1-jettiness at the EIC

Leticia Cunqueiro (ORNL), Peter Jacobs (LBNL), Henry Klest (Stony Brook), Sookhyun Lee (UM, Ann Arbor)

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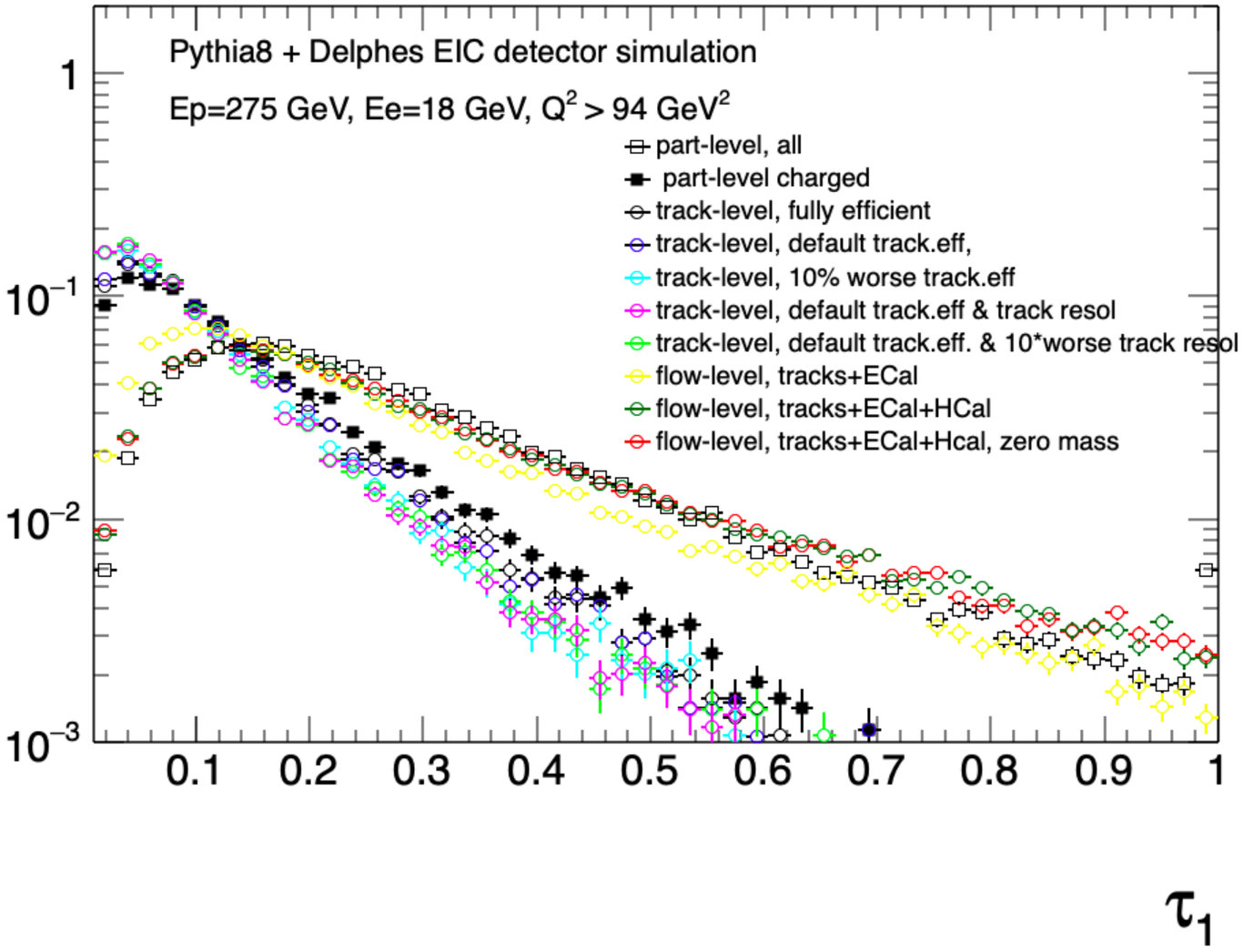
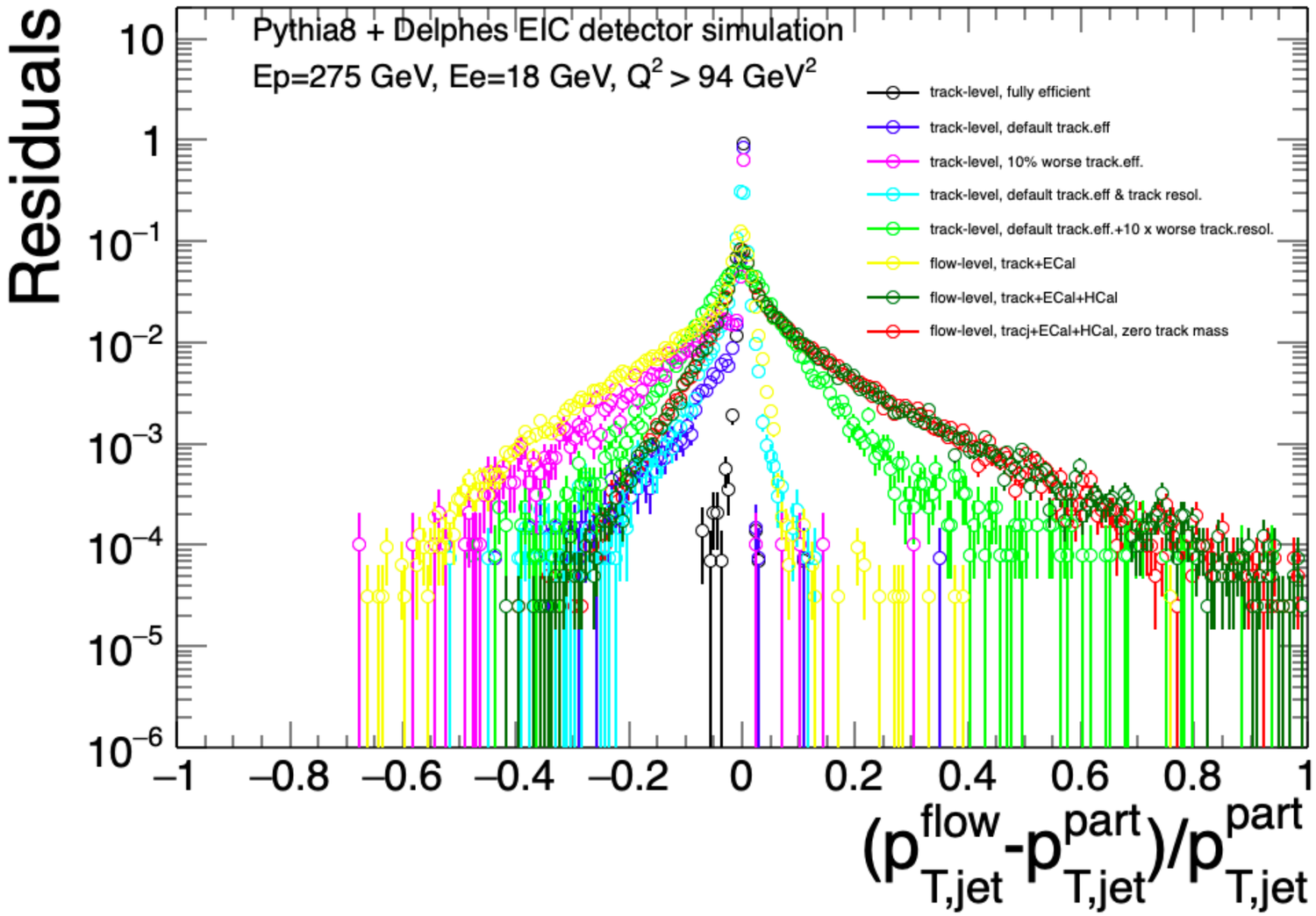
- Chapter 7.4 ongoing, with theory contributions from Chris Lee et al
- Experimental projection phase space choices dictated by best theoretical precision (probably Q~30 GeV, x=0.2)
- In this presentation, an example case for Q>10 GeV, and focusing on tau1_a
- First look at the unfolding corrections

The 1-jettiness distribution for different detector configurations



The detector elements piece by piece

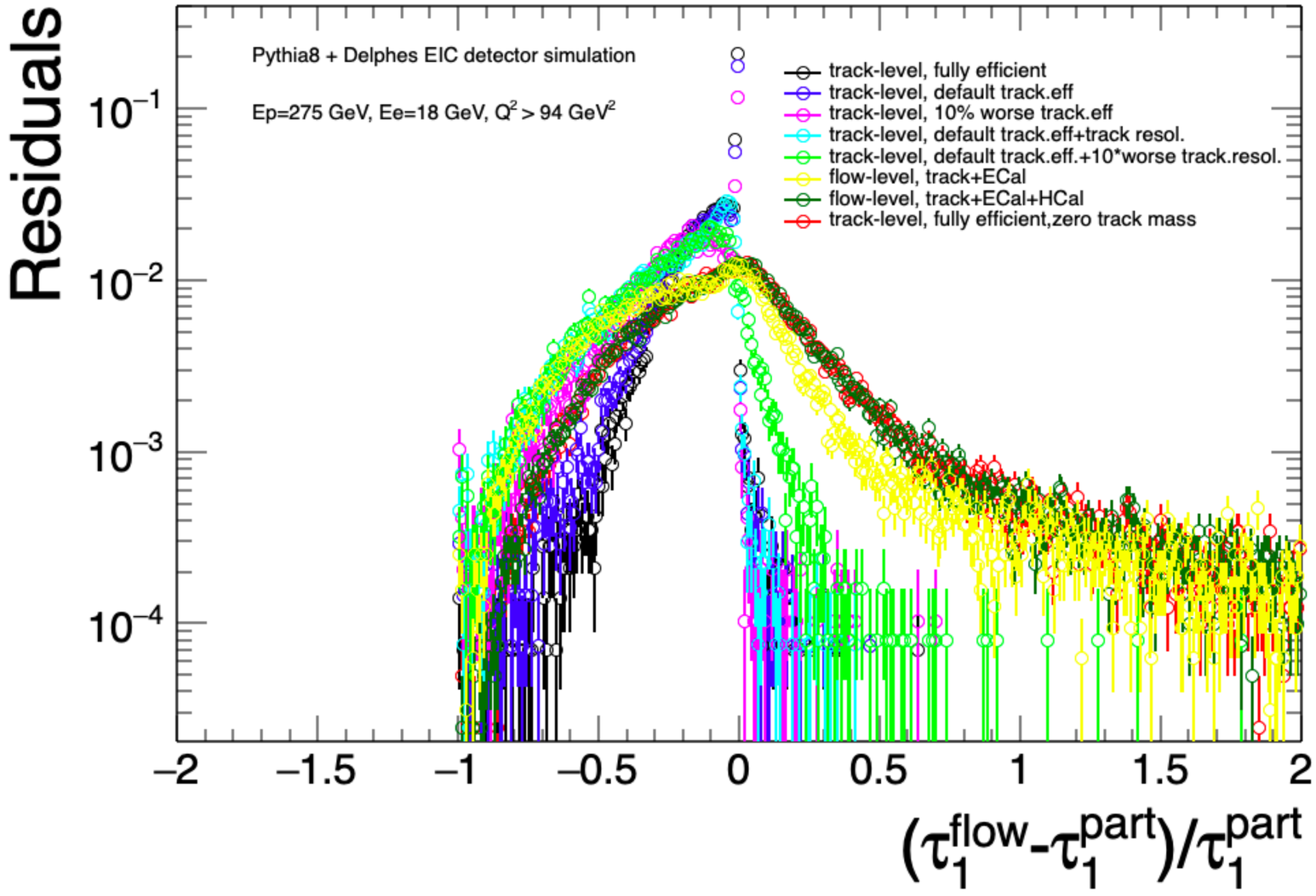
The jet momentum residuals for different detector configurations



The detector components piece by piece at the jet level

Note that when looking to track-level,particle-level is charged

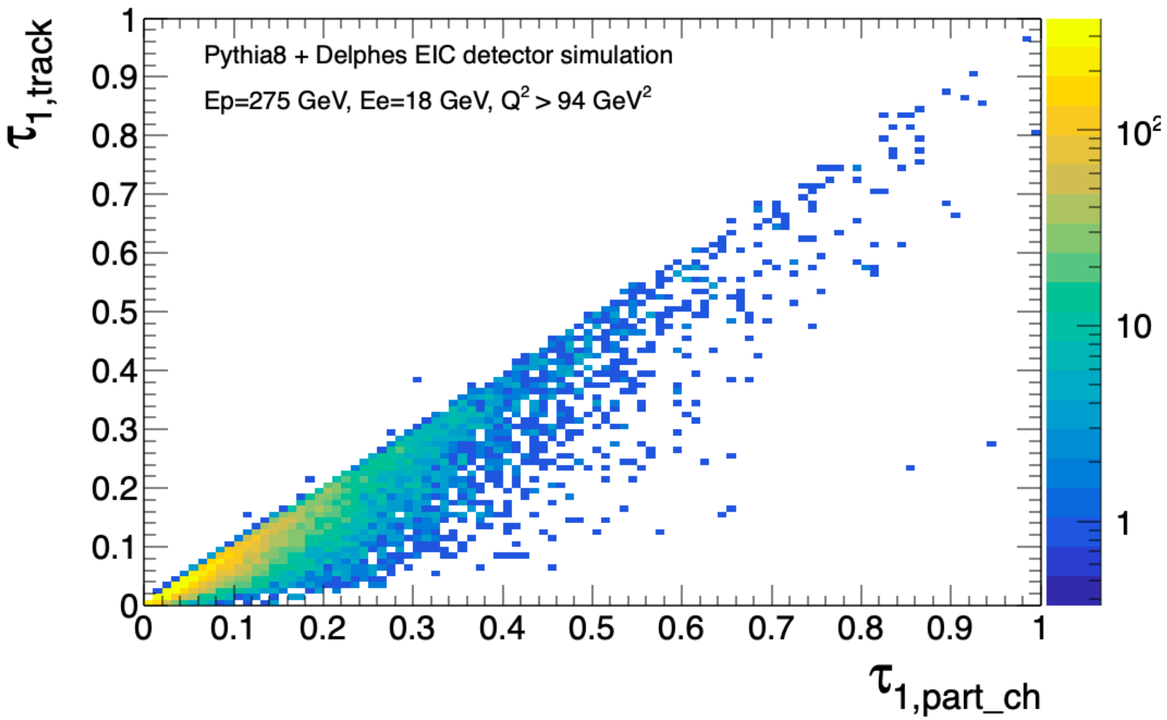
The 1-jettiness residuals for different detector configurations

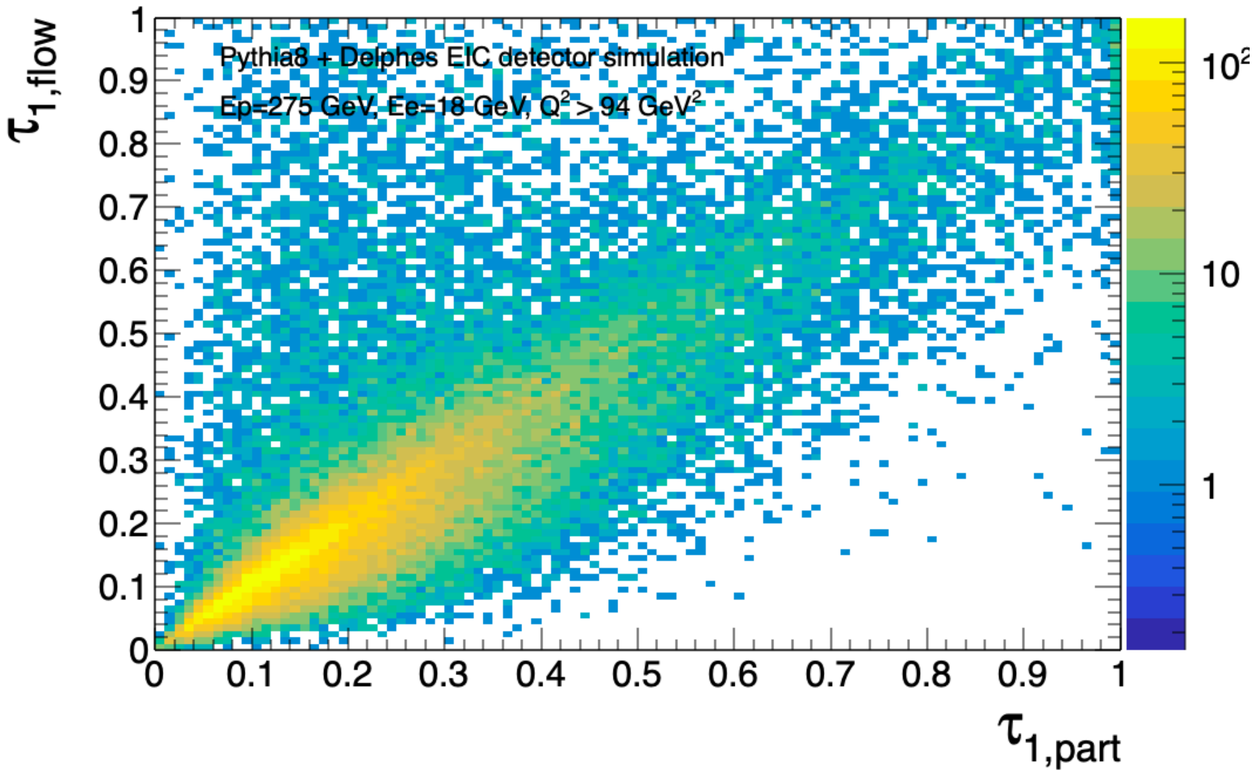


The detector components piece by piece at the shape level

Strong tails: consider for instance that at jet level particle resolution effects enter linearly while tau1 Involves products of particle and jet four-vectors.

The responses



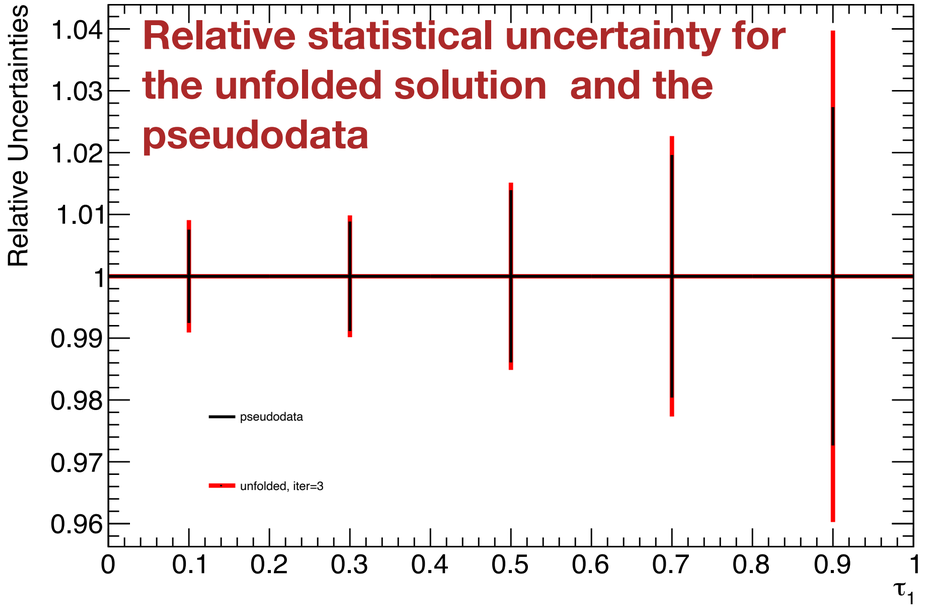


Track-level results will have smaller corrections, likely better precision

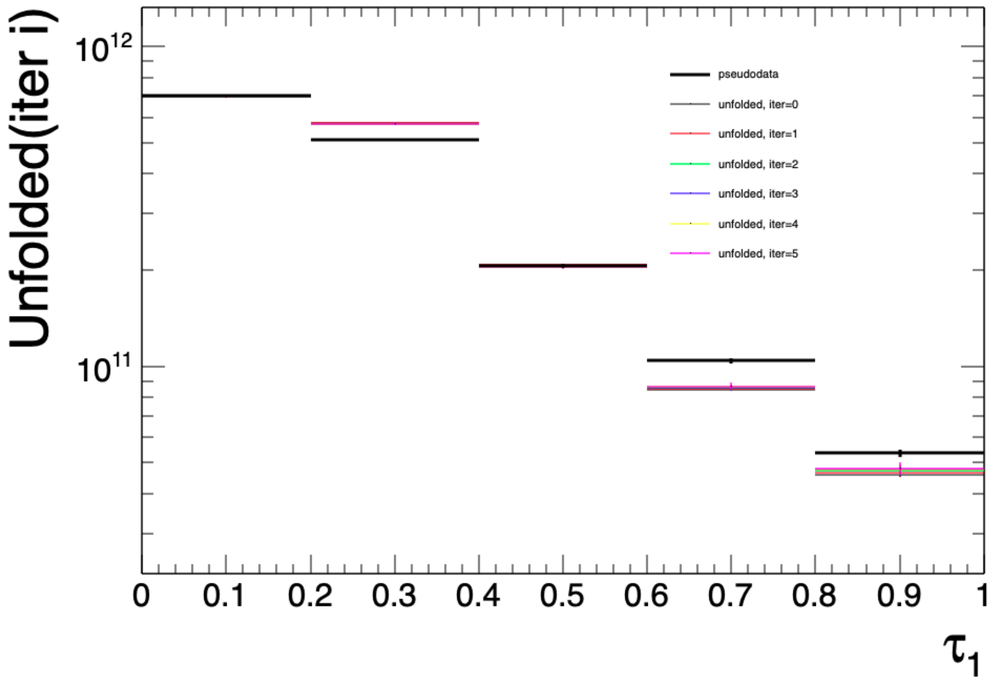
-> encourage track-based analytical calculations!

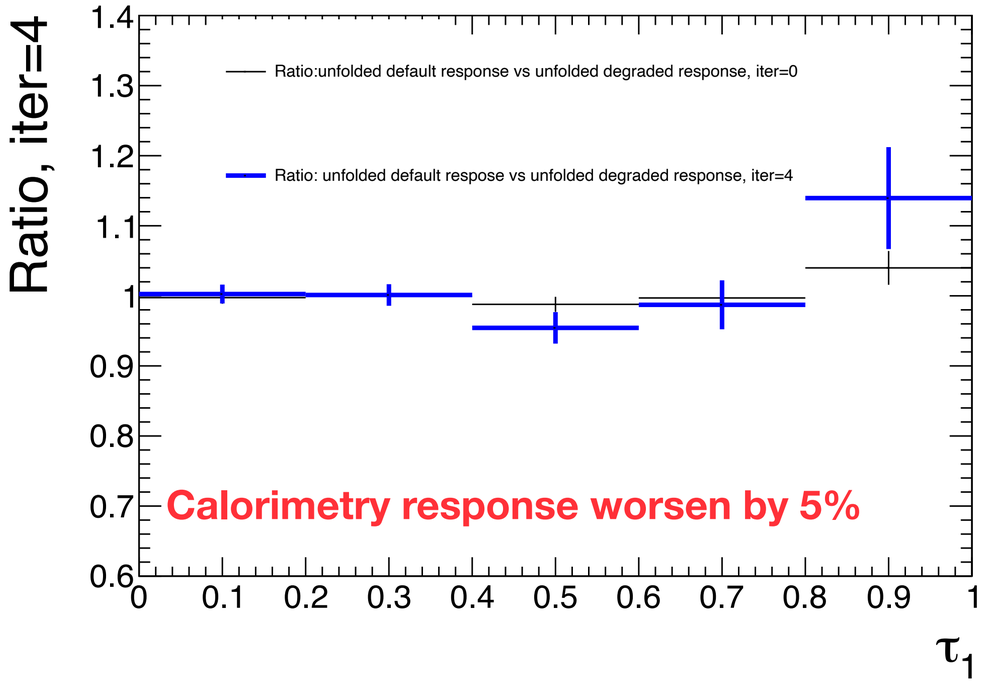
The impact of the corrections

- Take the smeared distribution, scale it by the expected luminosityof 10/fb
- Fill the response (below for full detector simulation and zero mass assumption)
- Unfold (for now just a 1D unfolding, assuming no impact of the Q2 cutoff)
- Repeat for all systematic effects (prior, track.efficiency uncertainty,
  uncertainty on the calorimetry and tracking response etc)
- Combine systematics into projected tau1 systematic uncertainties



Unfolded solution vs iterations





Final steps for the next week

Fix Q,x bin according to best opportunity in theory calculations

Increase statistics in the response

Decide best prescriptions for the systematic variations, produce the final plots with the projected experimental uncertainties for the observable