



# ALICE Report

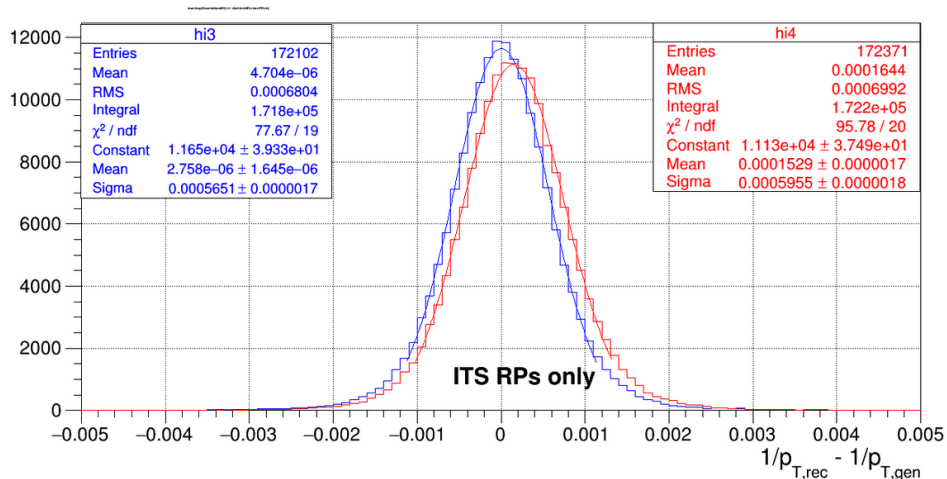
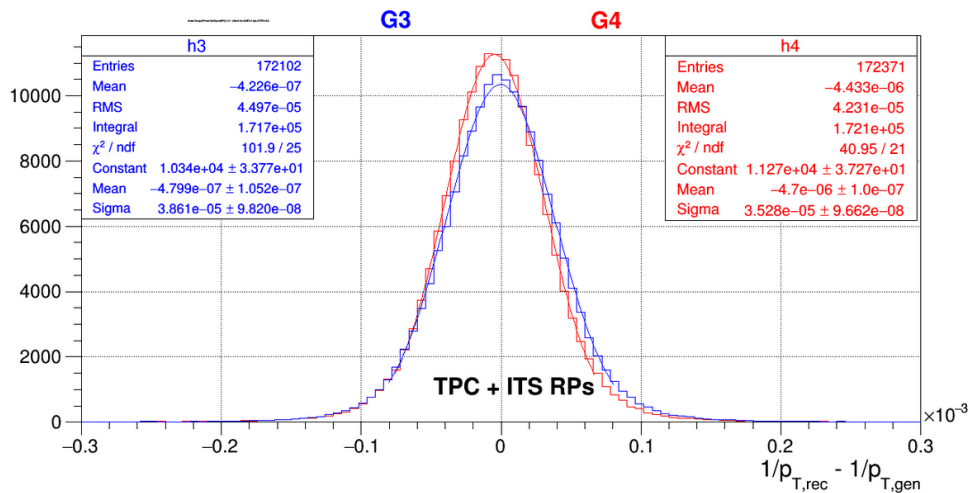
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# Tracking Precision Problem

- A strange bias on hit positions produced via Geant4 in our inner tracker (ITS).
- Geant4 10.1.p03 with the default magnetic field stepper with default field parameters

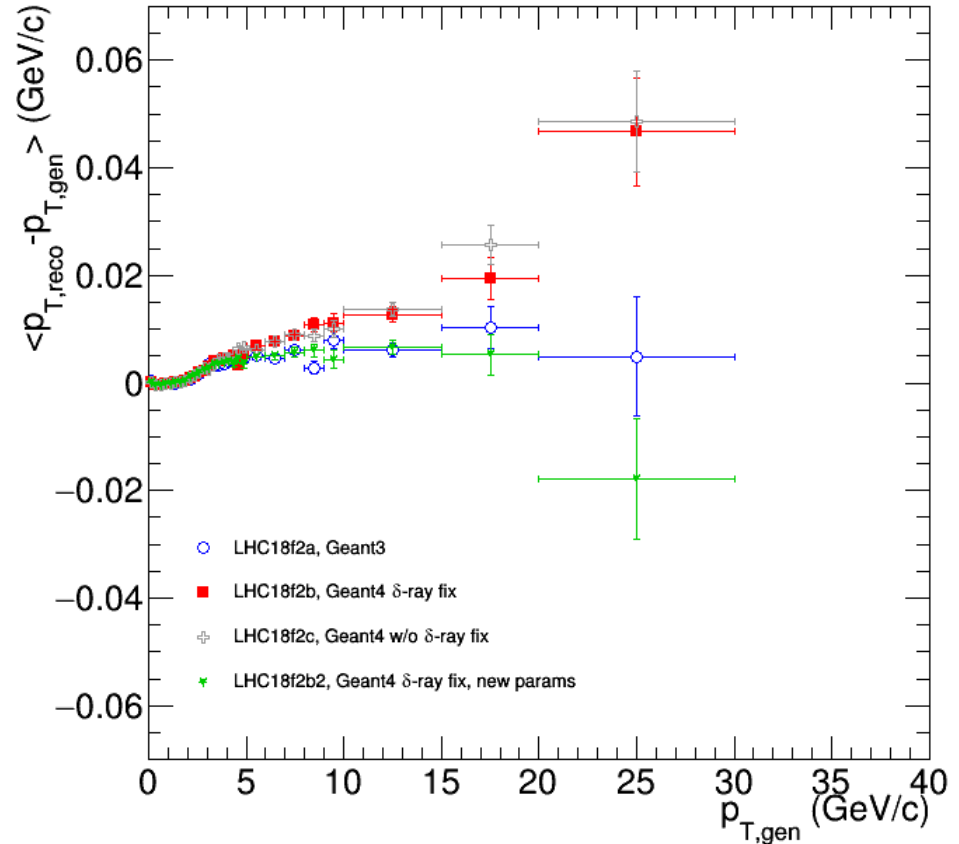


# Tracking Precision Problem (cont.)

- To isolate the problem mono-energetic 100 GeV muons produced at the vertex were simulated, with energy loss as well as multiple scattering switched off and a uniform field.
  - Hits are so called track references recorded at each crossing of a sensitive ITS layer.
- The actual hit positions were compared to theoretical ones (from circular trajectories).
  - For large steps in Air  $O(\text{cm})$  everything looks normal.
  - However, at each crossing of an  $O(100 \text{ }\mu\text{m})$  ITS material layer there is a significant increase of the tracking error in one direction corresponding to lower momenta.
- Also in Geant 3 we observe tracking imprecisions. However, in this case they lead to a symmetric smearing and not to a bias.

# Tuning Field Parameters

- The problem was reported to J. Apostalakis who suggested to tune the parameters of the magnetic field
- Suggestion #1:
- Tune the “**DeltaIntersection**” parameter and change the default value
  - from 1.0e-03 mm to 1.e-04mm (1<sup>st</sup> trial), 1.0e-05 mm (second trial)



# Tracking Precision Problem - Resolved

- The “DeltaIntersection” value  $1.0\text{e-}05\text{ mm}$  repaired the bias with no performance penalty (in real simulation) observed
- New tests are now running with Geant4 10.04.patch-02 and NystromRK4
- Do other experiment also use (a) tuned value(s) ?
- If so, could Geant4 consider a change of the default?

