Fake correction : 0 %
  - Track Hit Adders : 0.86 %
    - Switch off TrkHitAdders and see the change in Data/MC ratio.

- We can keep the first three, but the last two does not make sense.
  - No need for fake correction uncertainty…

New systematic study

- Use SVT-efficiency?
  - First order : pseudo-eff = DCH eff (e_DCH).
  - Use track history to calculate SVT-eff (e_SVT).

$$e\_SVT = \frac{nGTL \text{ with SVT hits}}{nGTL}$$

  - Total efficiency is

    e_total = e_DCH + e_SVT – (e_DCH)*(e_SVT)
  - Compare this to tau results to get systematic uncertainty.

- What else we should consider ?
- Needs input !!!