Tracking e pile-up

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Workshop di Fisica ATLAS Italia

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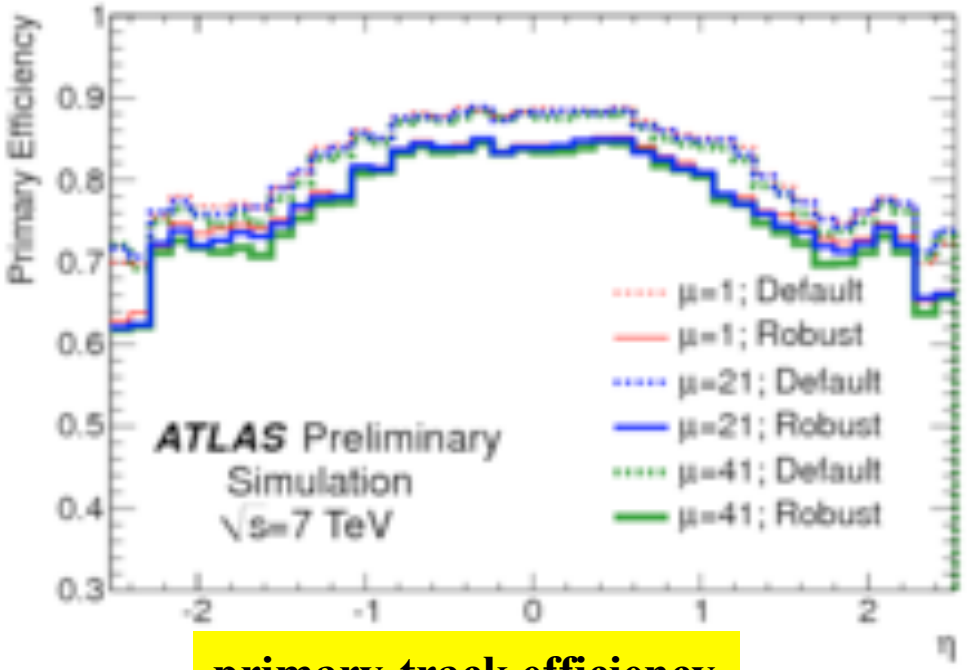
Executive summary

- Tracking performance with high pile-up studied in:
  - MC up to μ=40
  - Data of two high-μ runs in 2011 (μ_{peak}=29, 32)
  - Summary in ATLAS-CONF-2012-042

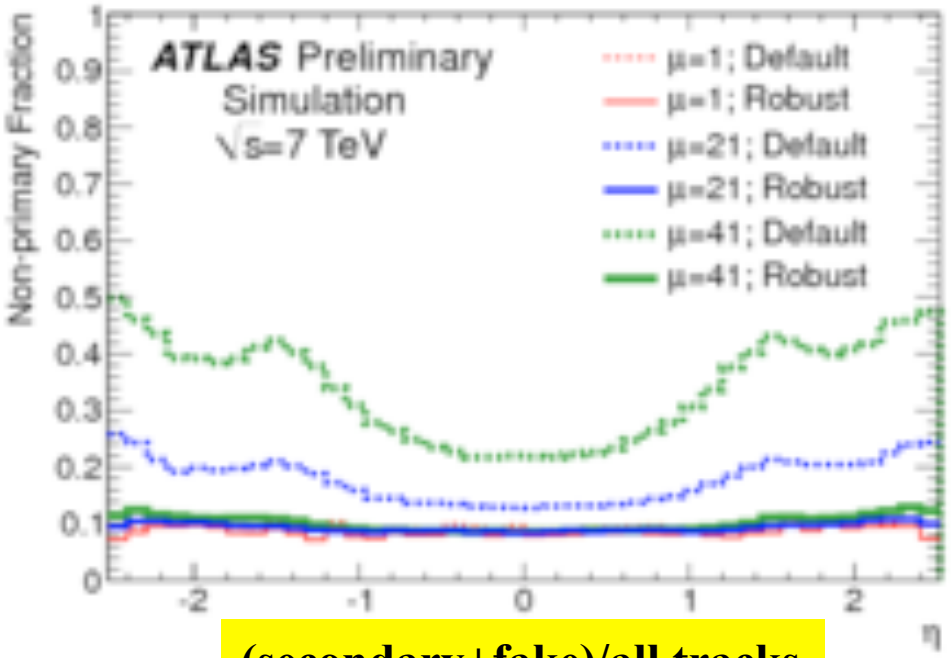
Performance stable if fake tracks kept under control

- Change of paradigm in tracking:
  - **keep efficiency high / get rid of fakes in analysis**
    - **"robust" cuts used in primary vertex reconstruction**
    - Less critical for physics objects: **a Δz cut is enough!**
- Work in progress:
  - Validation of pile-up model (= μ rescaling)
  - Re-selection of primary vertex
  - Isolation and JVF

Monte Carlo studies



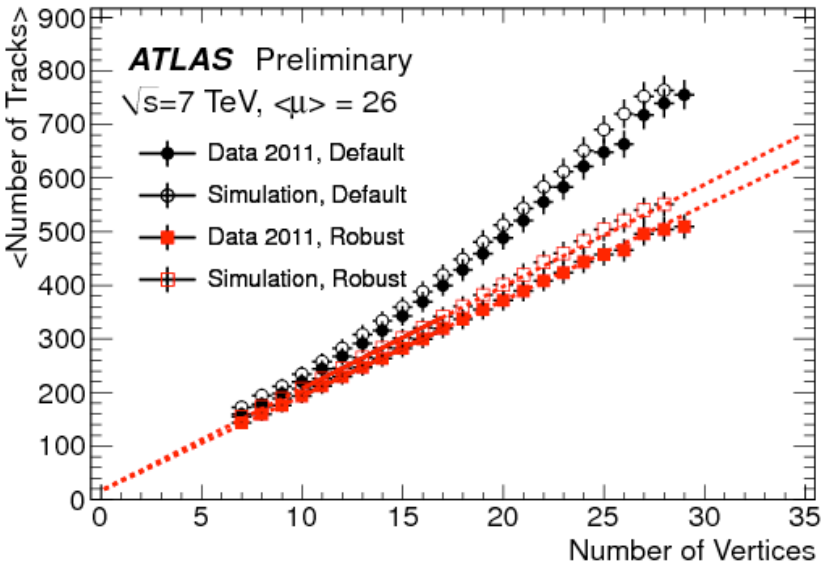
primary-track efficiency

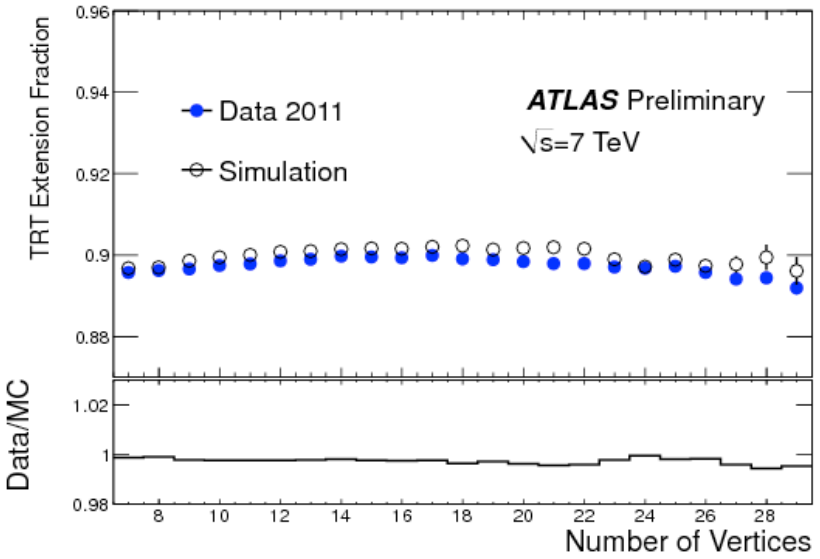


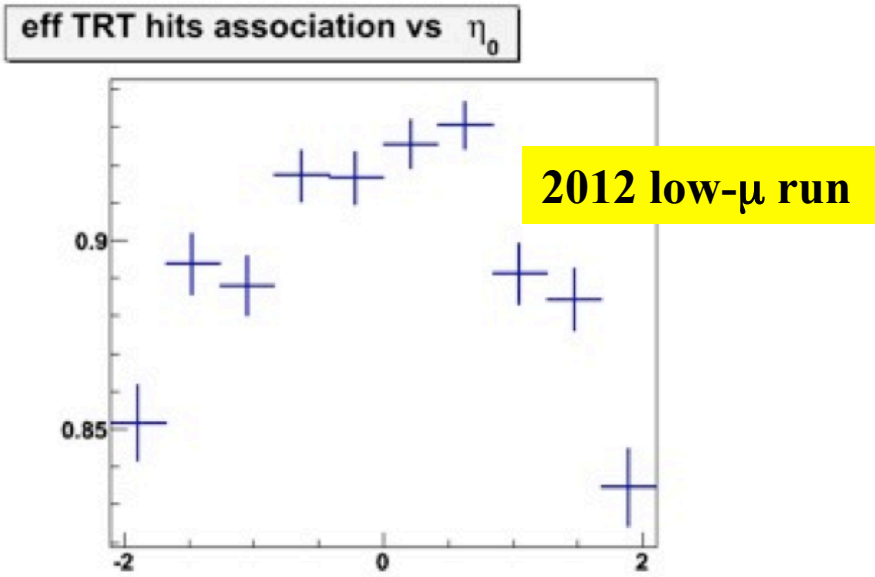
(secondary+fake)/all tracks

- Reconstruction efficiency insensitive to pile-up
- Increase number of combinatorial fakes
  - Cannot distinguish secondary from fakes according to pile-up truth
  - Use difference w.r.t. to no pile-up as estimation of fakes
- Fake rate constant with tight track quality:
  - NSiHits+NDeadModules ≥ 9, no holes in Pixel
  - About 5% efficiency loss

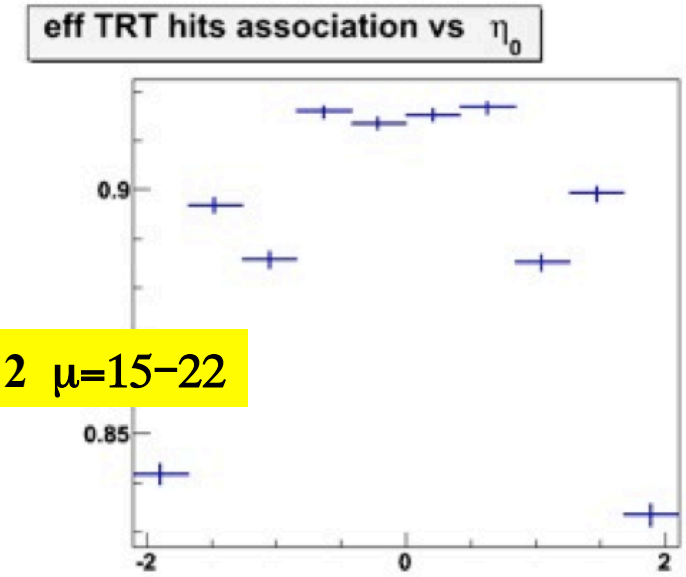
Data plots







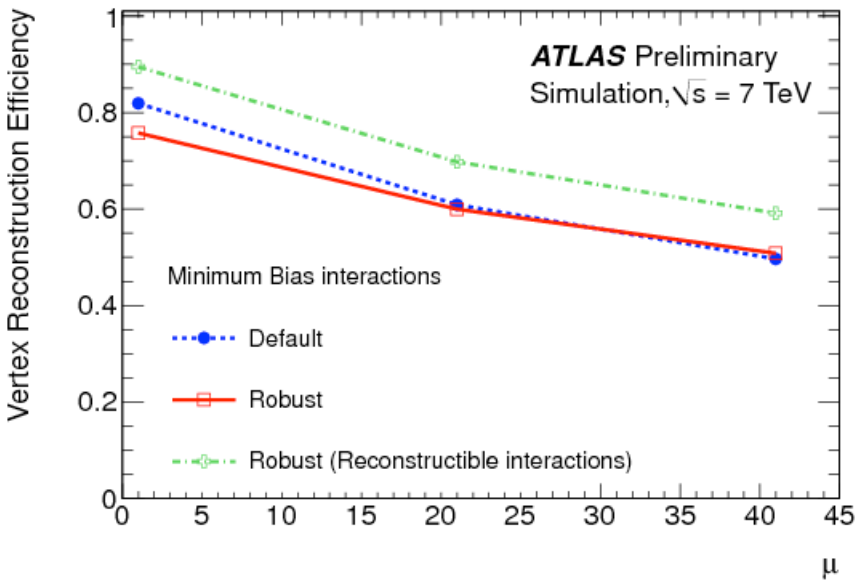
2012 low-μ run

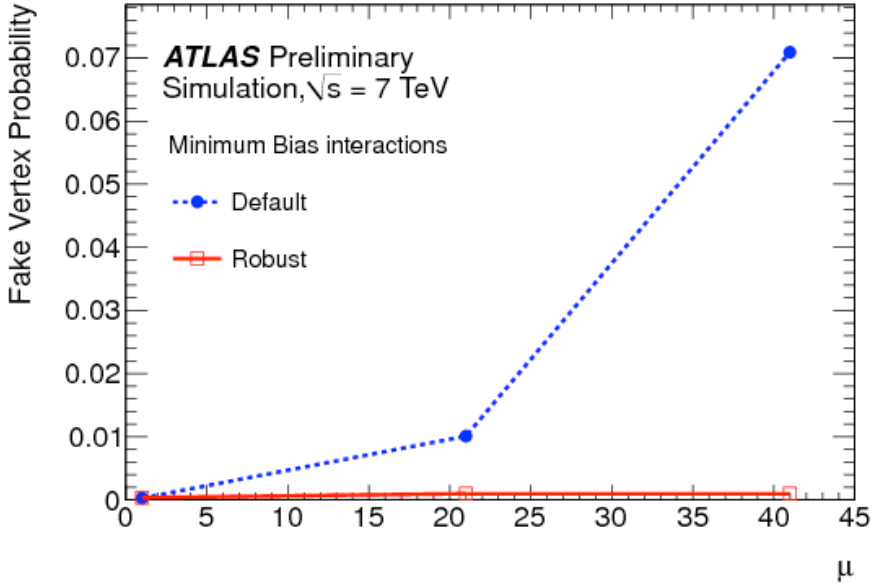


2012 μ=15−22

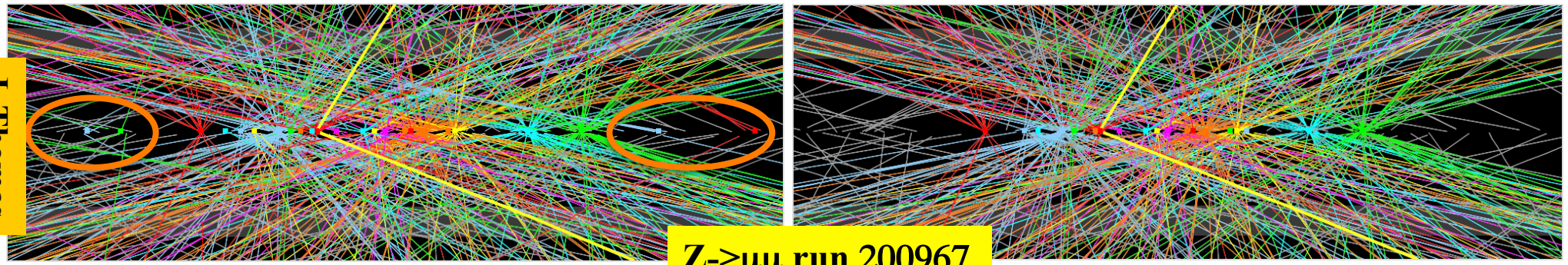
J. Adelman

Vertexing

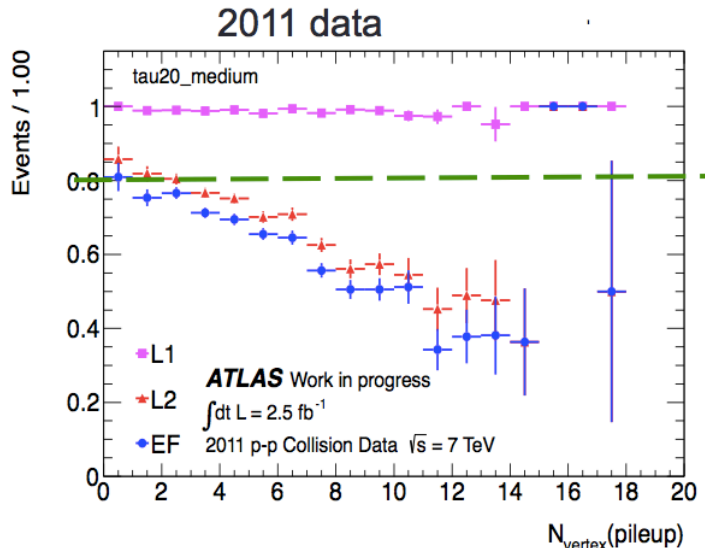


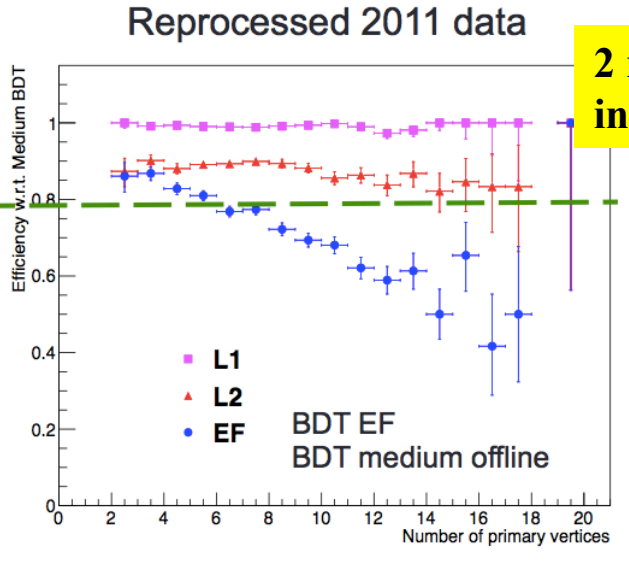


- Use of "robust" cuts essential is no other kinematical constraint
- ...actually improves efficiency at very high pile-up



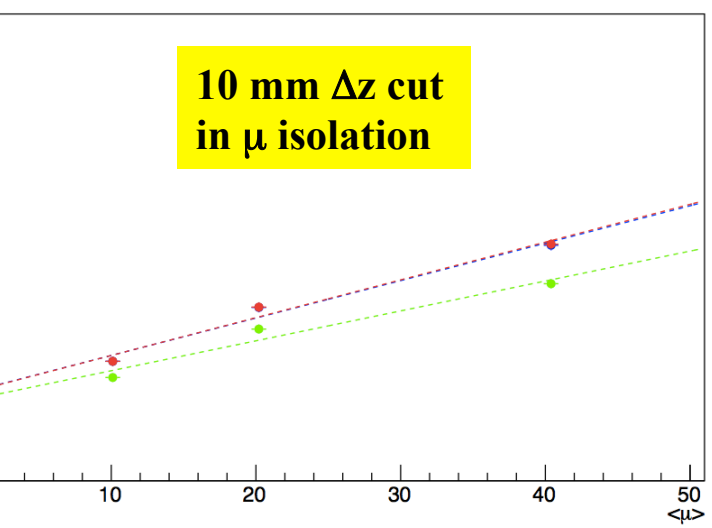
Pile-up suppression: Δz cuts



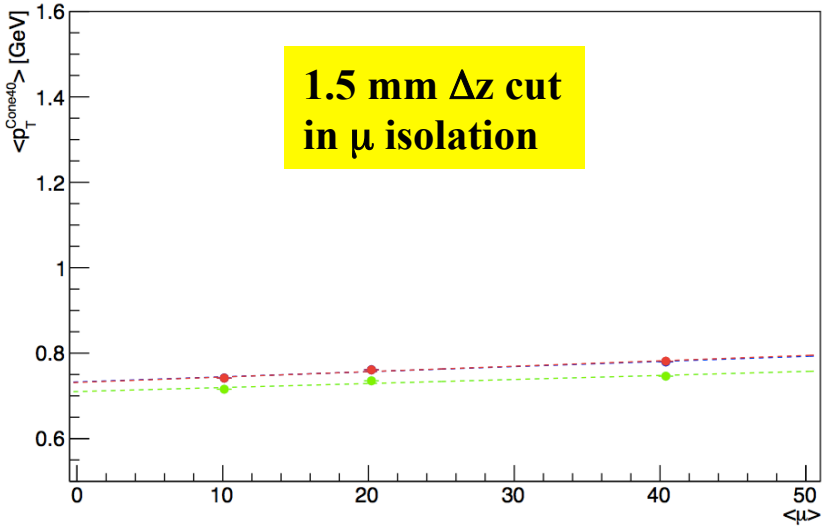


2 mm Δz cut in L2 τ trigger

M. Shamin



10 mm Δz cut in μ isolation

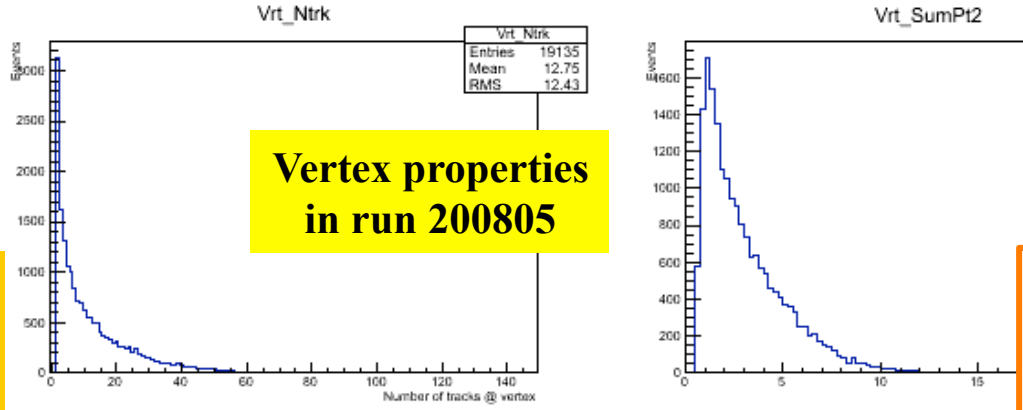


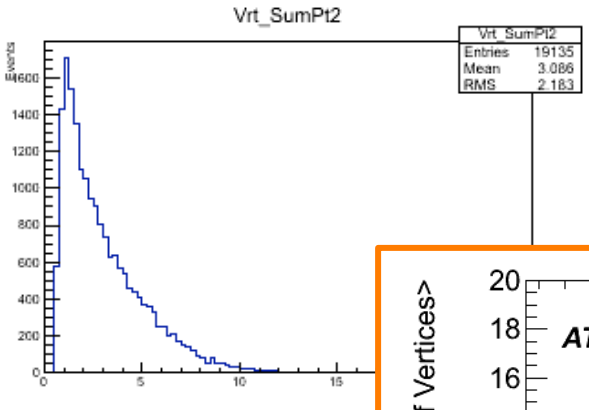
1.5 mm Δz cut in μ isolation

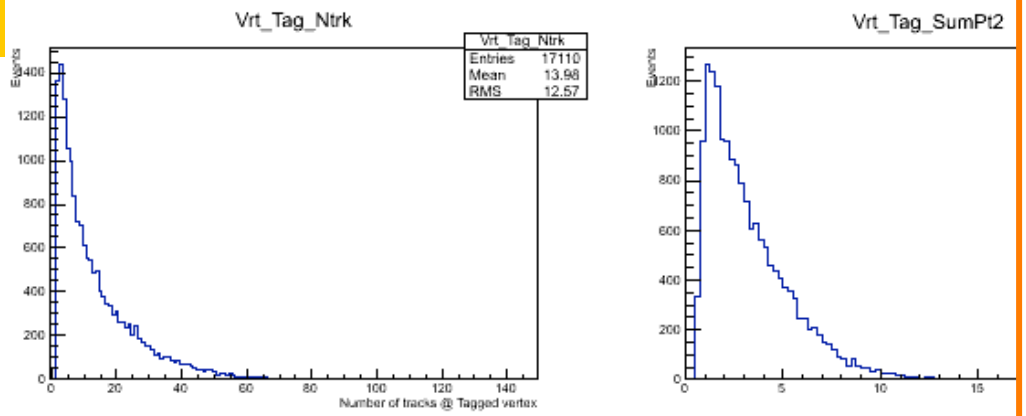
M. Goblish-Korlb

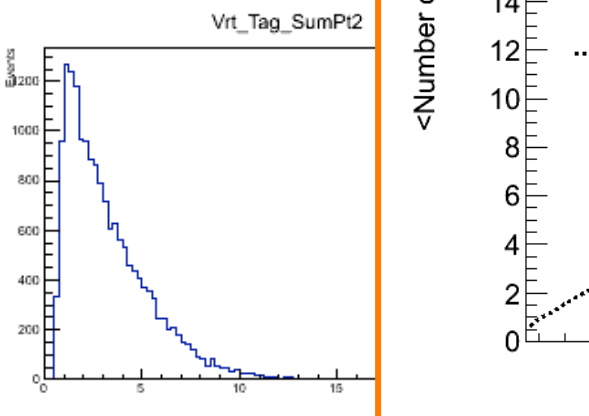
K. Grimm

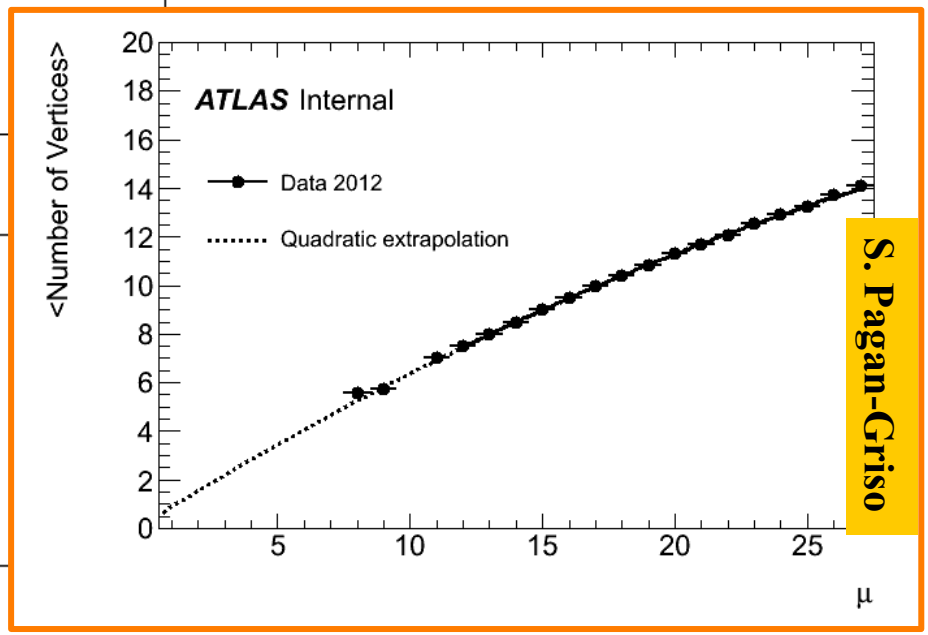
Vertex properties in run 200805







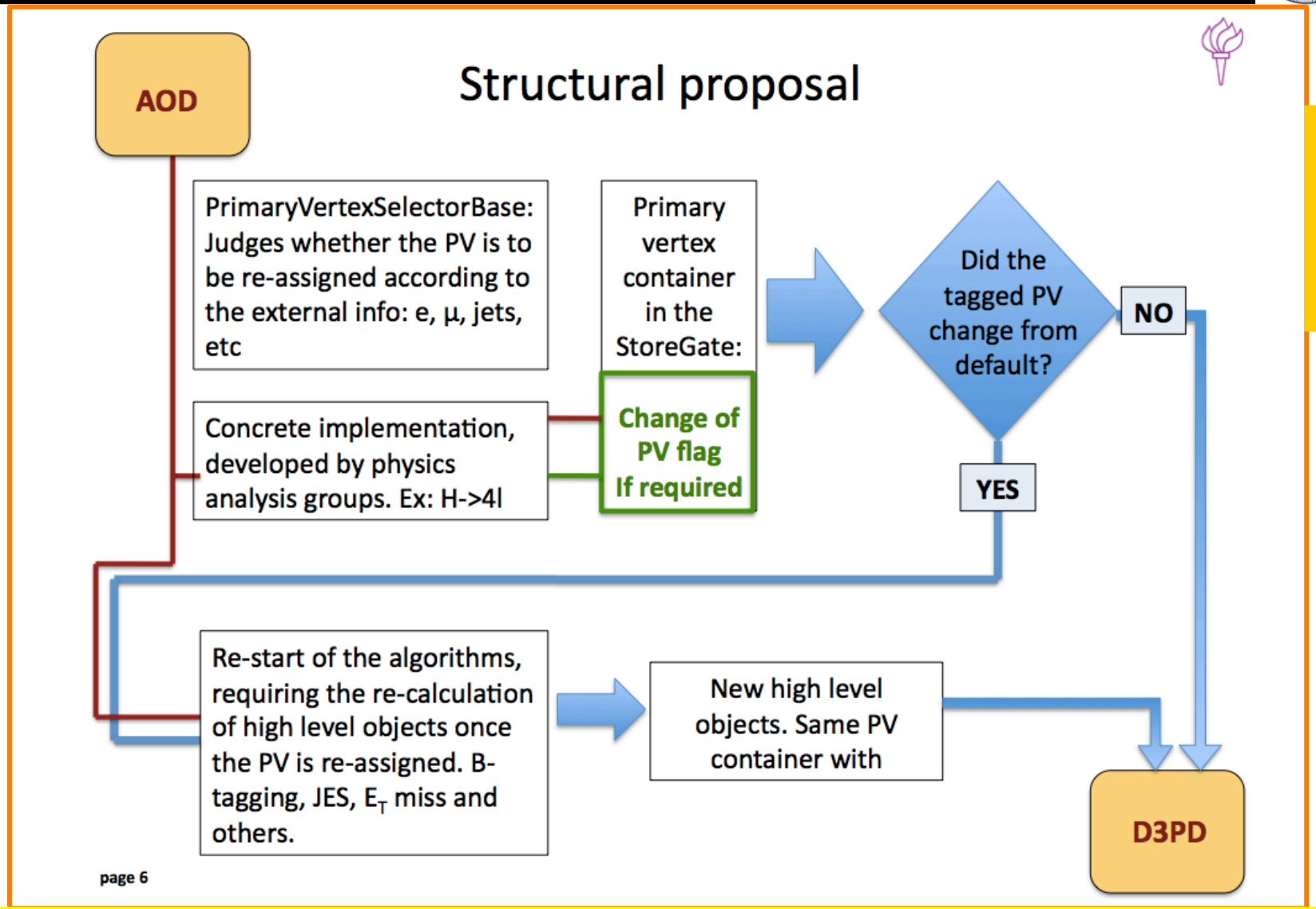




S. Pagan-Griso

- Low-μ run (=no pile-up) for validation of minimum bias generators
- and computation of μ rescaling (expected to be similar to MC11b)
- *...guess what is missing*

Tool to select primary vertex



K. Prokokiev

https://twiki.cern.ch/twiki/bin/viewauth/AtlasProtected/VertexReselectionOnAOD

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