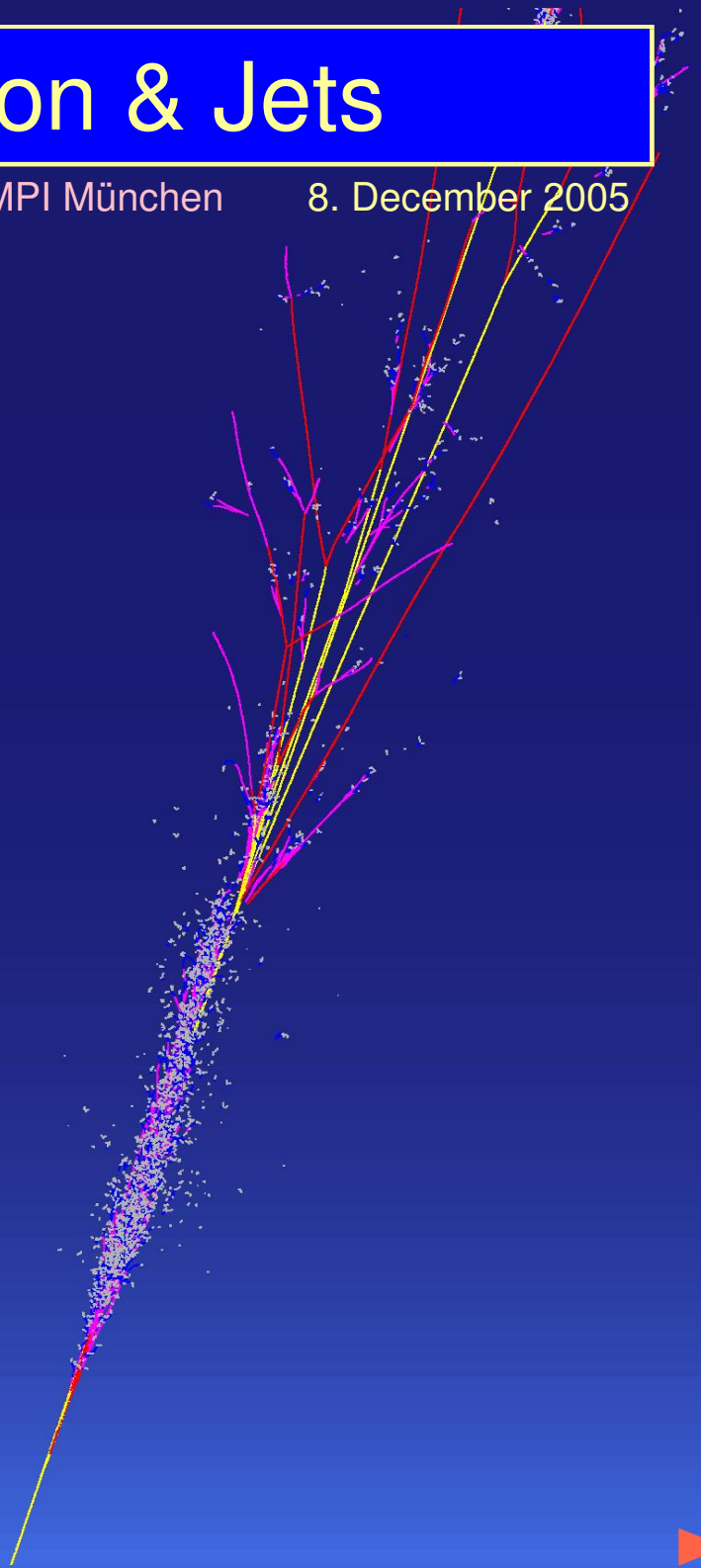
# Local Hadron Calibration & Jets

Bratislava/Kosice/MPI Calorimeter Video Meeting Sven Menke, MPI München 8. December 2005

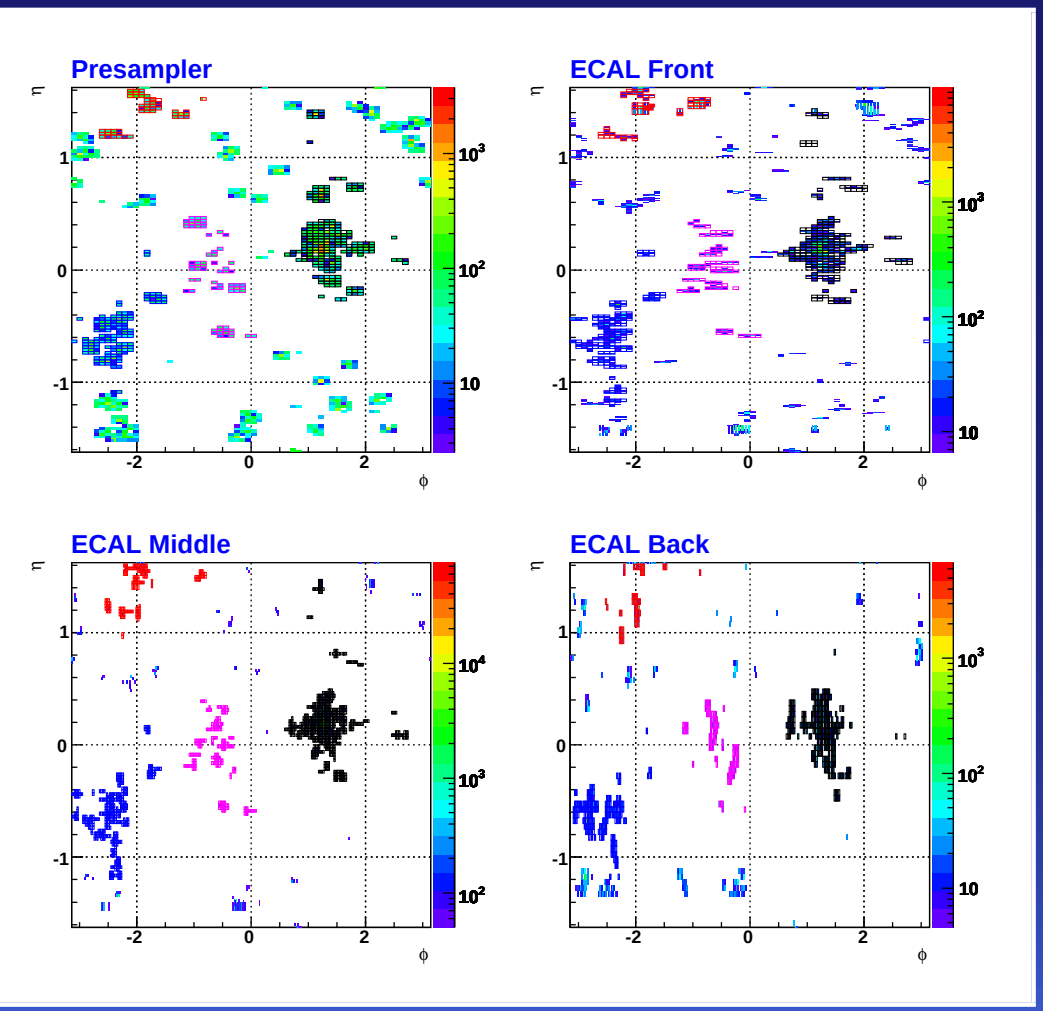
- Update on `KtJet`s from postrome dijet events
  - matching of truth and reco jet
  - comparison with particle truth
  - comparison with calibration hit truth
- Next steps

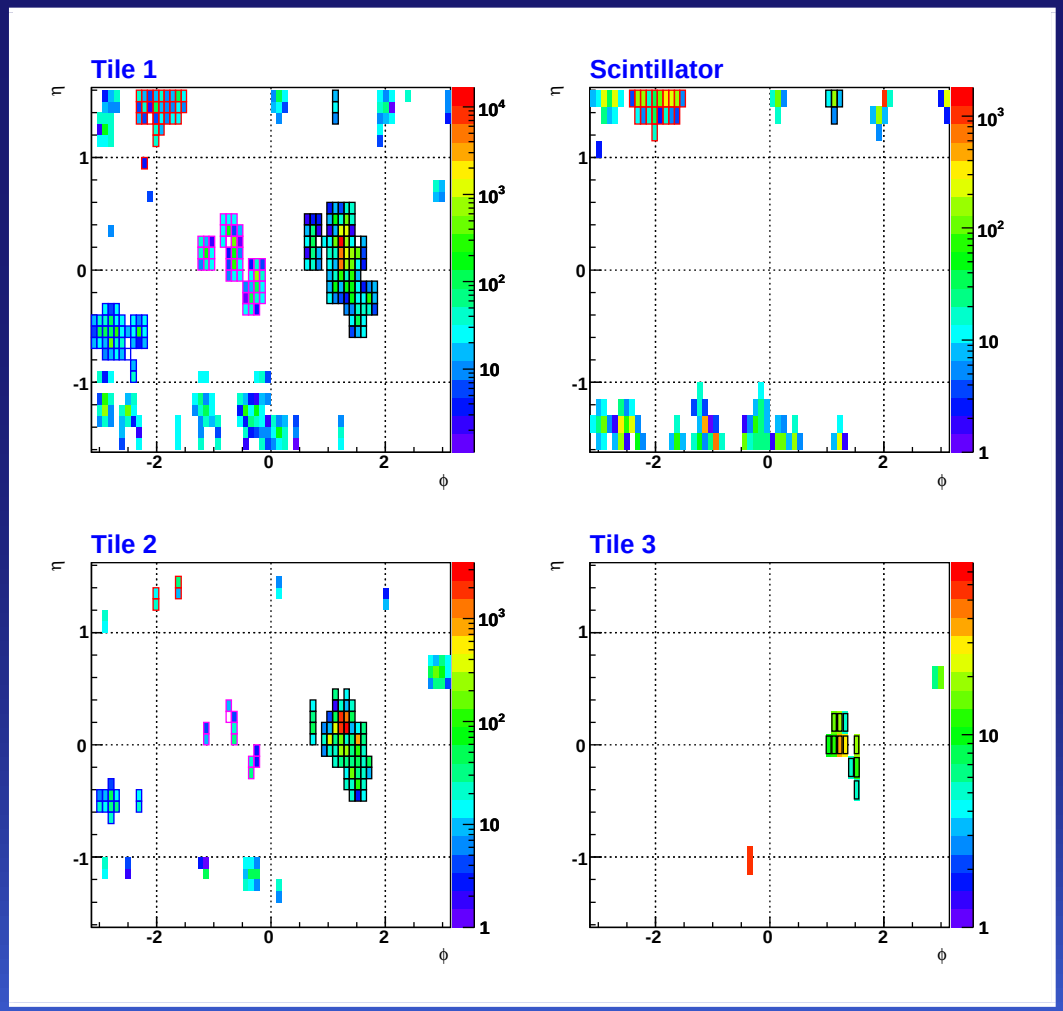


# KtJets from postrome dijet events

- In order to have quick turnarounds I use KtJet standalone on top of CBNT containing:
  - _topo clusters from calibrated CaloTopoCluster container with AddCellDetails
  - _topoC calibration hit info from CaloTopoCluster-preLocalCalib container
  - TRUTH info
- So far I've processed only the postrome J4 samples from Pavol with 11.0.0 and produced CBNTs for them on castor: /castor/cern.ch/user/m/menke/postrome_11.0.0.003037.recocalibnew.J4_Pt_140_280/
- Settings I used for KtJet on _topo clusters:
  - Cut on cluster input: $E_{\perp} > 0$
  - KtJet-settings: *pp*, $\Delta R < 0.7$, *E*-recombination scheme
- Settings I used for KtJet on TRUTH
  - only stable particles: KLDauNt == -1
  - within the calorimeter acceptance: |EtaGen|<5
  - same KtJet-settings as for clusters

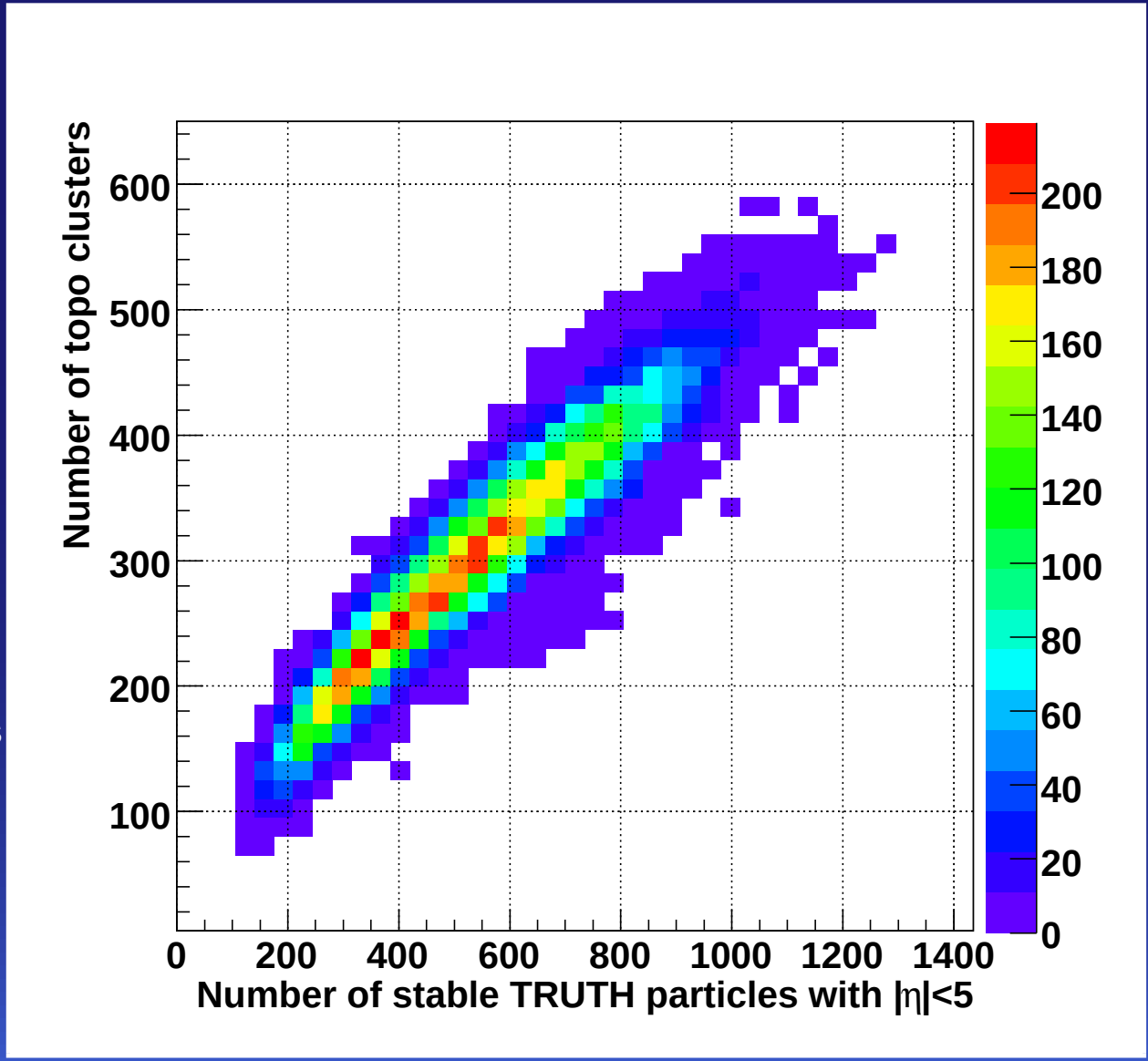
- KtJet with $\triangle R < 0.7$, $E_{\perp}^{\text{clus}} > 0$ and $E$-recombination scheme in dijet events with $140\,\text{GeV} < p_{\perp} < 280\,\text{GeV}$
  - the 6 leading jets in $E_{\perp}$ are shown as colored cell borders
  - left plot shows LArEM, right plot Tile



- Input to KtJet for the dijet events with $140\,\text{GeV} < p_\perp < 280\,\text{GeV}$

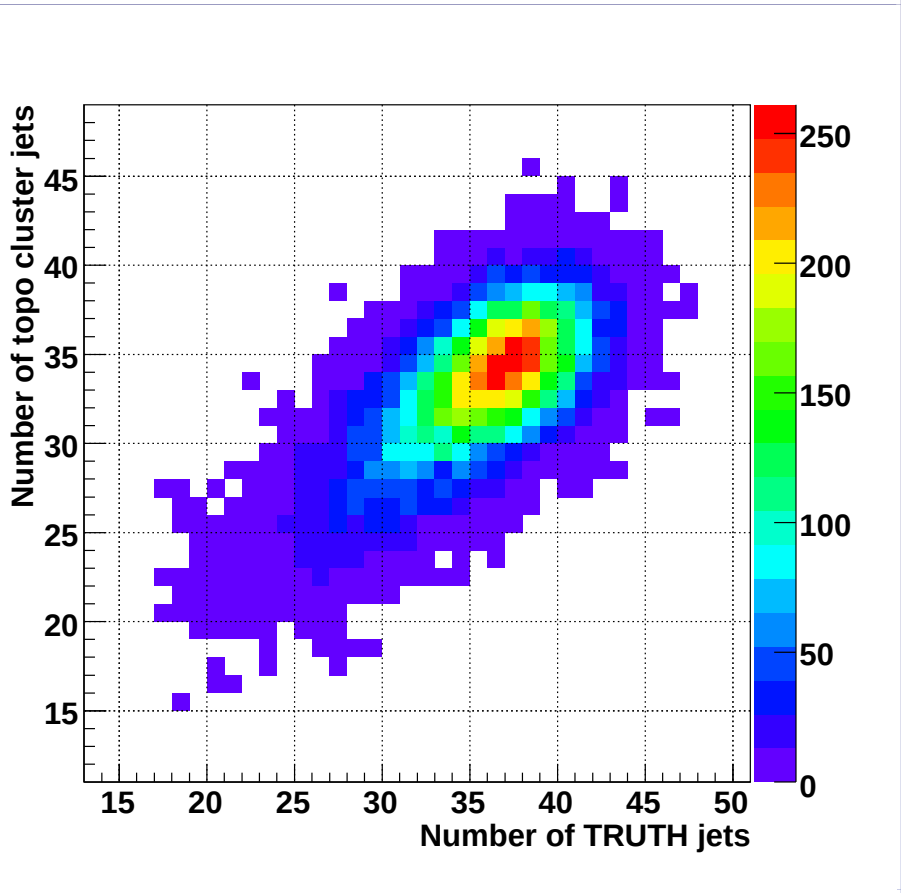
- for reco: all _topo clusters on the CBNT
- for truth: all stable TRUTH particles within $|\eta| < 5$
- plot shows the correlation of both quantities
- there is a fraction of the events (between Event 7700 and 10100, excluded from the plot) with much more clusters per generated particles – need to be investigated . . .

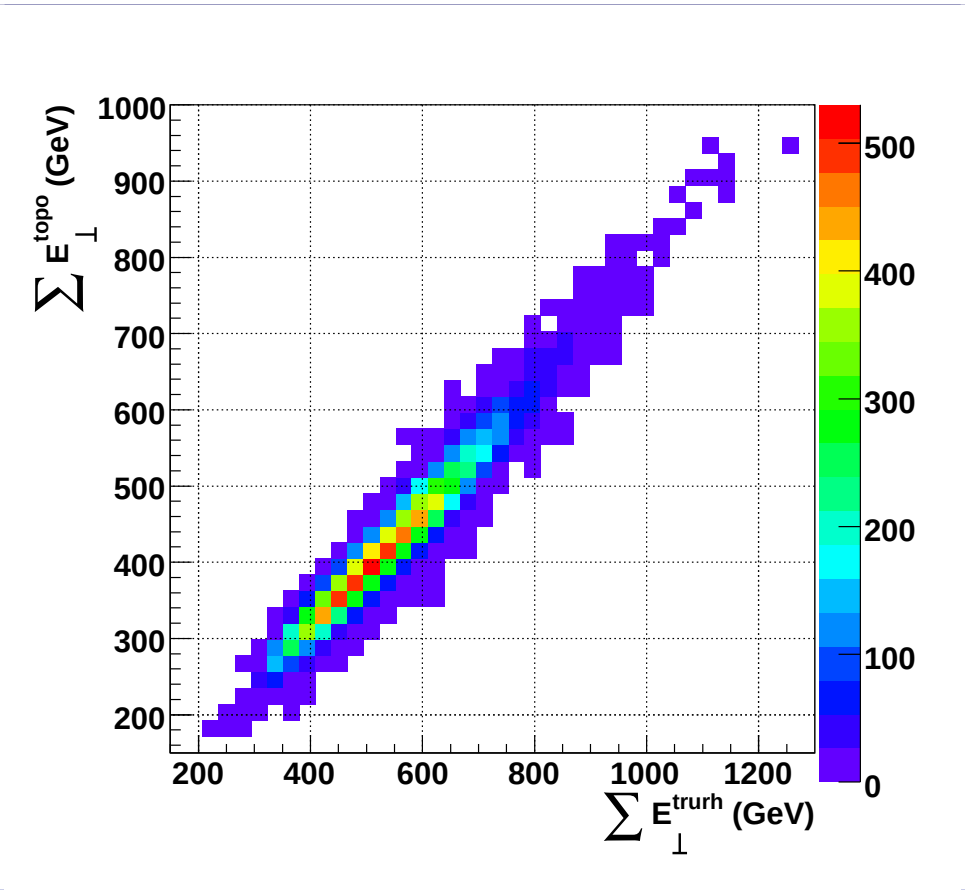


- Comparing reco with truth has two very different meanings:
- You can compare to a jet made out of the TRUTH particles if it matches in $\eta$ and $\phi$ with the reco jet
  - the truth jet contains low $p_\perp$ charged particles not reaching the calorimeters
  - the truth jet looses and gains some low $p_\perp$ particles to/from other jets
  - all particles have full energy in the truth jet including dead material, $\mu$, $\nu$, $K_L$ etc.
- You can compare to the calibration hit level of the cells inside the jet
  - no matching to be done - exact one-to-one relation
  - only hits reaching the calorimeter and depositing energy there are accounted for
  - dead material is excluded
- Both comparisons are valuable
  - the comparison to the TRUTH jet shows how many corrections are still missing to come from the calorimeter level to the TRUTH level
  - the comparison to the calib hits inside the jet shows how far jet-definition independent calibrations bring us

# Comparison of local calibrated jets and MC truth

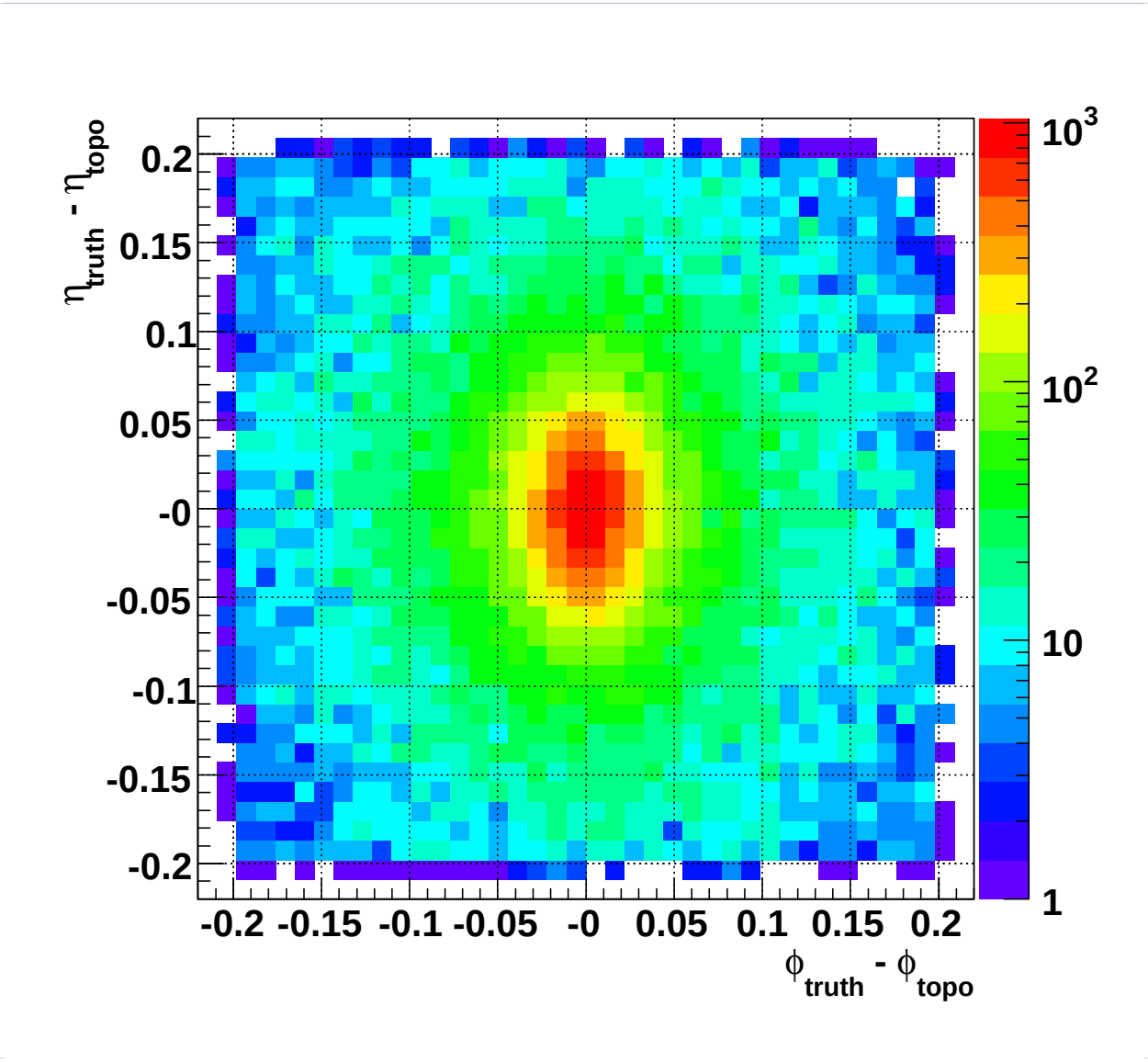
- Check global quantities
  - Number of topo jets vs. number of TRUTH jets
  - $\sum E_{\perp}^{\text{topo}}$ vs. $\sum E_{\perp}^{\text{truth}}$



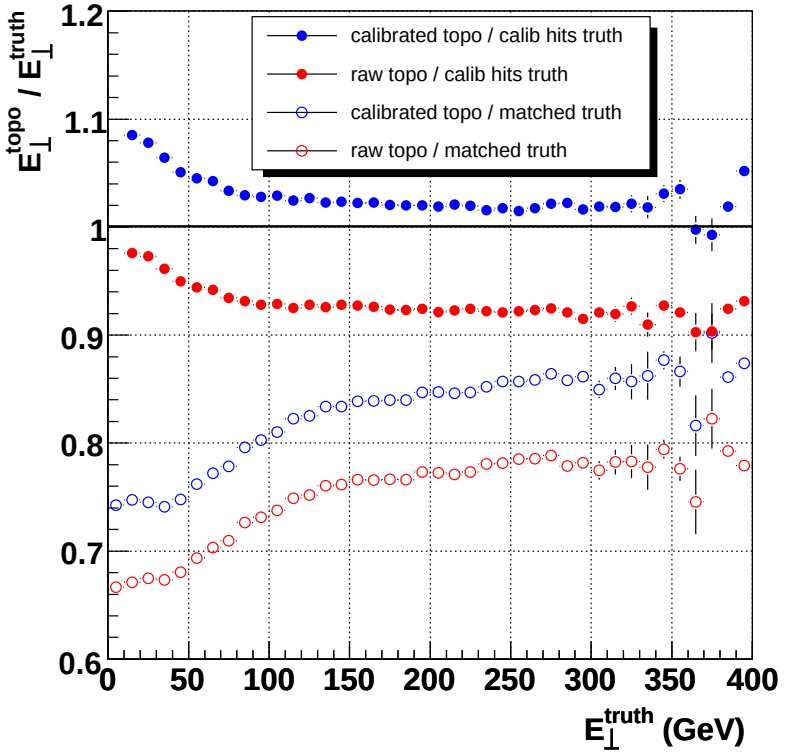



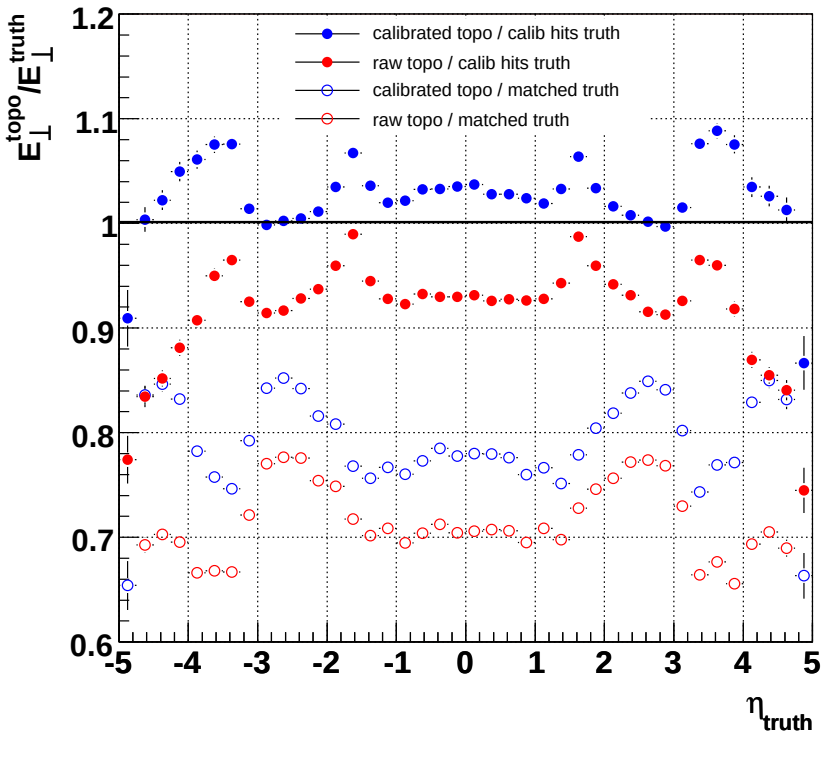
# Comparison . . . ► matching of topo and TRUTH jets

- use all pairs of topo and TRUTH jets in the event with
  - $|\eta_{\text{truth}} - \eta_{\text{topo}}| < 0.2$ and
  - $|\phi_{\text{truth}} - \phi_{\text{topo}}| < 0.2$



- ratios of $E_\perp$ for the matched jets as function of $E_\perp^{truth}$ (left) and $\eta^{truth}$ (right) for
  - calibrated topo jets over the calibration hit truth (full blue dots)
  - raw topo jets over the calibration hit truth (full red dots)
  - calibrated topo jets over the matched particle truth (open blue dots)
  - raw topo jets over the matched particle truth (open red dots)



- We probably need to offer some jet-style weights to be used on-top of jets made of topo clusters with the local hadron calibration for the period before propper handling of dead material corrections in the local hadron calibration is available
- This would be:
  - a jet-style cell weight tool
  - containing cell weights for presmpler and gap scintillators
  - dead material corrections i.e. the cryo term
  - out-of-jet corrections – i.e. the jet scale
- I'll try to produce this based on `KtJet`
  - would need feedback about parameters for the jet algo to use – I could switch to the ATLAS default $\triangle R < 1$ ...
  - also good would be some comments on the used truth jets – some particles to exclude? ...