Single hadron response measurements in ATLAS

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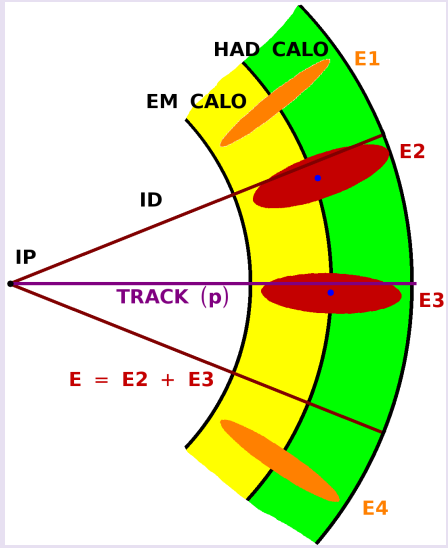
E/p measurement

- Compare the calorimeter energy from single isolated hadrons to the precise measurement of the track momentum.
- Test modelling of the calorimeter response in MC.



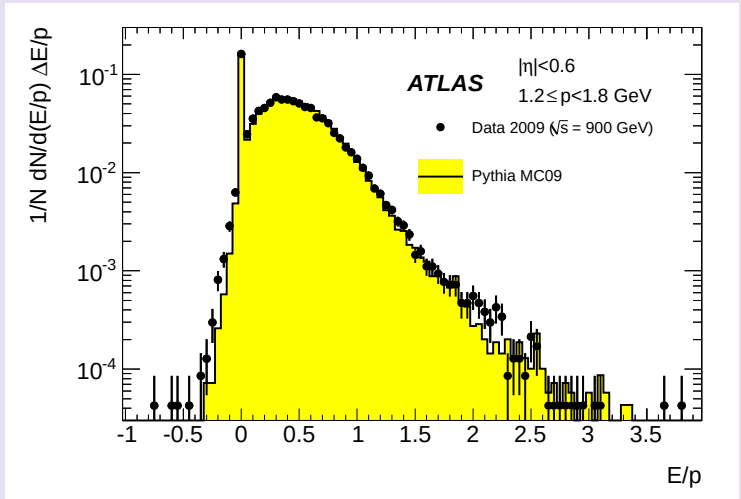
Select isolated hadrons:

$p_T > 500\ MeV$.

No other track in isolation cone around the track.

Remove background from neutral particles:

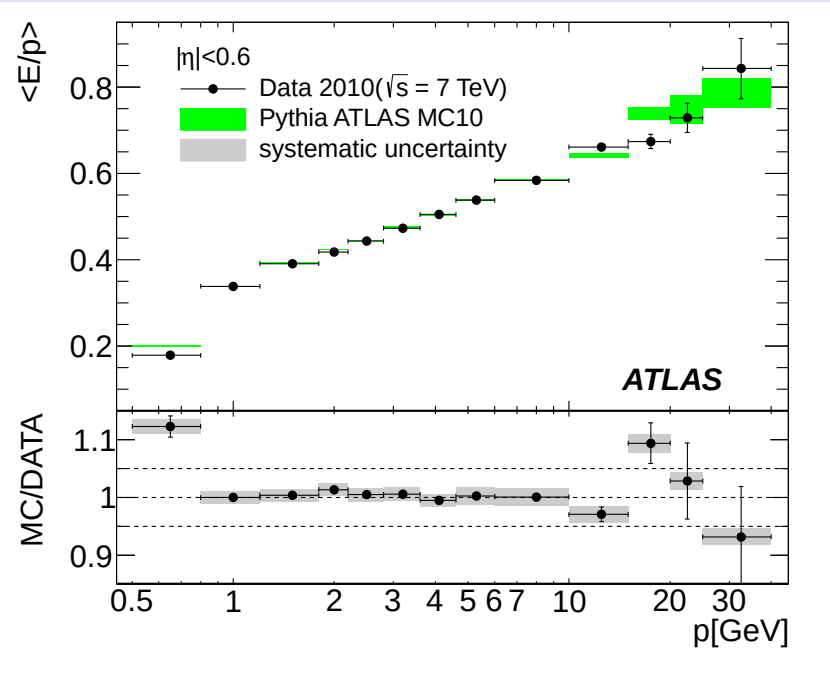
- $\langle E/p \rangle_{corr} = \langle E/p \rangle_{RAW} - \langle E/p \rangle_{BG}$
  - $\langle E/p \rangle_{BG}$ is estimated using late-showering hadrons that leave low energy in the EM calorimeter.

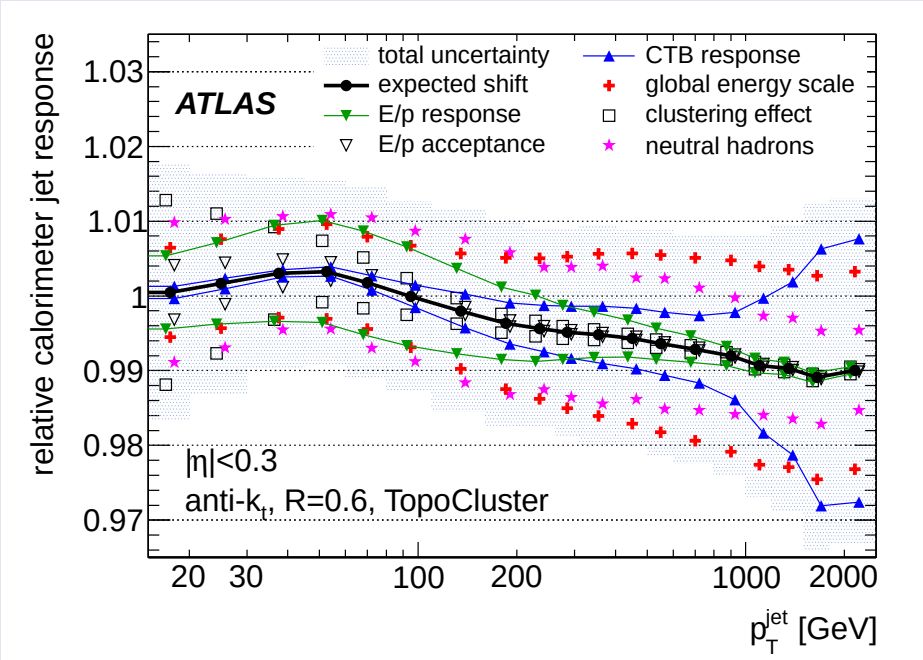


- 2009 Data.
- E/p $_{RAW}$ distribution for one η, p bin.
- Geant4 physics model: QGPS_BERT.

E/p measurement and importance

CERN-PH-EP-2012-005 (results from 2010)





Data and MC agreement:

- 2% @ $1 < p < 10$ *GeV*.
- 5% @ $10 < p < 30$ *GeV*.

- This is the largest contribution to the Jet Energy Scale uncertainty.
  - Calorimeter response uncertainty smaller than 2%.
  - Expected shift of JES smaller than 0.5%.