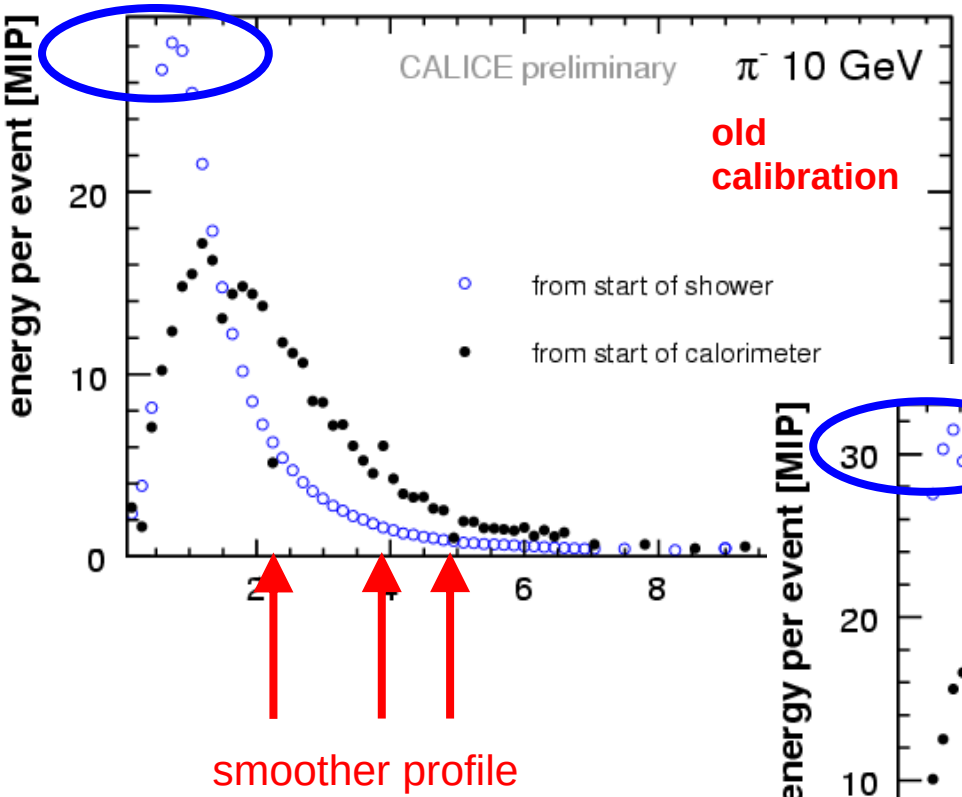
Update on
Shower Start and Leakage Analysis

by
Benjamin Lutz

News

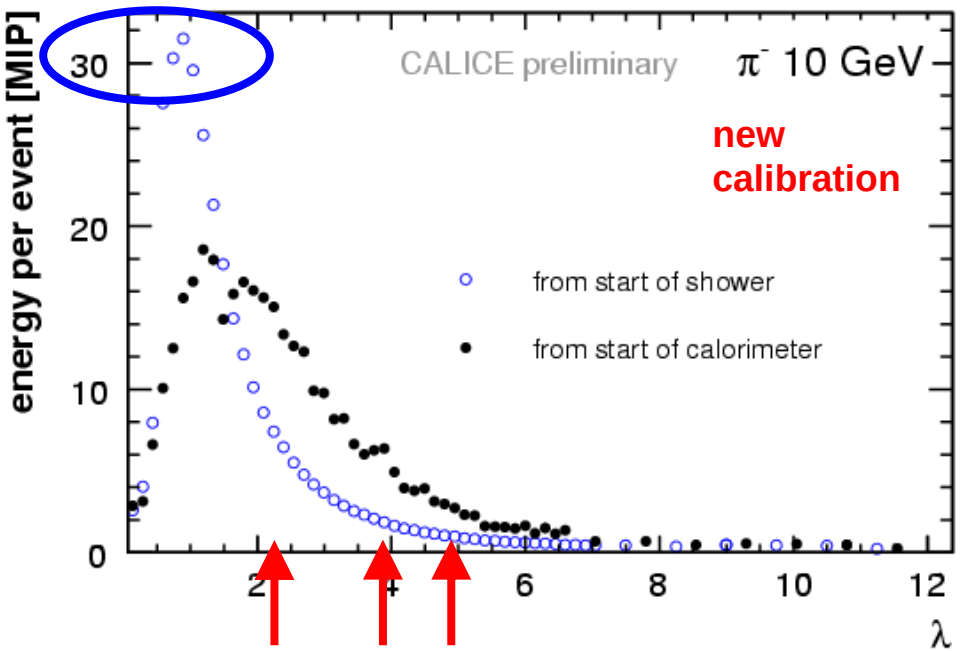
- reprocessed data with new calibrations
- Monte Carlo
  - all energies: 8, 10, 12, 15, 20 GeV
  - 2 physics lists: LHEP, QGSP_BERT
  - 1st order beam profile approximation from DC
  - no Birk's law
- digitization
  - HCAL: Sebastian's code (status Aug 2008)
  - TCMT: released from G. Lima July 2008
  - temperature effects missing

Effects of new Calibration

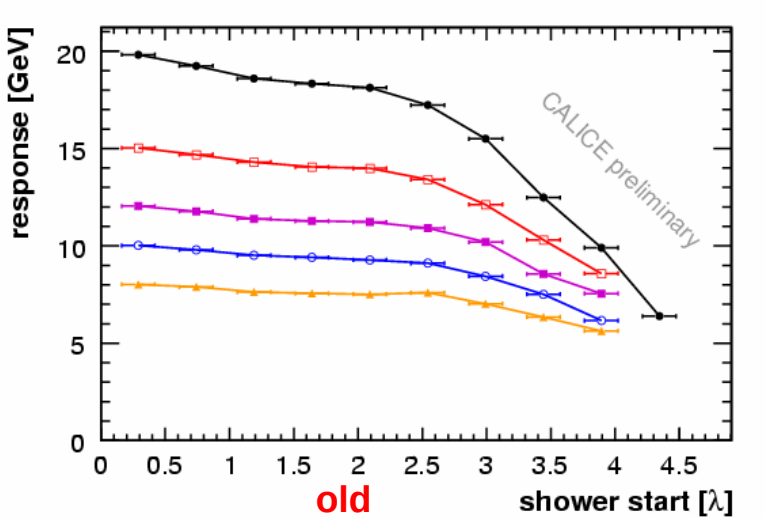


smoother profile

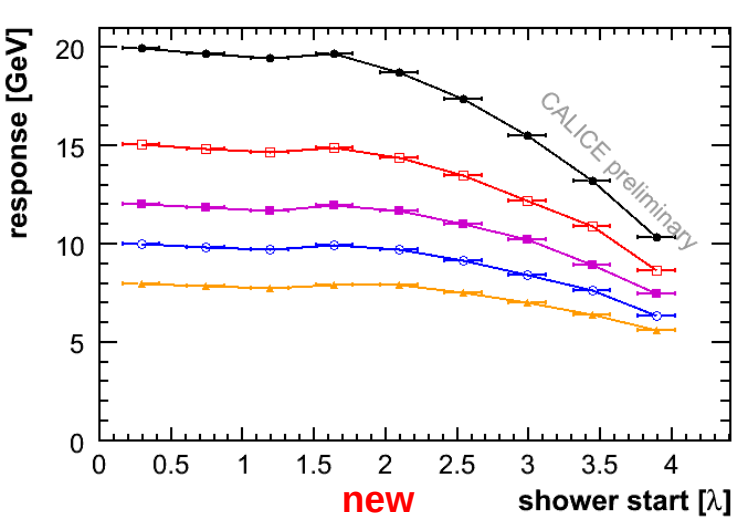
more visible energy



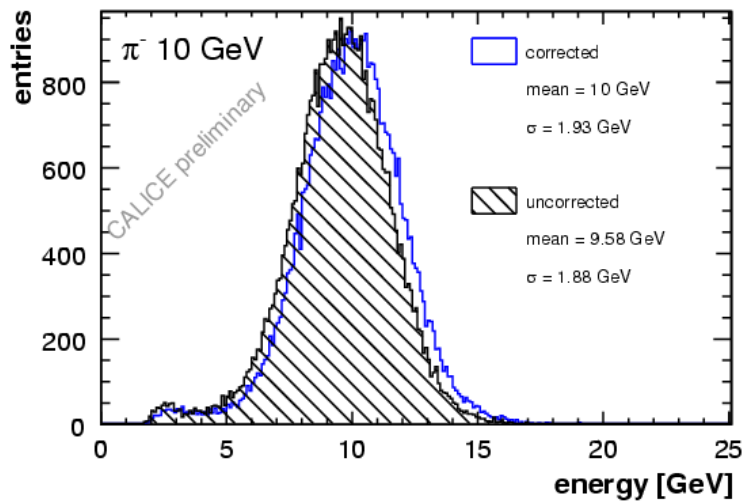
Effects of new Calibration (2)

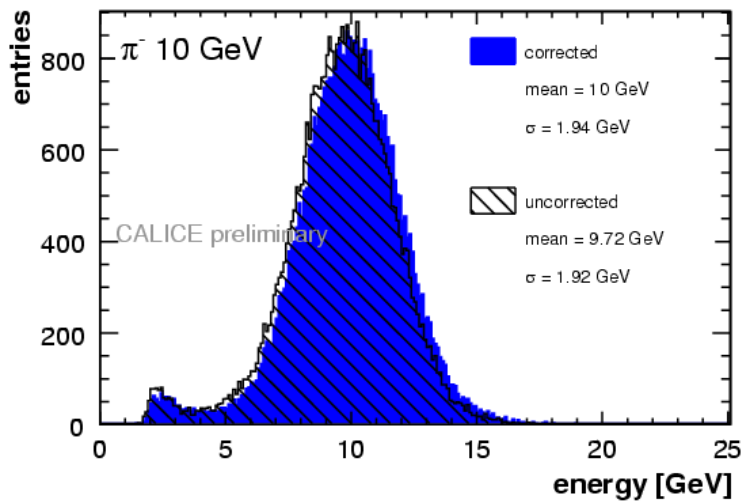


old calibration

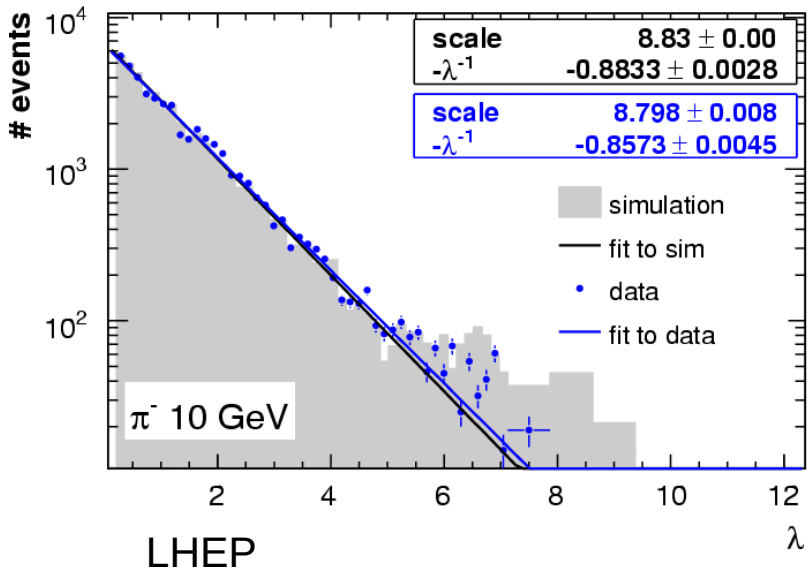


new calibration

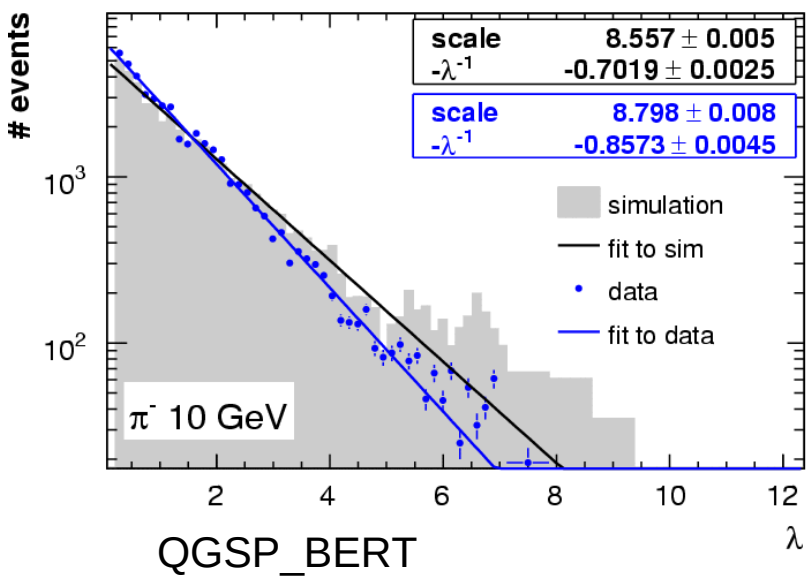




Data v. MC – Interaction Length



LHEP



QGSP_BERT

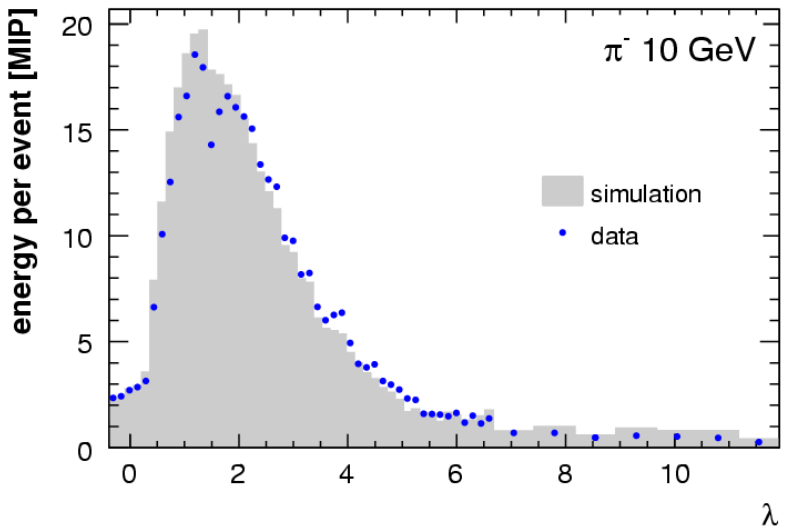
LHEP:

- differences inside the expected systematic uncertainties (4%)

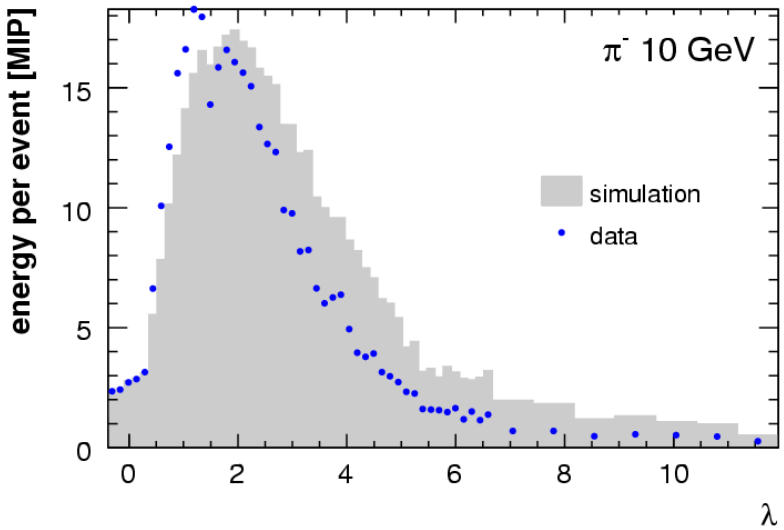
QGSP_BERT:

- significant deviations for small energies <= 10 GeV (20% @ 8GeV)

Data v. MC – Shower Shape



LHEP



QGSP_BERT

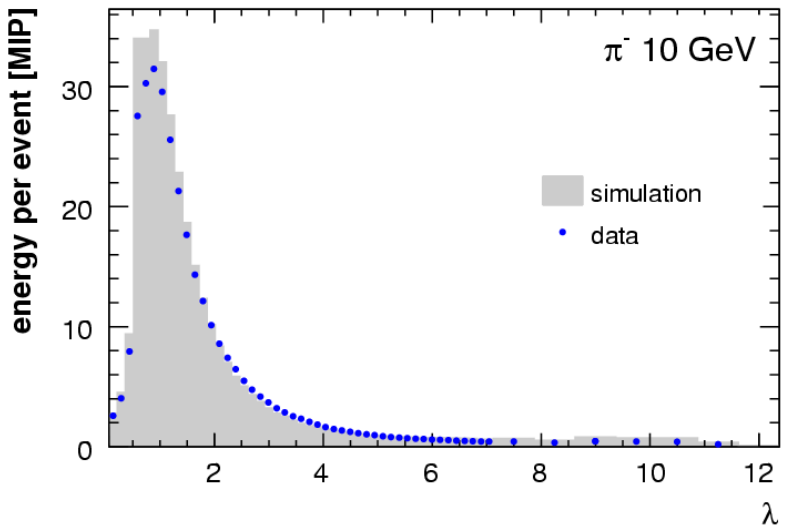
LHEP:

- matches peak position and shower depth

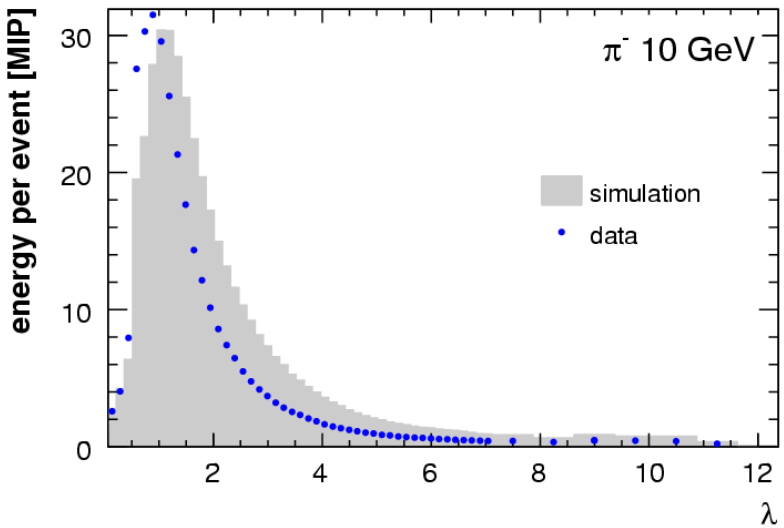
QGSP_BERT:

- later and longer shower

Data v. MC – Corr. Shower Shape



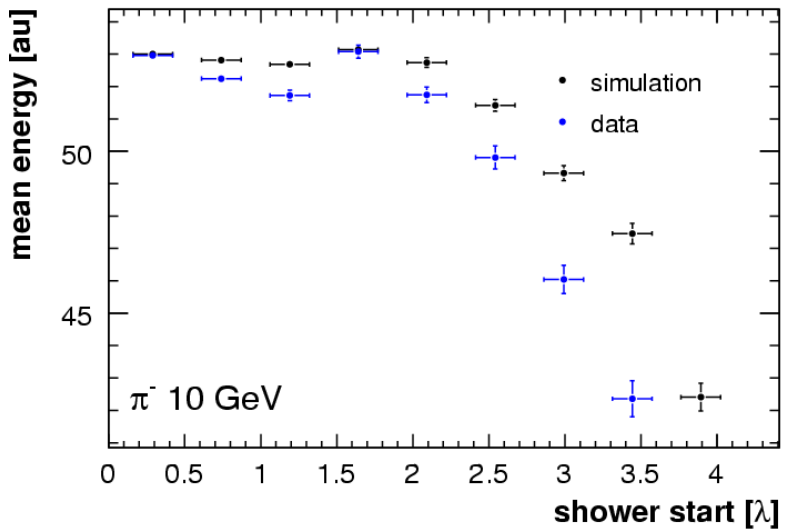
LHEP



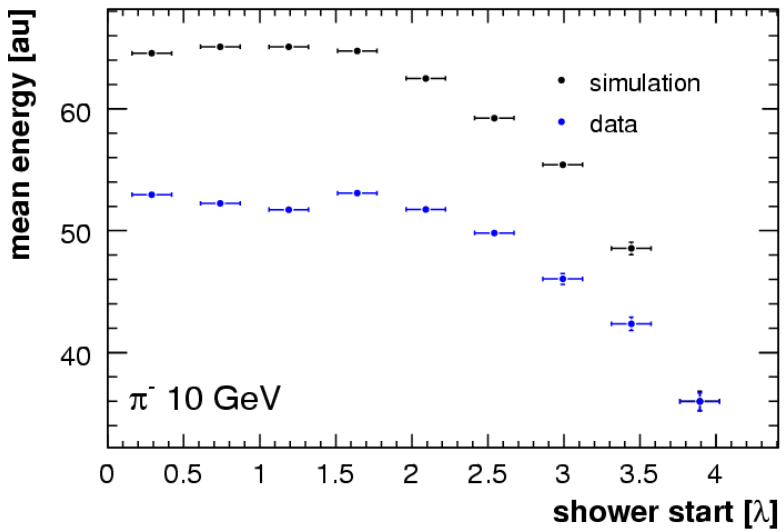
QGSP_BERT

- same effect as in uncorrected profile

Data v. MC
Reconstructed Energy v. Shower Start



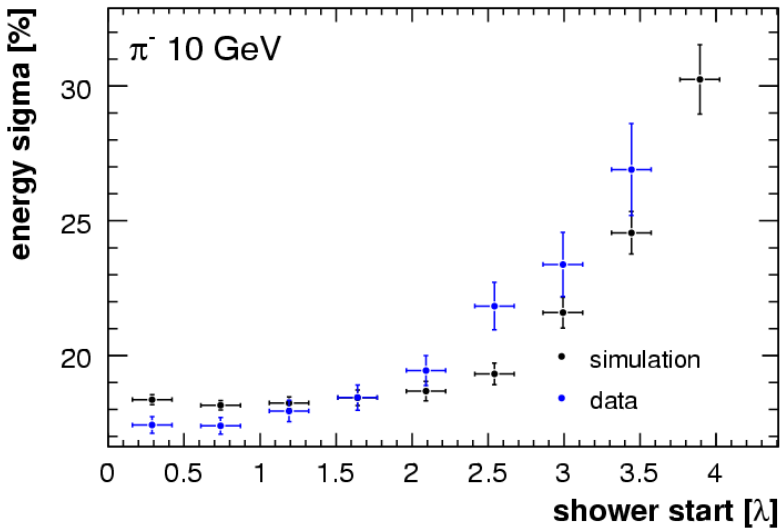
LHEP



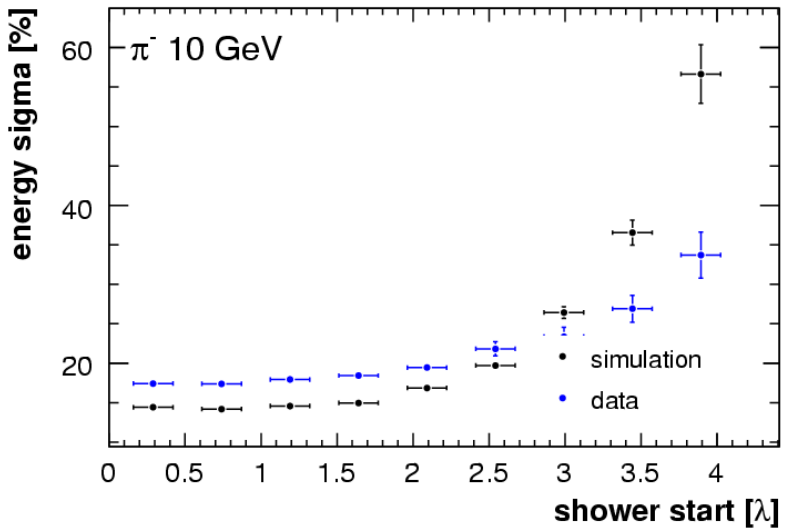
QGSP_BERT

- MC shows more energy than data
  - LHEP 5 -10%
  - QGSP_BERT 10-30%
- temperature corrections are expected to reduce this values

Data v. MC
Resolution v. Shower Start



LHEP



QGSP_BERT

LHEP:

- reasonably well described resolution

QGSP_BERT:

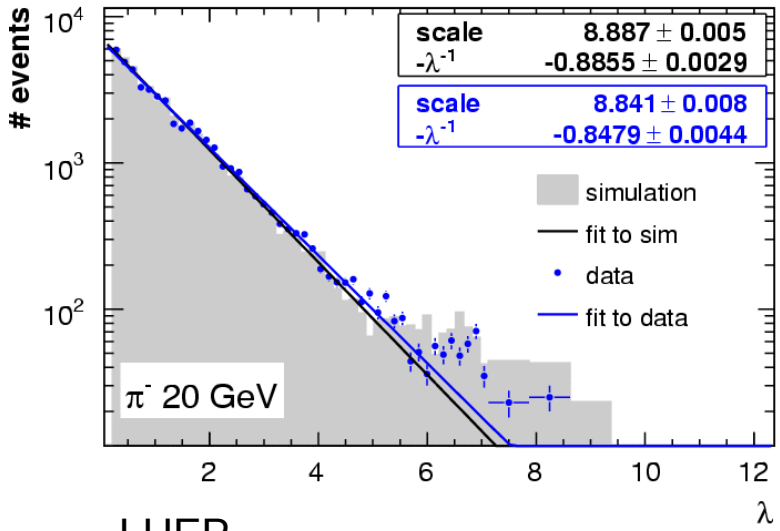
- systematic differences in the development of resolution with shower start

Summary

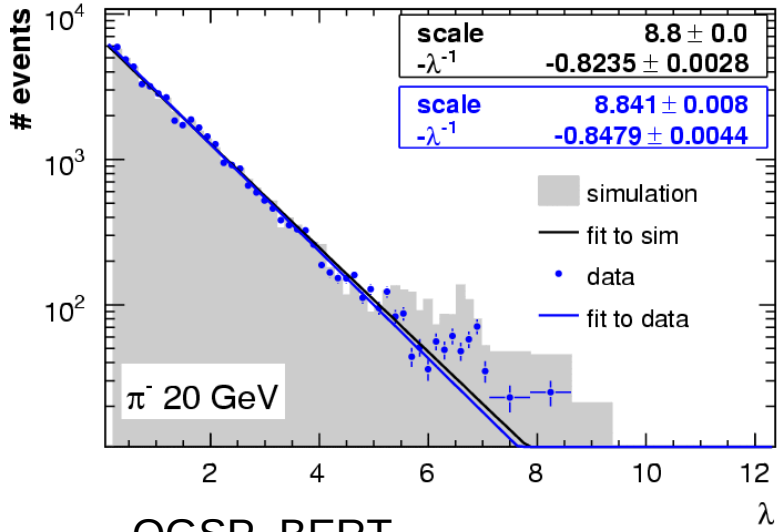
- latest calibration used
  - no major changes to old results
- MC production & digitization started
  - no temperature effects so far
- first data MC comparison
  - LHEP describes the data by far better than QGSP_BERT
  - with LHEP the agreement of data and MC is better than 10%

Backup

Data v. MC – Interaction Length



LHEP



QGSP_BERT

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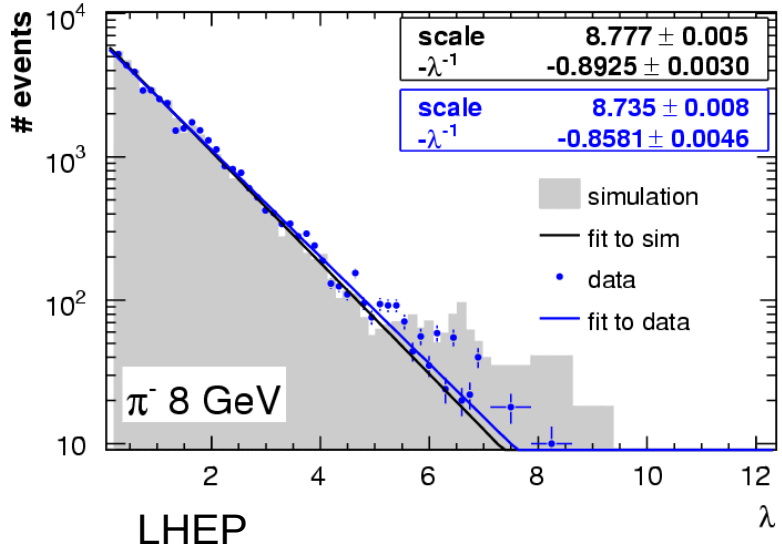
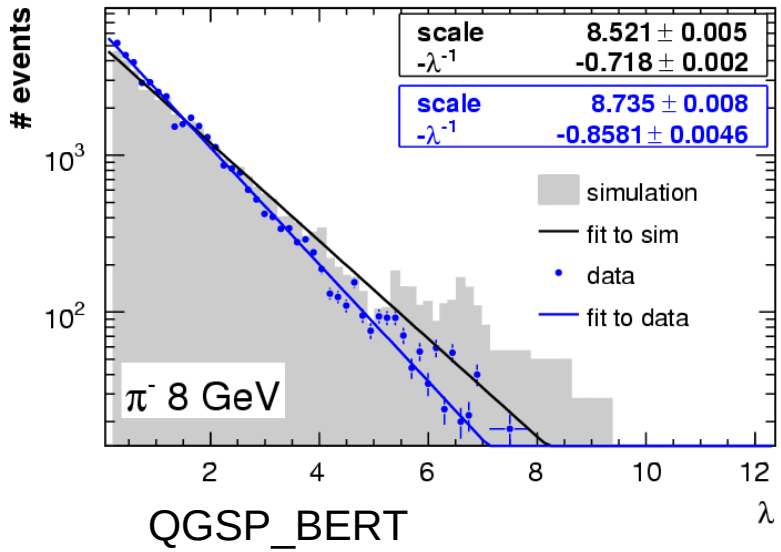
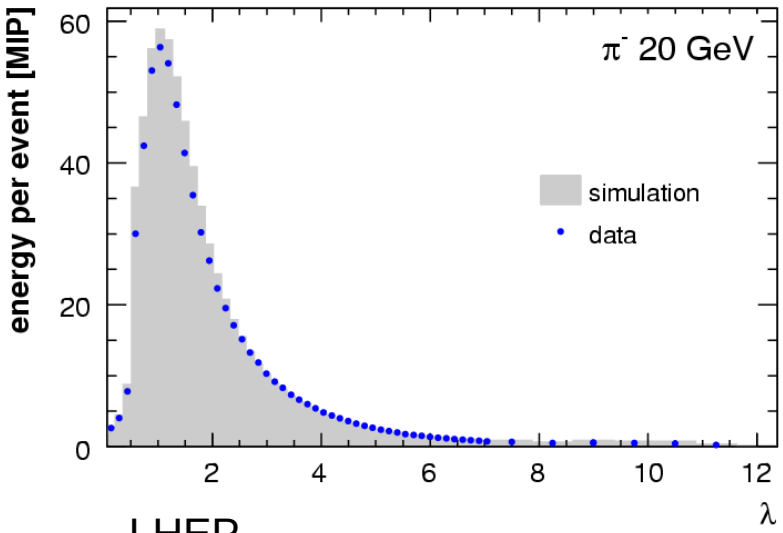


LHEP

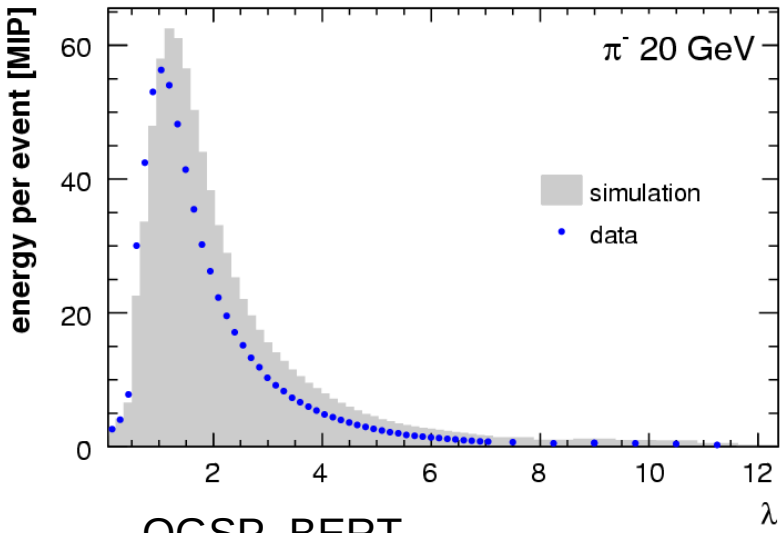


QGSP_BERT

Data v. MC – Corr. Shower Shape



LHEP



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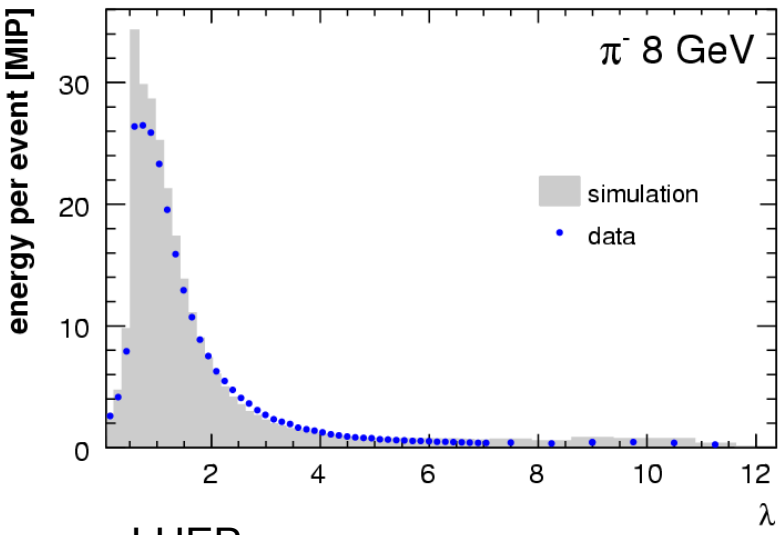
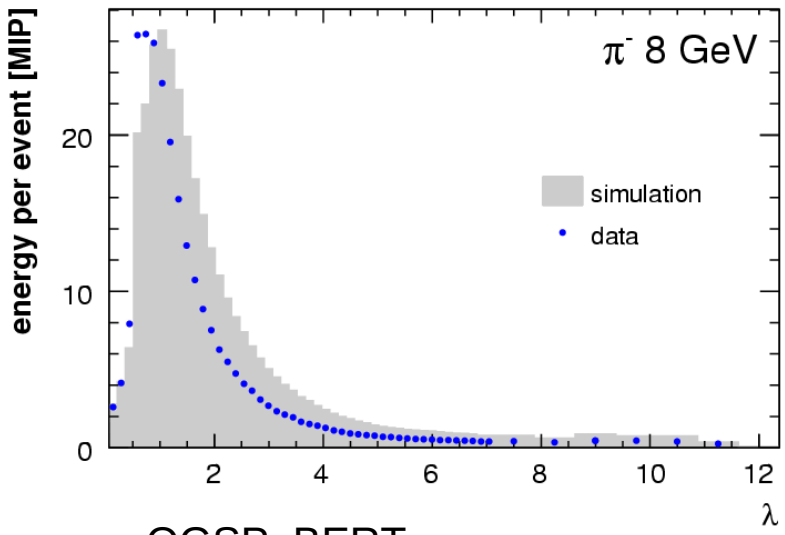
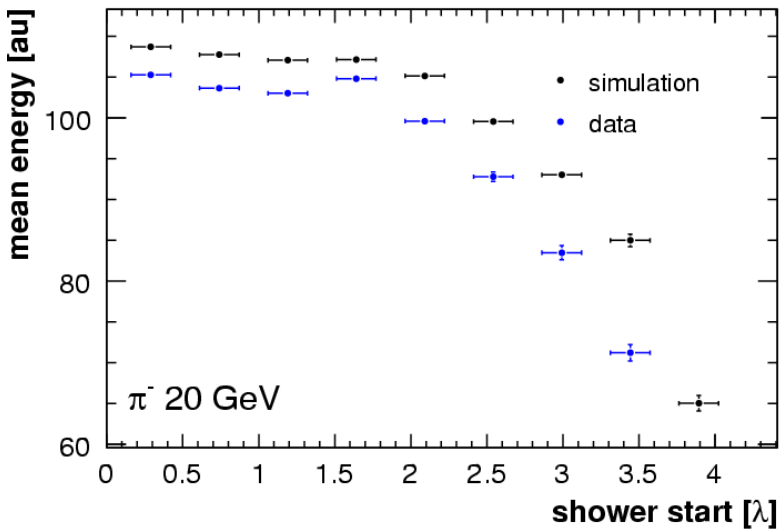


LHEP

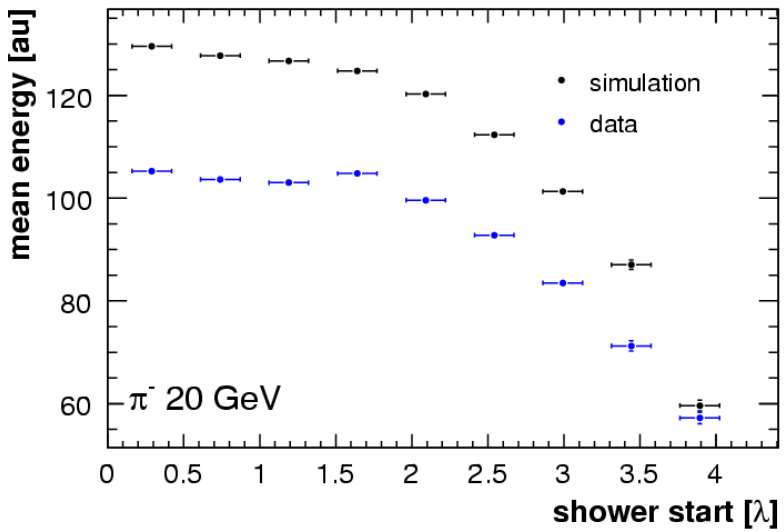


QGSP_BERT

Data v. MC
Reconstructed Energy v. Shower Start



LHEP



QGSP_BERT

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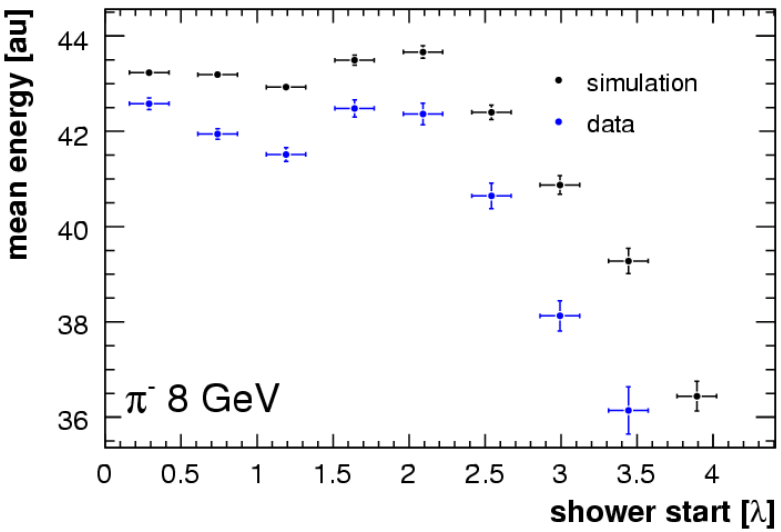
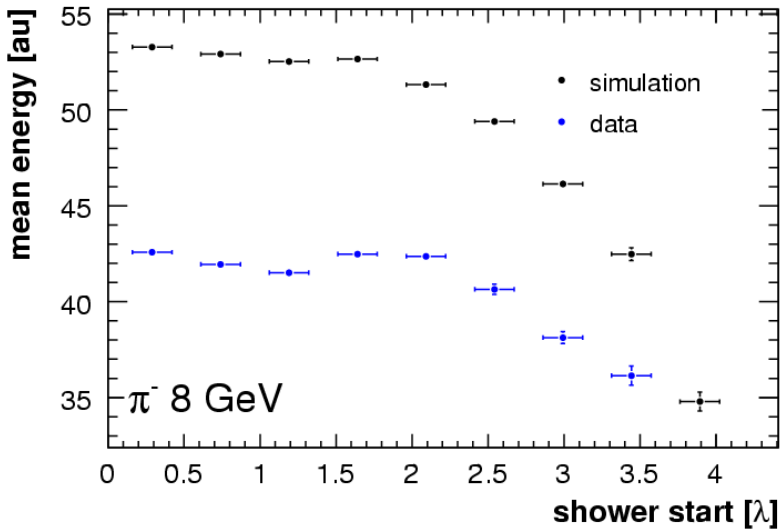
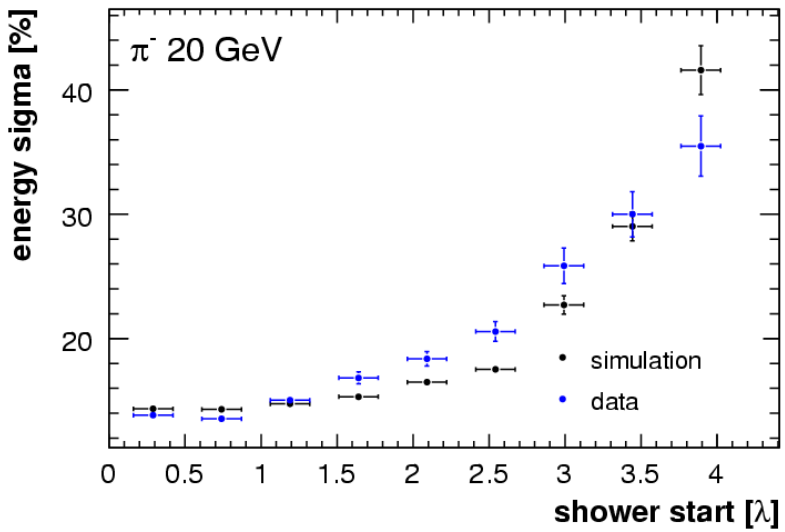


LHEP

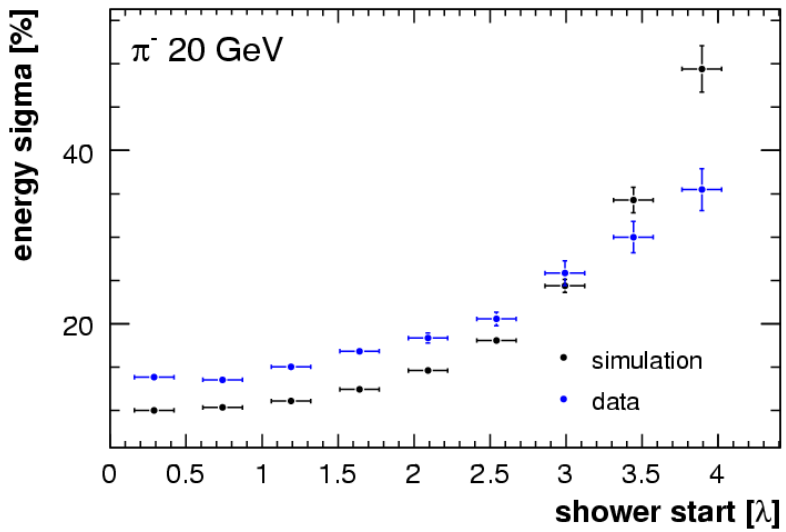


QGSP_BERT

Data v. MC
Resolution v. Shower Start

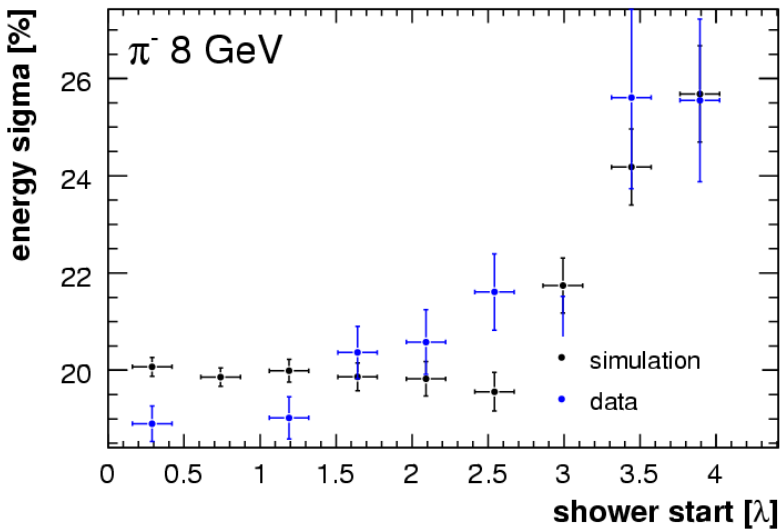


LHEP

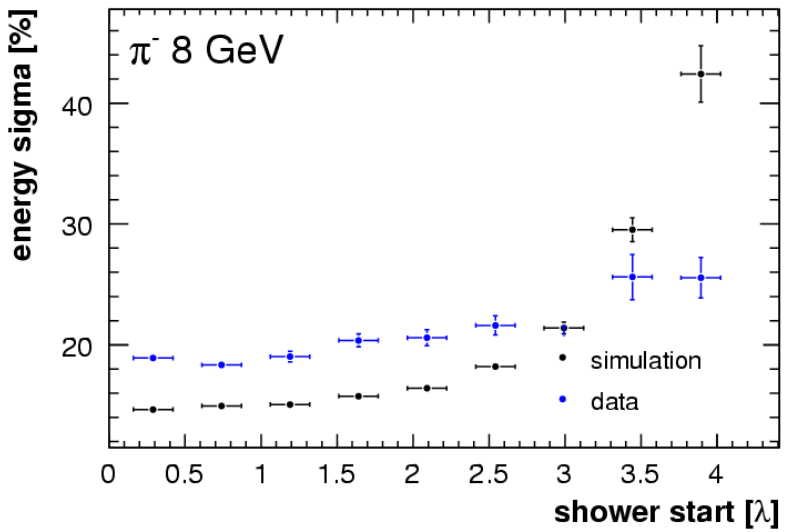


QGSP_BERT

Data v. MC
Resolution v. Shower Start



LHEP



QGSP_BERT