A First Look from A SUSY Perspective

on Missing E_T in 900 GeV data

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Study of the 2009 LHC Collision Data at 900 GeV and 2360 GeV from a SUSY Perspective

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- Supporting analysis note (draft) to
  - PAS JME-10-002: Performance of Missing Transverse Energy in 900 and 2360 GeV pp Collision Data
    - PAS is public since Saturday

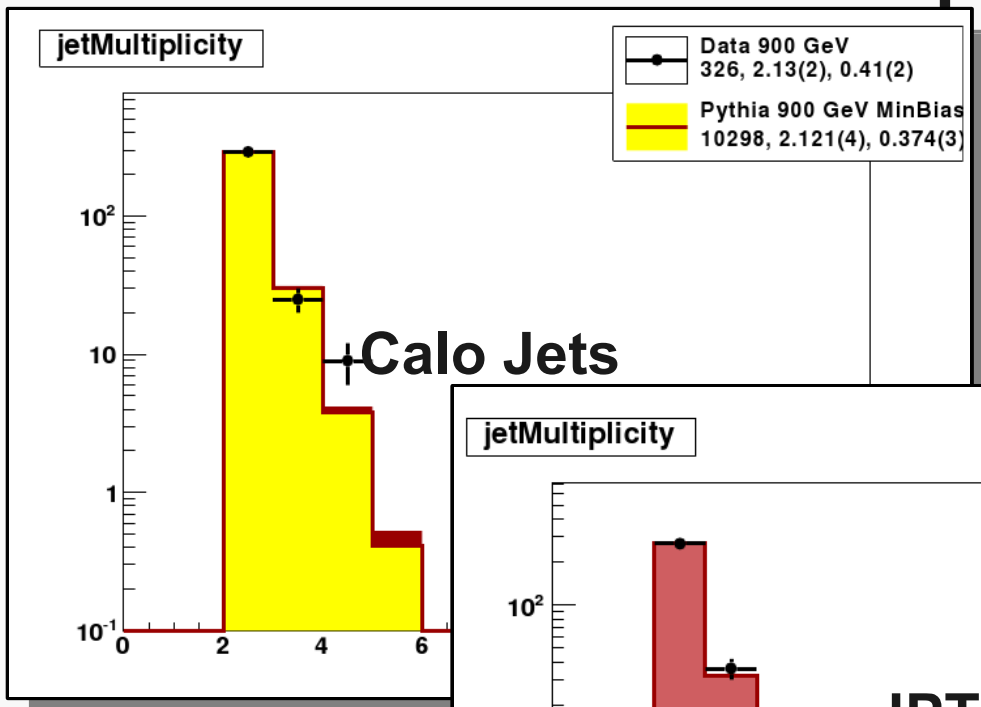
Data and Monte Carlo

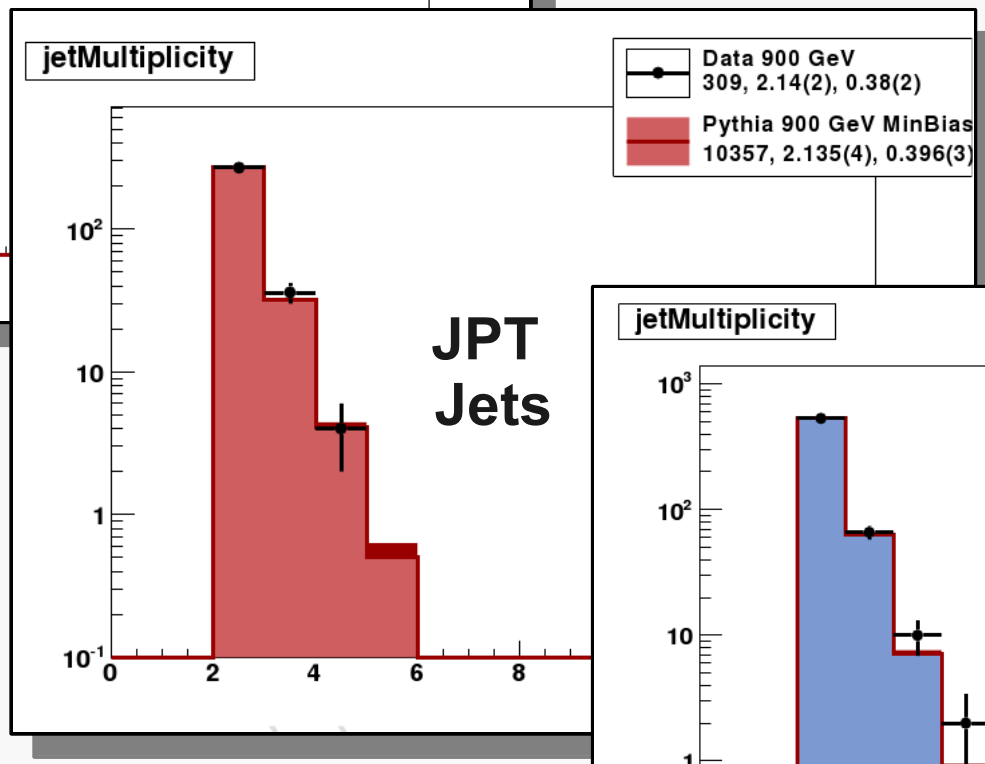
- Data 900 GeV
  - /MinimumBias/BeamCommissioning09-SD_AllMinBias-Jan23Skim-v1/RAW-RECO/
- MC (Pythia 6.42 min bias):
  - /MinBias/Summer09-STARTUP3X_V8P_900GeV-v1/GEN-SIM-RECO/
- Standard event selection, see note for details (tech. bits 0/40/41 !36-39, clean vertex, etc.)

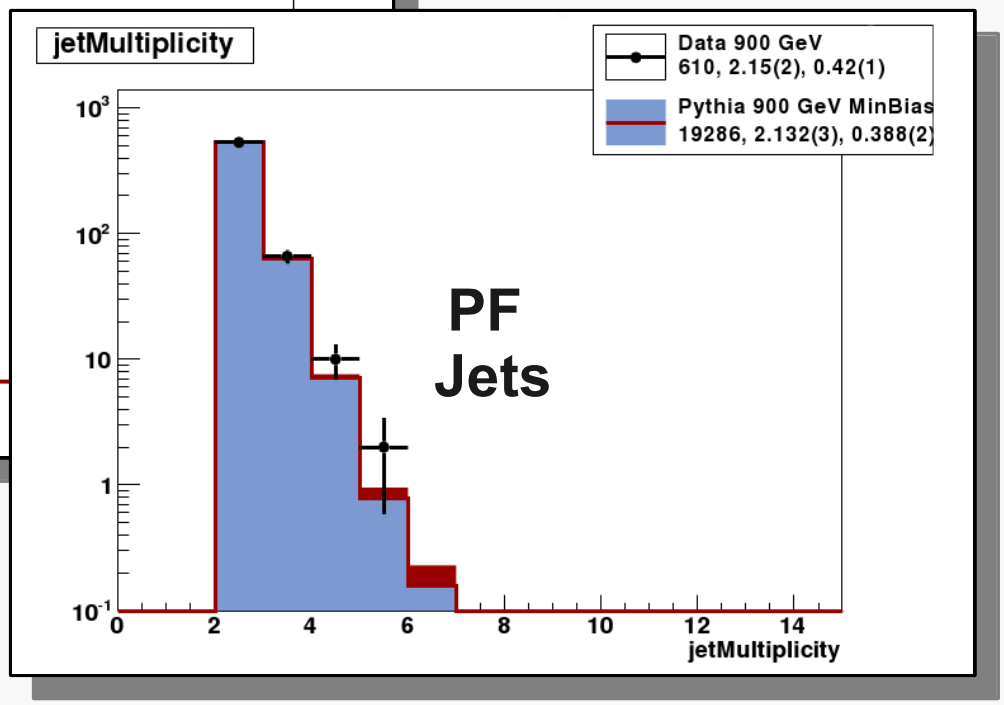
Jets

- 3 kinds of jets (anti-kt, R=0.5) following the recommendation of the JetMET POG
  - **Calo** (p_t > 10GeV, |η| < 3, lose jet ID, ...)
  - **JPT** (Jet-Plus-Track, p_t > 8 GeV, |η| < 2, loose jet ID, ...)
  - **Particle Flow** (p_t > 8 GeV, |η| < 3, loose extended, …)
- n>= 2 jets
  - Multiplicity plots ->

Jet Multiplicity n>=2







- Mainly Di-Jets
- Well described by MC

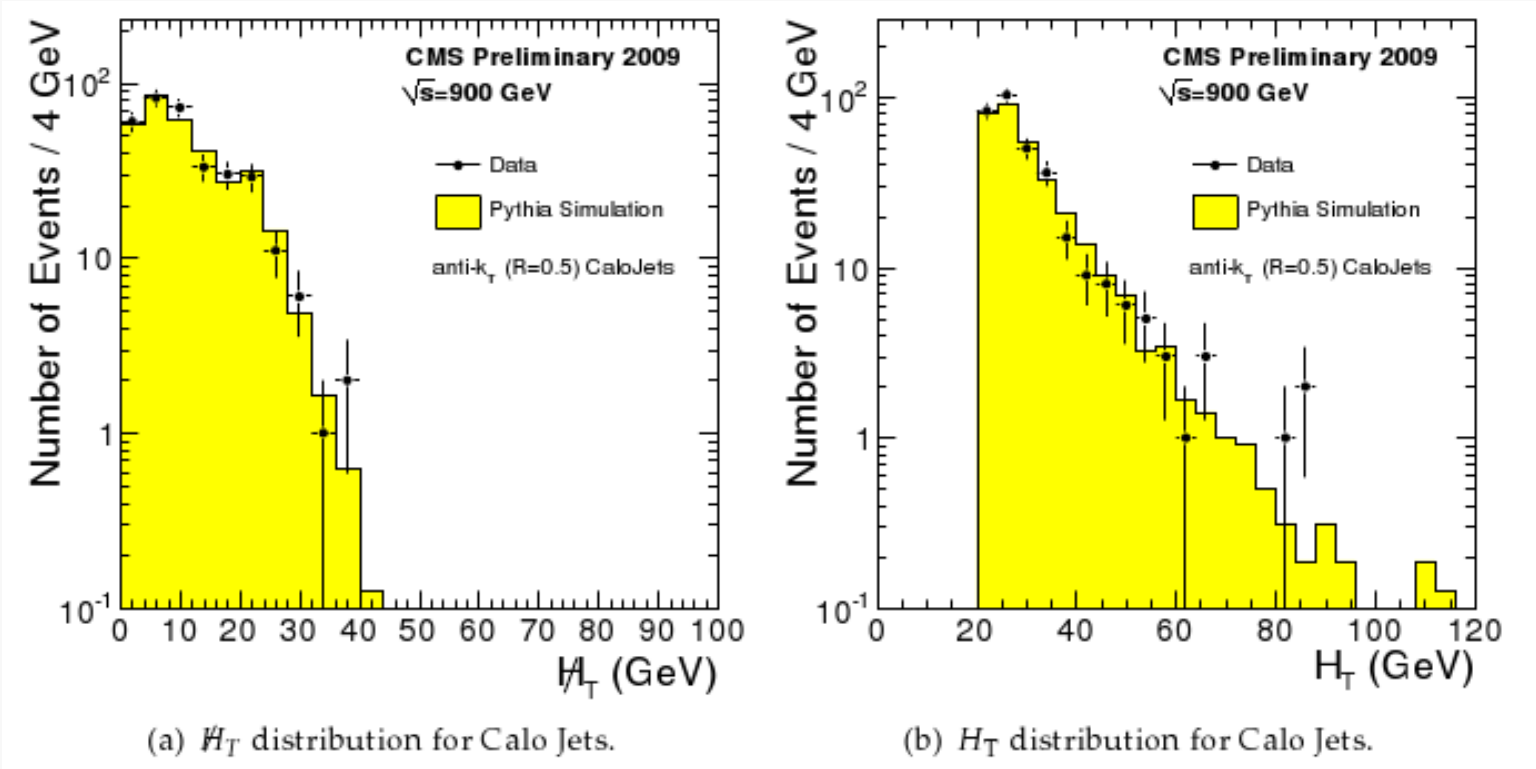
Missing E_T related Quantities

$$HT = H_T = \sum_{jets} |\vec{p}_T| \qquad MHT = \not{H}_T = \left| -\sum_{jets} \vec{p}_T \right|$$

- HT and MHT
  - Sum over all jets, where jets = Calo, JPT, PF
- MET = Calo $\not{E}_T$
  - Sum over all calorimeter energy deposits
- MPT – missing PT
  - Sum over all tracks

Different nomenclature between AN and JetMET PAS

Public Plots

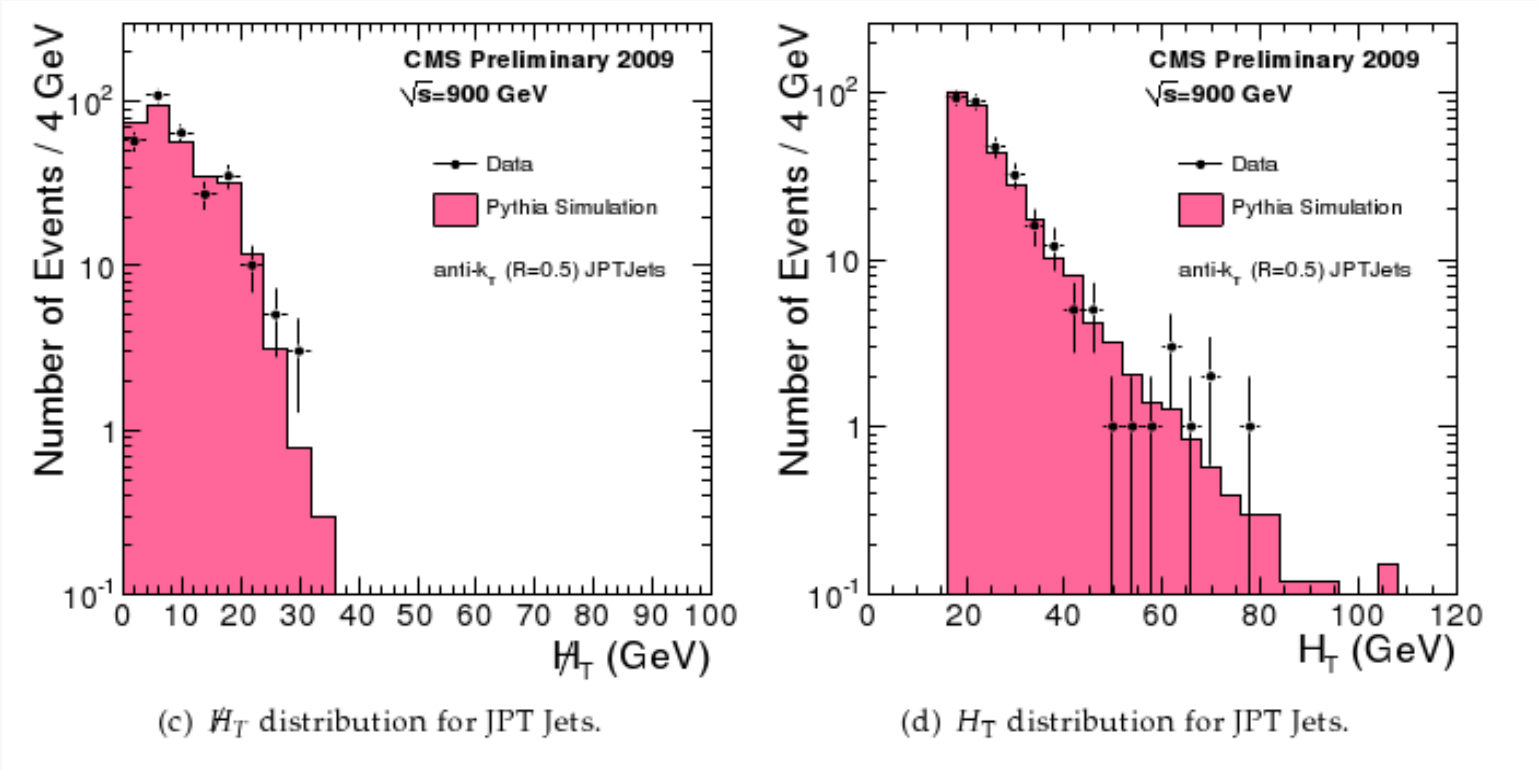


(a) $\not{H}_T$ distribution for Calo Jets.

(b) H_T distribution for Calo Jets.

- No unexpected missing E_T
- Good agreement with MC

Public Plots

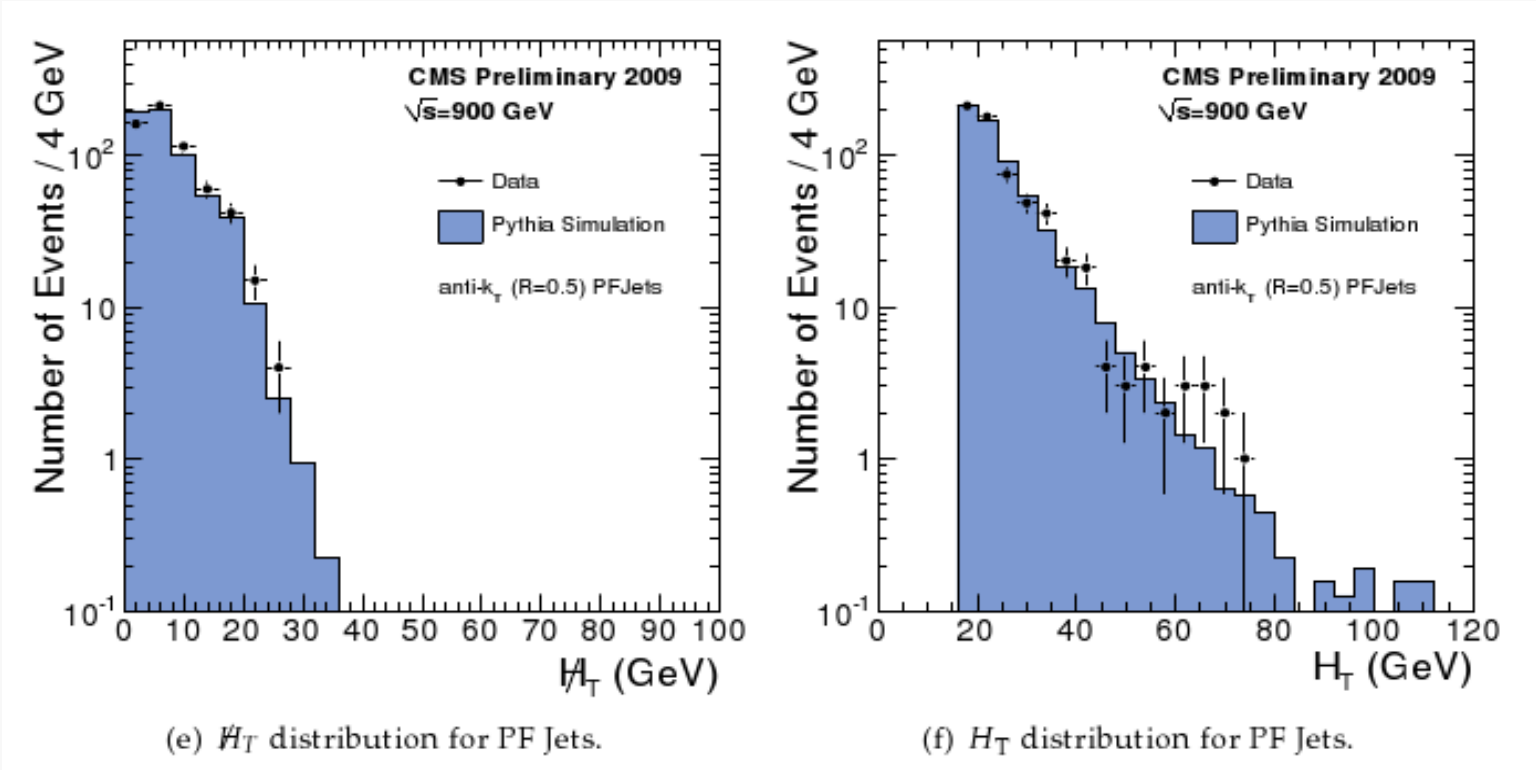


(c) $\not{H}_T$ distribution for JPT Jets.

(d) H_T distribution for JPT Jets.

- No unexpected missing E_T
- Good agreement with MC

Public Plots

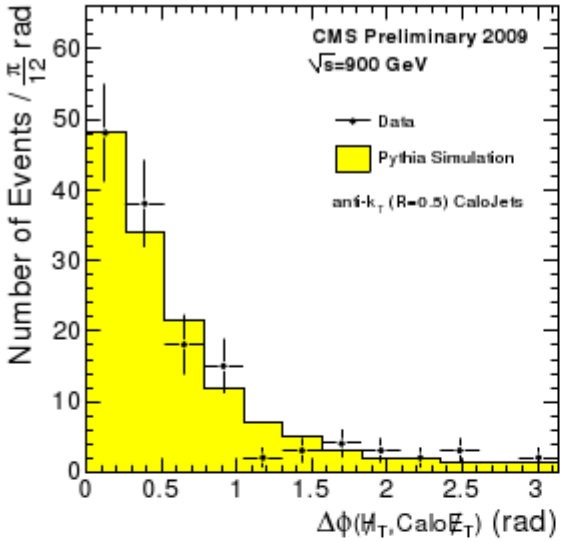


(e) $\not{H}_T$ distribution for PF Jets.

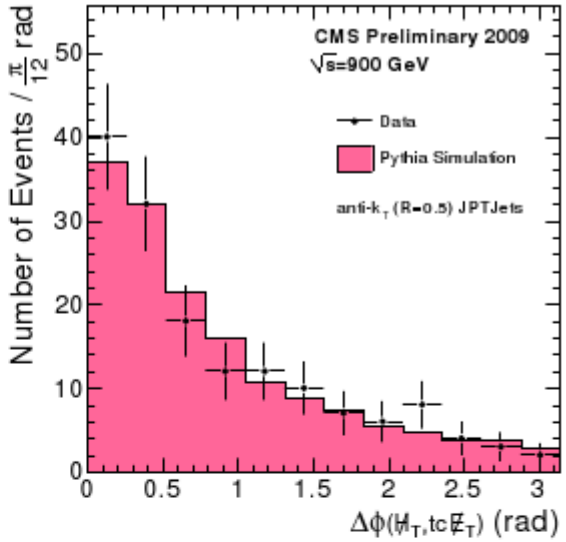
(f) H_T distribution for PF Jets.

- No unexpected missing E_T
- Good agreement with MC

Public Plots



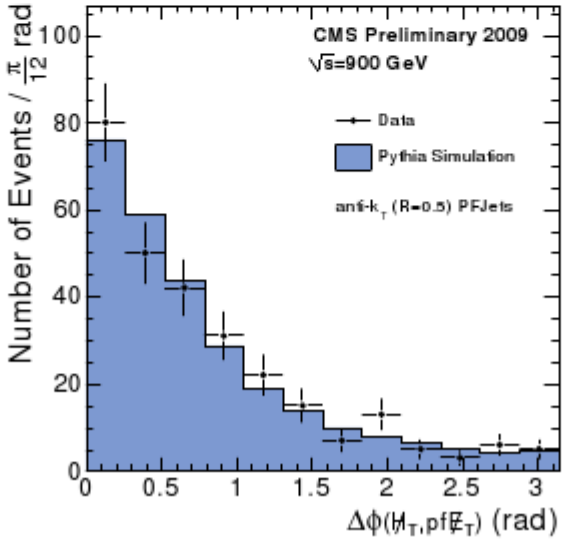
(a) $\Delta\phi(\not{H}_T, \text{calo}\not{E}_T)$ distribution for Calo Jets.



(b) $\Delta\phi(\not{H}_T, \text{tc}\not{E}_T)$ distribution for JPT Jets.

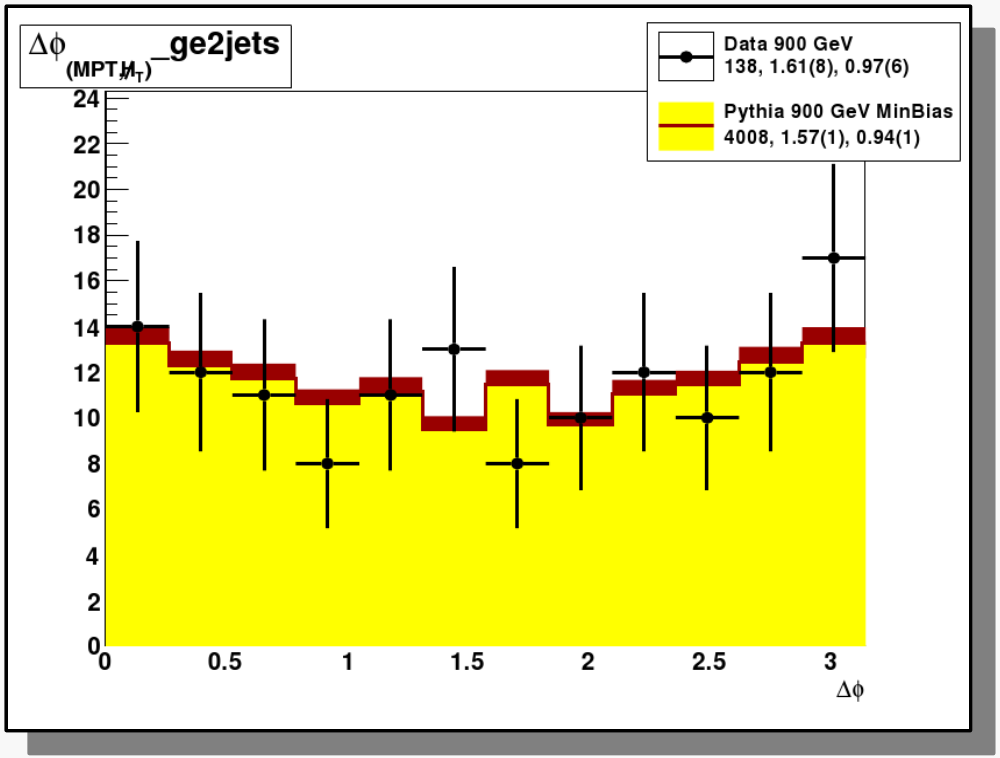
ΔΦ MHT vs MET

Calo MET
> 5 GeV



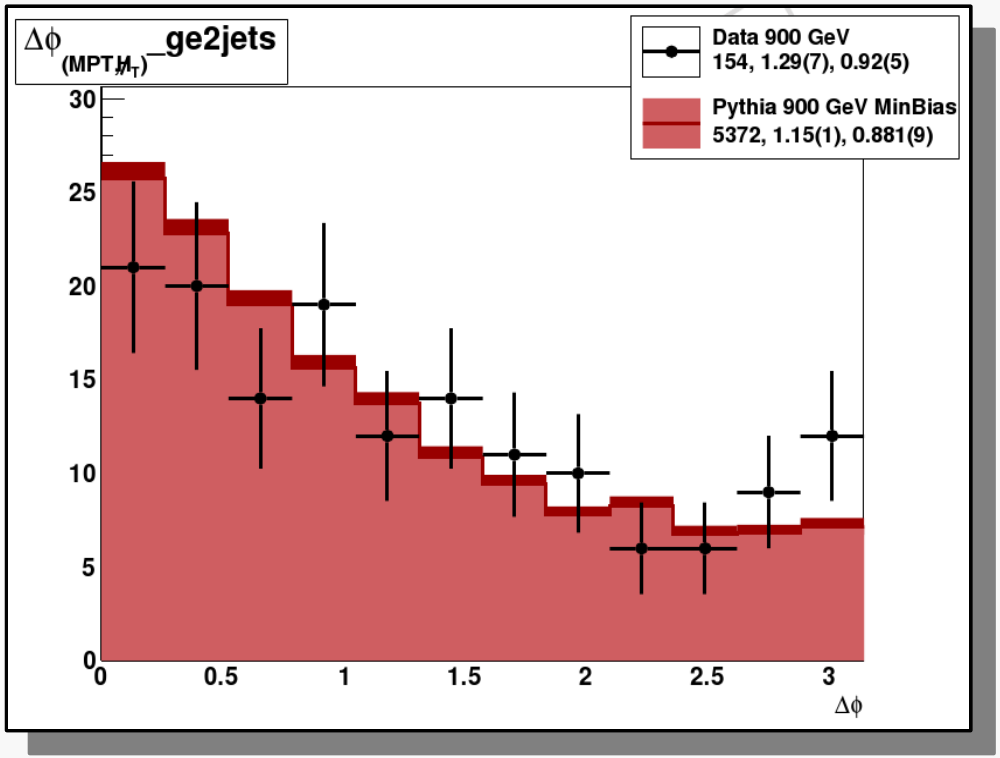
(c) $\Delta\phi(\not{H}_T, \text{pf}\not{E}_T)$ distribution for PF Jets.

Non Public:
Tracker-Calo- Correlations



MPT vs Calo MHT

Calo MET> 5 GeV



MPT vs JPT MHT

- No real missing ET in QCD