MET/EWK PAS overview

Artur Apresyan and Stefano Lacaprara

MET Working Group Meeting

CERN 14 May 2010

News

- Progress in Plot preparation
  - Including DATA (will flash some PR plots, more details during physics week meeting)
- Timescale and statistics
- PAS status
  - Open issues:
    - Which metric to compare MET performances?
    - MC based efficiency for W for various METs
      - Discussion is going on, your feedback is welcome

Timescale and statistics

- Timescale for EWK/MET pas is still the same:
  - Freeze Dataset by May 31
    http://indico.cern.ch/getFile.py/access?contribId=0&resId=1&materialId=slides&confId=90934
  - By that, we might have some 0.1 pb-1, namely O(400) W's and O(40) Z's:
    - So especially the Z section can suffer from lack of statistics, and so some plots/results in the PAS not very informative
    - Plots will be updated for stat up to 16-20 June
    - PAS approval will be conditional:
      - basic technique must be in place and documented, as well preliminary plots
    - We will update the plots and can also change selection/description if needed

PAS list of plots

For W events updated

- MET distribution in W candidate events
- MET decomposition

recoil distribution in W candidate events

- recoil versus lepton pt (tentative plot)

recoil along and perp to bisector between lepton and

- MET (tentative plot)

Forget about recoil vs Qt and perp and // to Qt,

- **since QT for W is identical (but sign) to recoil**

opening angle between lepton and recoil

- opening angle between lepton and recoil as function

of recoil magnitude (scatter plot)

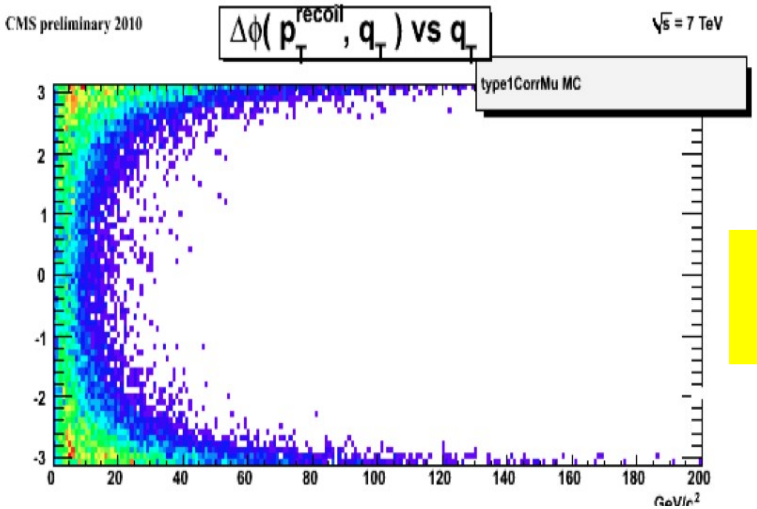
- if possible, reproduce MET distributions in W candidates with >=1 jet, >=2 jets, >=3 jets

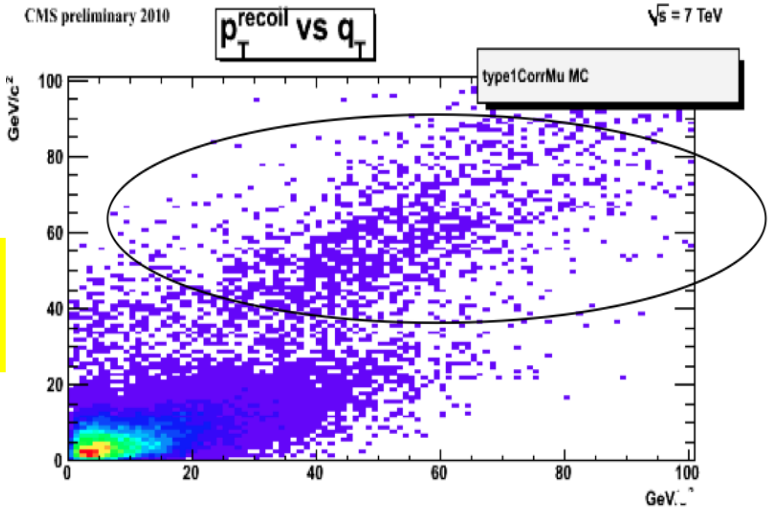
- **For Z events and direct photon events**
- MET distribution in Z candidate events
- MET decomposition
- recoil distribution
  - recoil versus qT (scatter plot)
  - opening angle between recoil direction and the direction of qT
  - opening angle between recoil direction and the direction of qT versus the magnitude of qT (scatter plot)
  - component of recoil perpendicular to bisector (s
  - component of recoil parallel to bisector
  - component of recoil parallel to bisector versus component of qT parallel to bisector (scatter plot)
  - mean value of component of recoil parallel to bisector versus component of qT parallel to bisector
  - RMS value of component of recoil parallel to bisector versus component of qT parallel to bisector

Hadronic recoil in events with Z mm

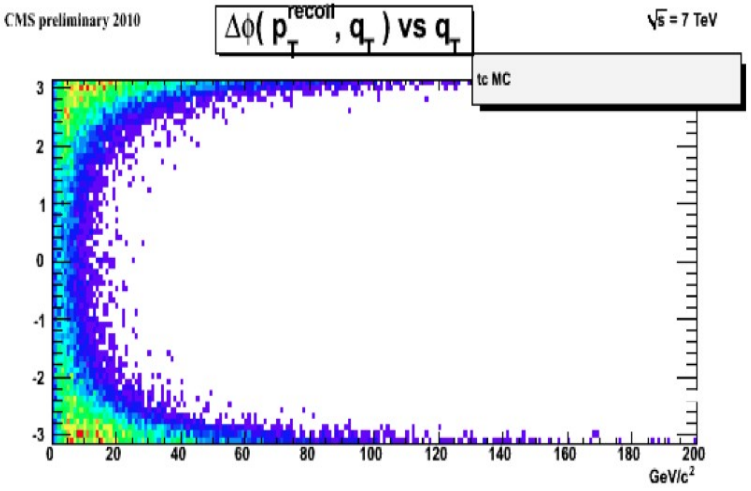
M.Tosi et. al

Remove both charged leptons from the event reconstruction and compare the measured hadronic energy against the dilepton four-momentum.

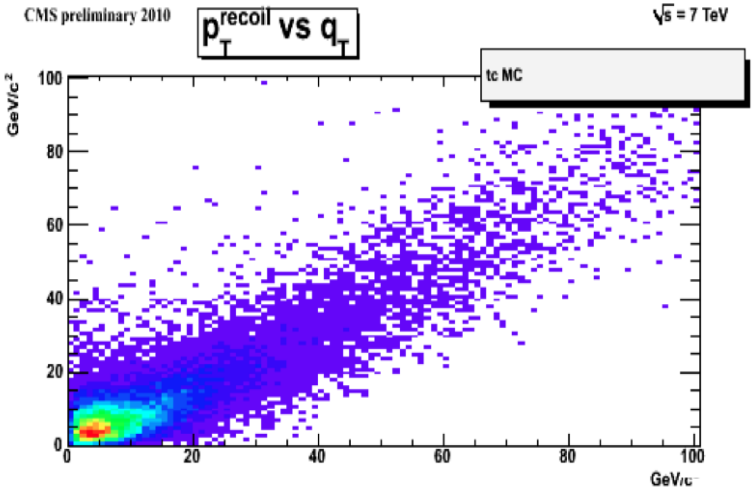




Type 1MET



tcMET

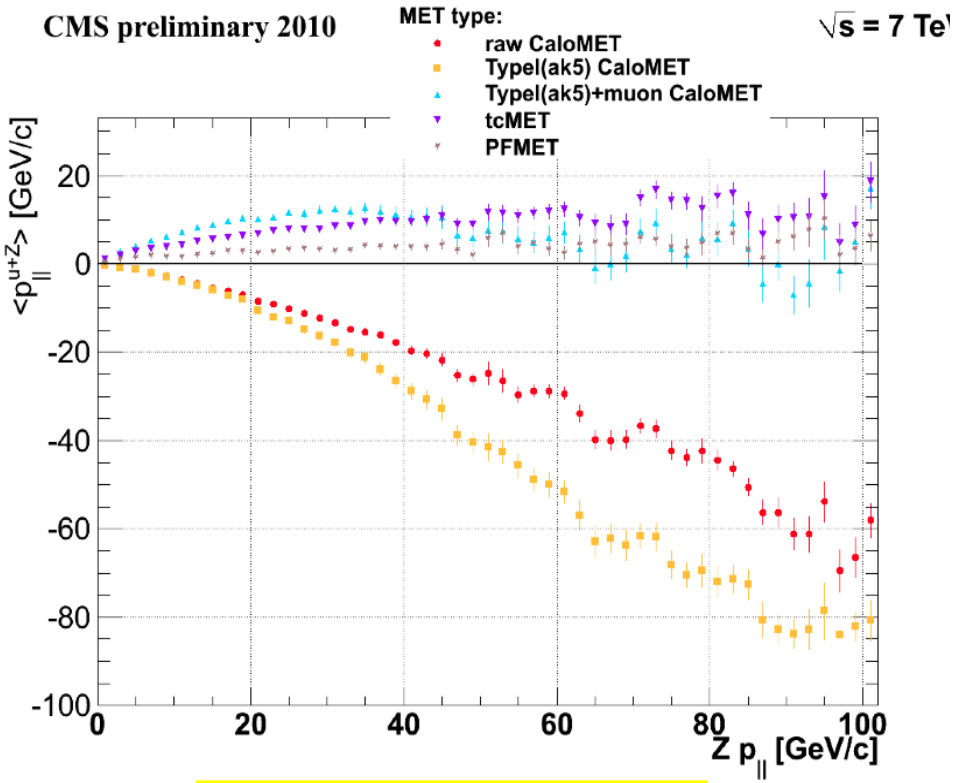


Hadronic recoil in events with Z

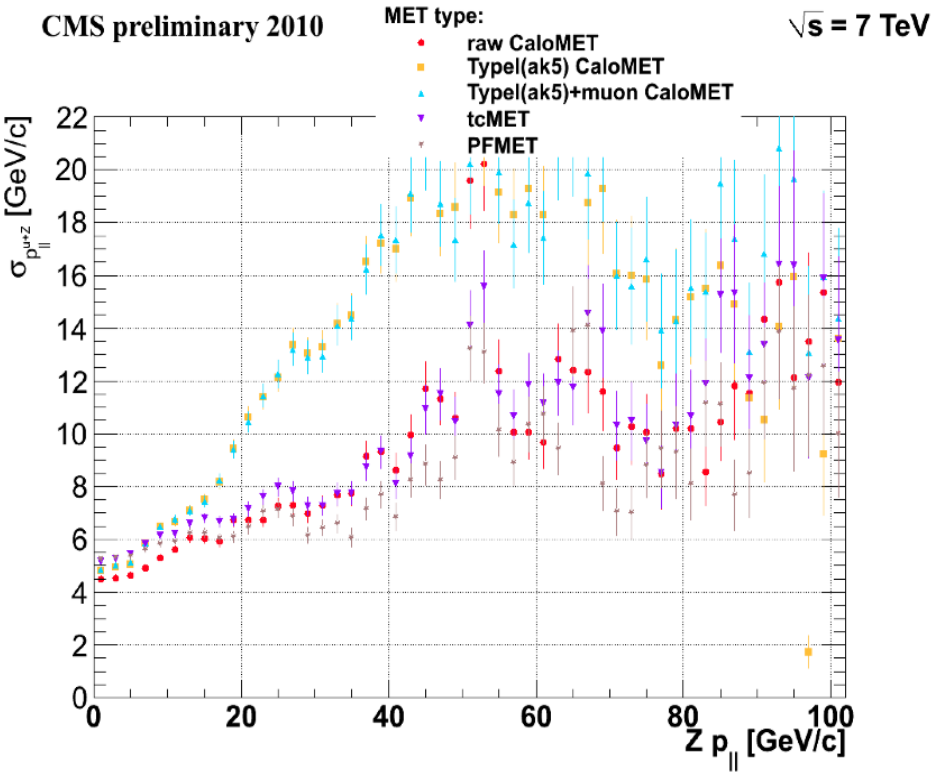
M.Tosi et. al

project the vector sum of pT(ll) and u on a set of orthogonal axes (defined by lepton directions)

mean and RMS of projections as a function of pT(Z) provide information on hadronic model parameters



Mean of recoil plus Z PT



RMS of recoil plus Z PT

W->enu Ersatz MET

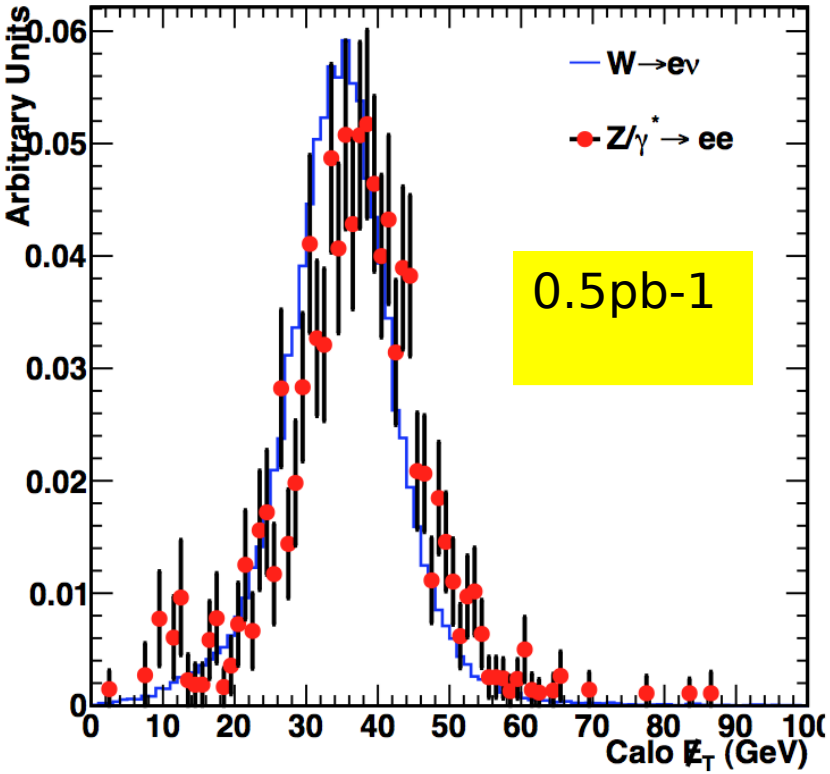
For ersatz MET by removing one of the leptons from Z->ll

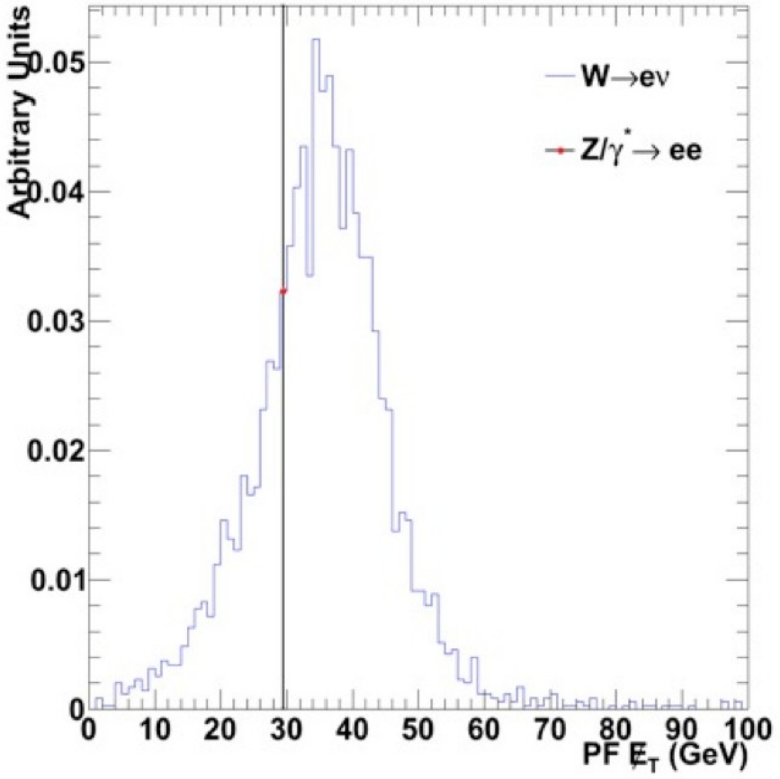
Use as a model for MET in W->lnu events

R. Nandi et. al

Apply the W electron selection (tag)

Find another electron such that 71 GeV < mee < 111 GeV (probe);





TypeI/TypeII corrections

Study TypeI and TypeII corrections of Calo MET in Z->ee events

U. Gebbert, D.Wang

Comparison of resolution (Sigma x/y/perp/par) for the different correction algorithms

Study impact of TypeI/TypeII corrections on Mean/Sigma of MET perp, par in bins of average electron/z/photon pt

Current status

Tools to produce the plots from Zee and Photon+Jet events in place

First studies done with Zee MC, focusing on the finalization of TypeII algorithm

Studying different MC samples (Zee, Photon+Jet, Dijets) to Understand composition of unclustered energy

Other possibilities

MET calibration can be studied in events where one of the charged leptons from the Z decay is removed from event

Mimics missing transverse energy, however MET is precisely known (lepton PT)

A bias in this difference of MET and PT of removed lepton could indicate the imperfection in MET calibration

Compare Calo/Tc/PF METs, which method has the narrowest distribution

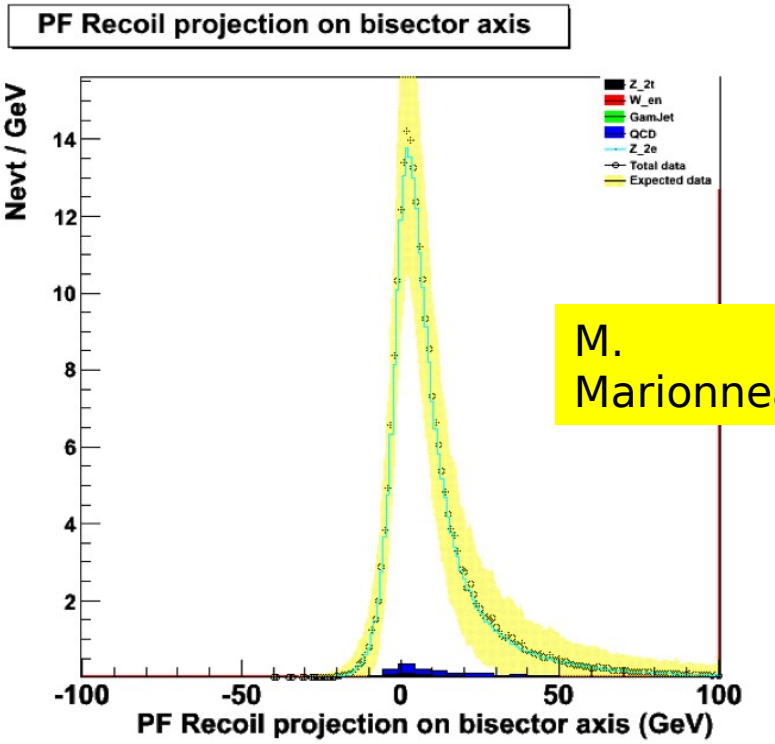
Define the bisector axis as the axis that splits the angle between the two leptons into equal parts

component of recoil perpendicular to bisector

component of recoil parallel to bisector

If statistics allows, reproduce all the studies

with +1,2,... jets.



M. Marionneau

Hadronic recoil in W->enu

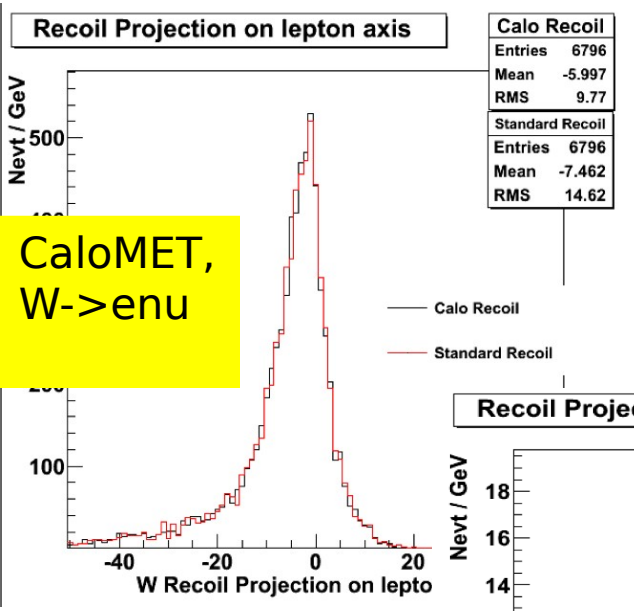
M. Marionneau

Study recoil for Calo/Tc/PF MET

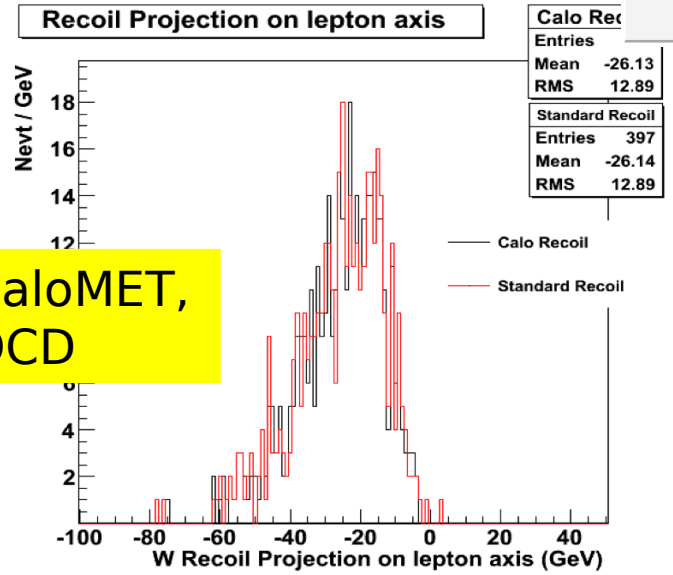
Recoil computation possibilities: use GsfElectrons or corresponding super-clusters

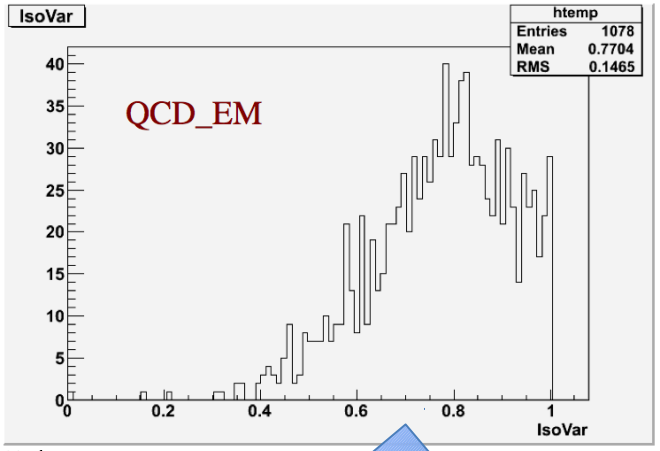
Some discrepancies found between QCD EM enriched MC samples and Data for Isolation variables: needs some adaptations...

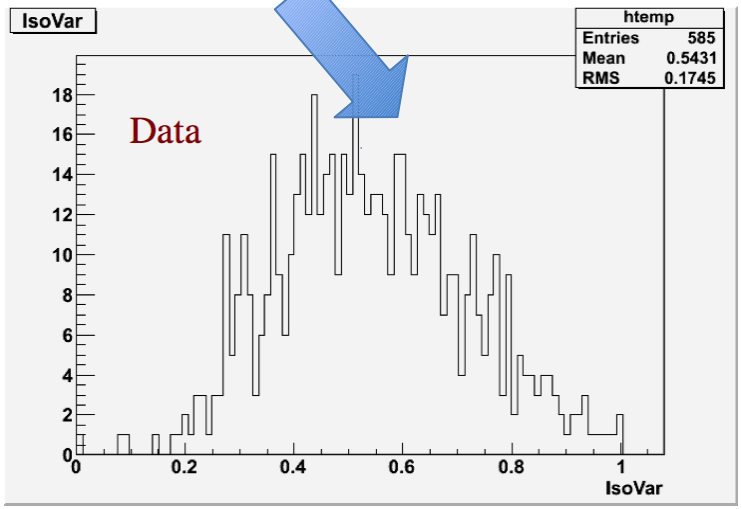
CaloMET, W->enu



CaloMET, QCD



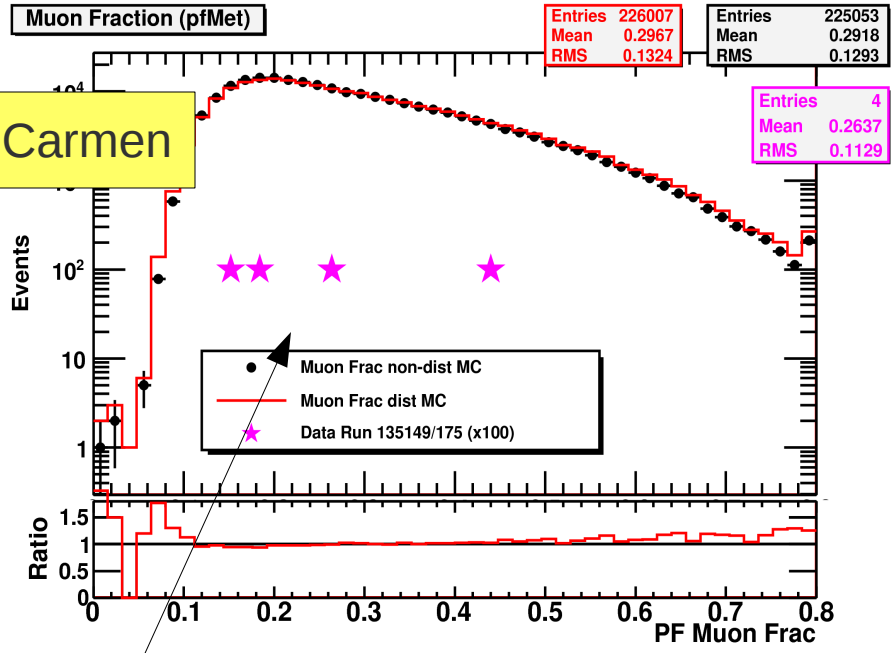




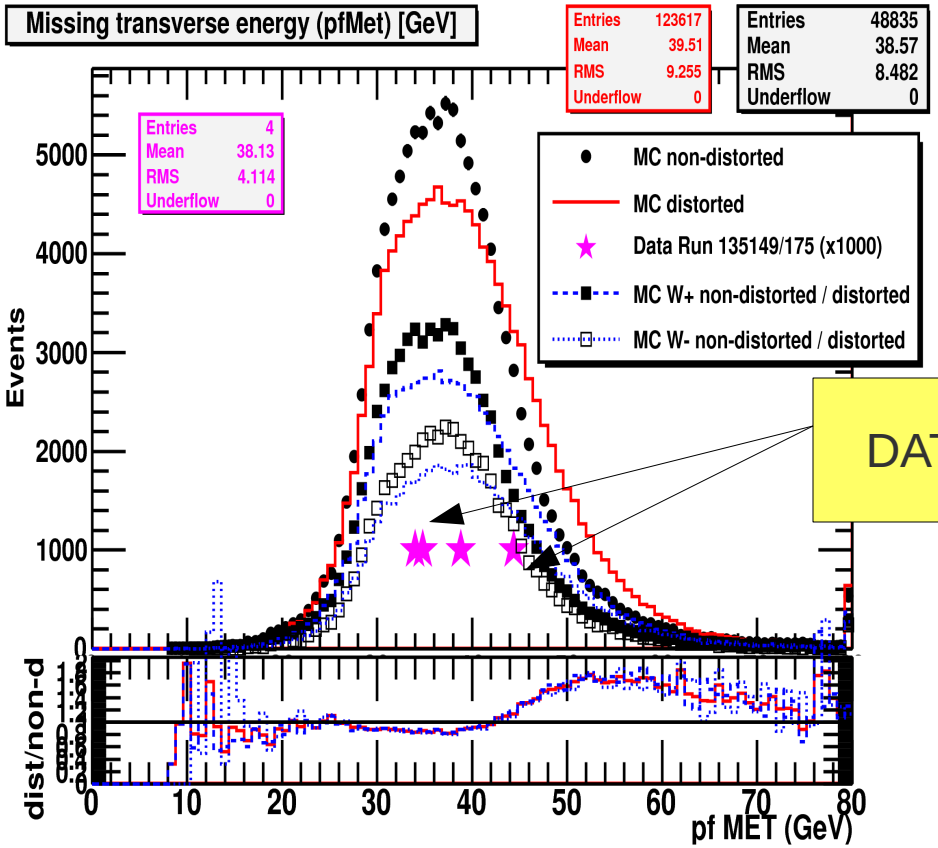
MET decomposition and Muon distortion

Mara & Carmen

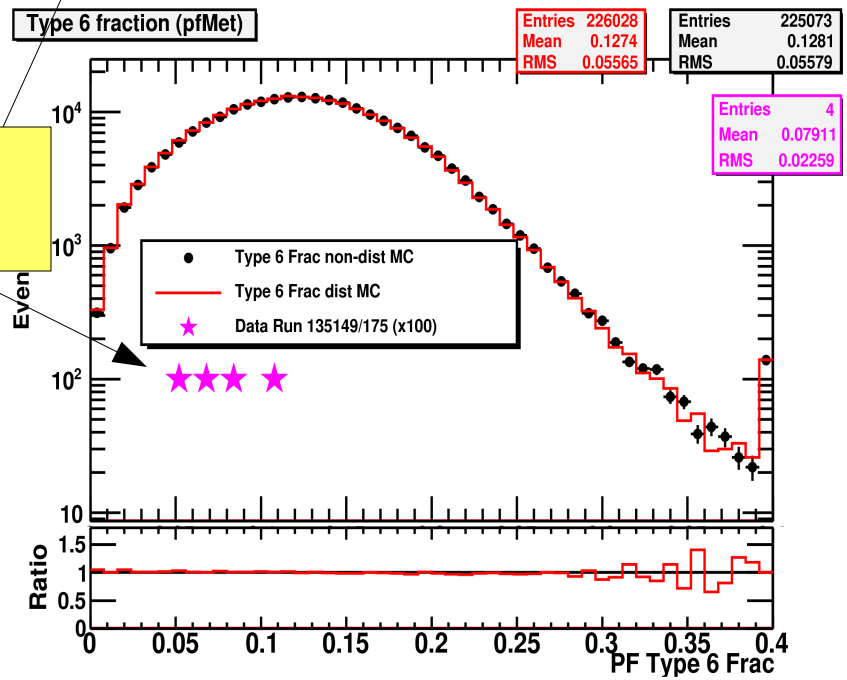
- Effect of possible muon reco distortion on MET for W



PfMET decomposition

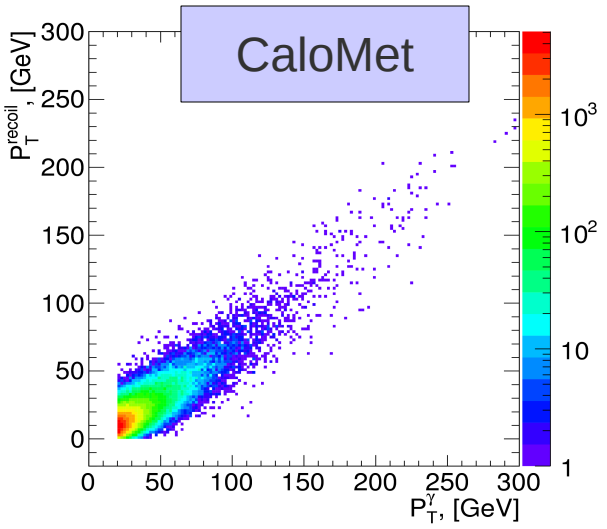


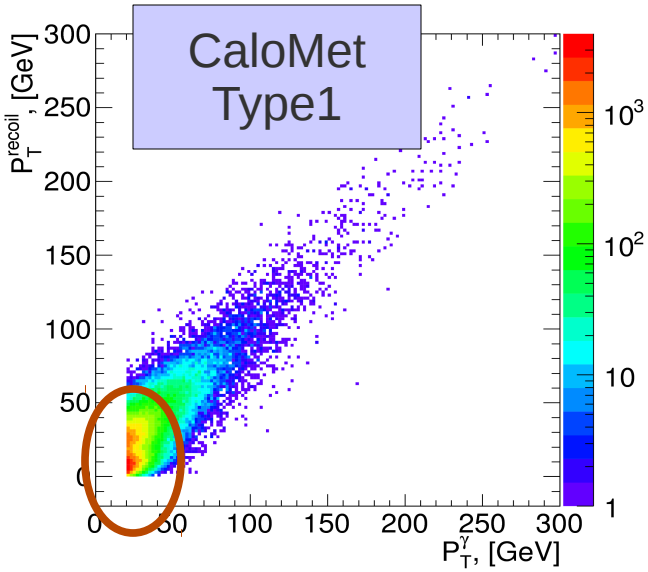
DATA!

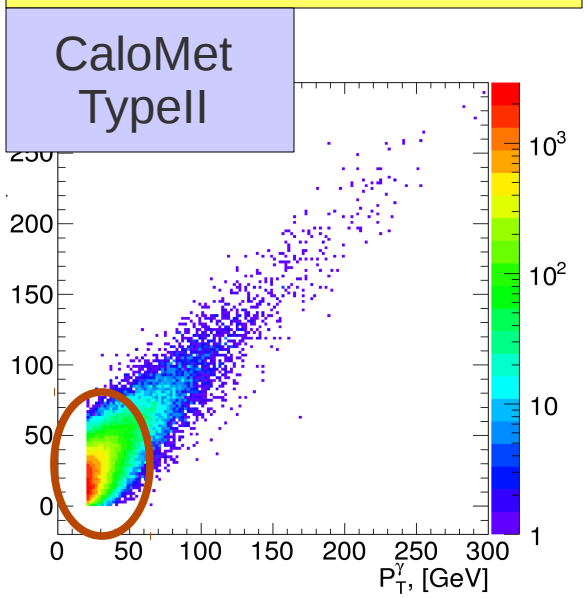


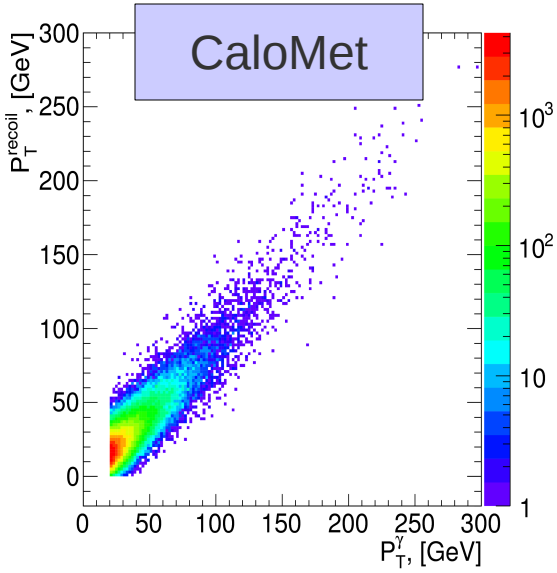
Gamma + Jet: pT(recoil) vs Pt (gamma)

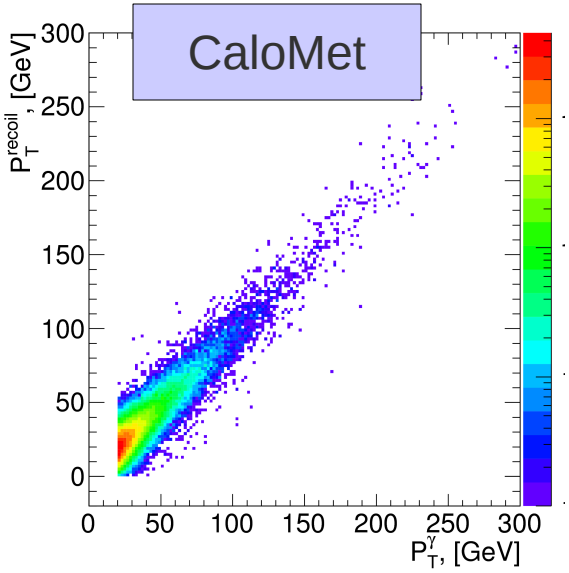
Jordan, Sungwon & Efe
More on next talk

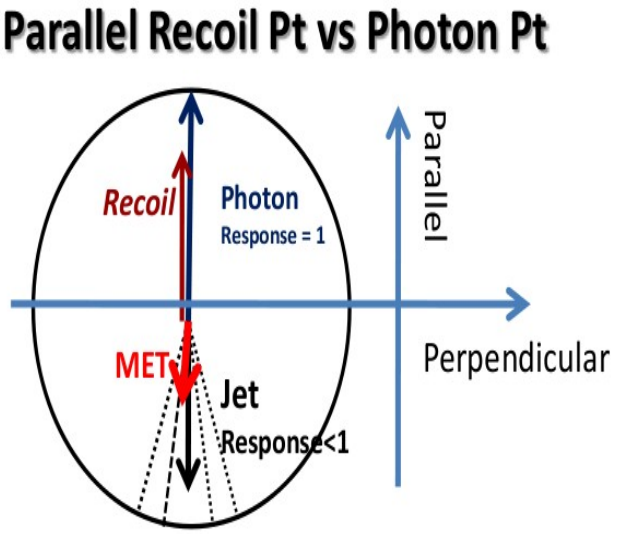






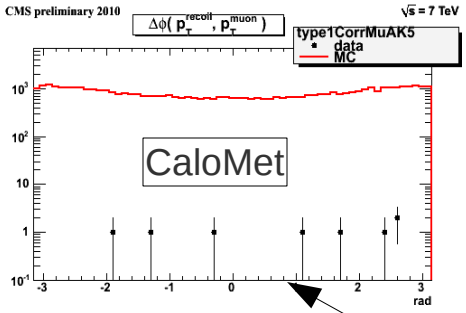


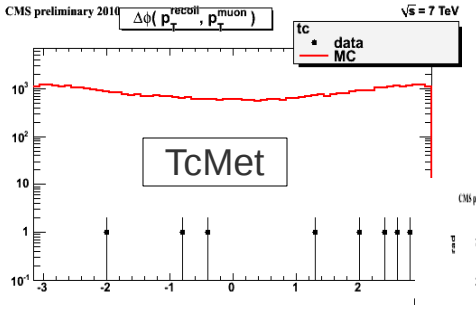




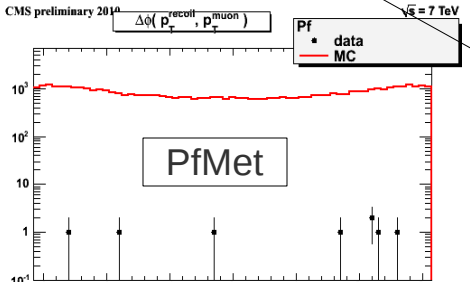
W to Muon: hadronic recoil

A. Branca, Mia, S.Vanini, M.Nespolo, SL
See also Mia's talk



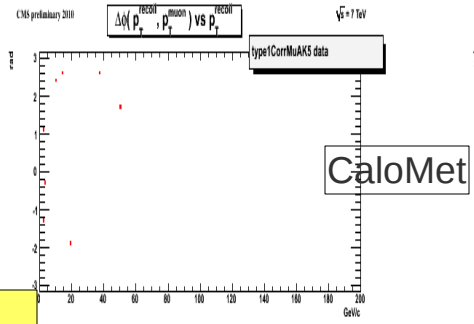


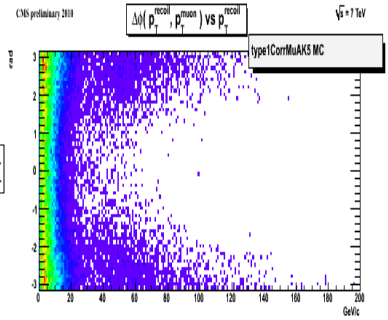
Angle Recoil-muon
Vs pt recoil

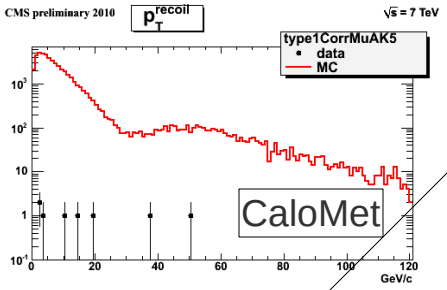


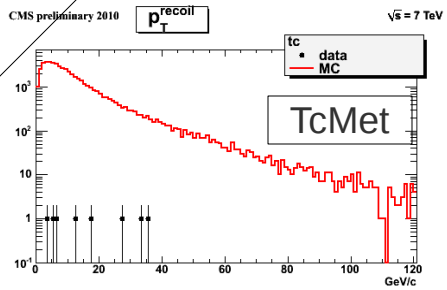
Angle Recoil-muon

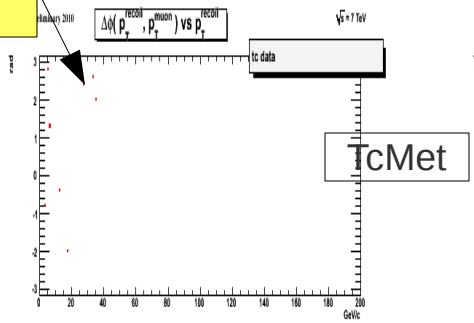
DATA! 8 ev

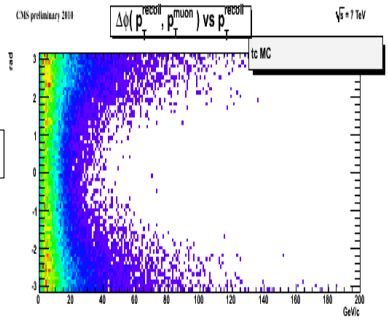


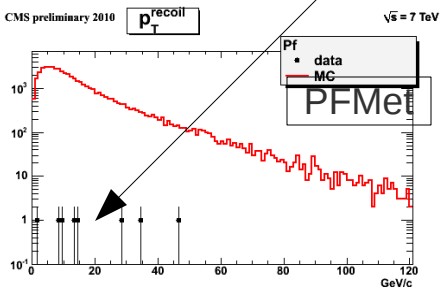




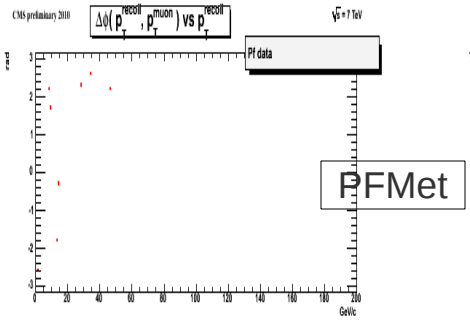


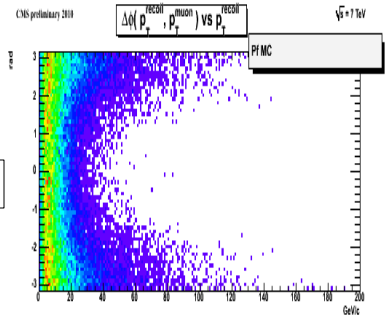




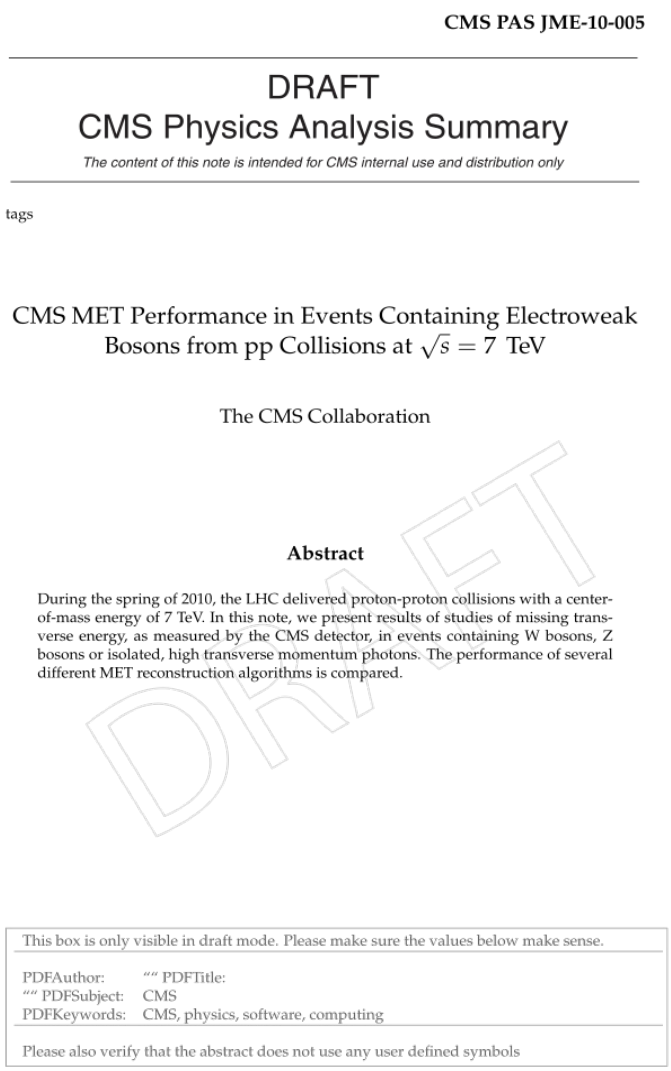


Angle Recoil-muon





PAS status



CMS PAS JME-10-005

DRAFT
CMS Physics Analysis Summary

The content of this note is intended for CMS internal use and distribution only

tags

CMS MET Performance in Events Containing Electroweak Bosons from pp Collisions at $\sqrt{s} = 7$ TeV

The CMS Collaboration

Abstract

During the spring of 2010, the LHC delivered proton-proton collisions with a center-of-mass energy of 7 TeV. In this note, we present results of studies of missing transverse energy, as measured by the CMS detector, in events containing W bosons, Z bosons or isolated, high transverse momentum photons. The performance of several different MET reconstruction algorithms is compared.

DRAFT

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PDFAuthor: "" PDFTitle:
"" PDFSubject: CMS
PDFKeywords: CMS, physics, software, computing

Please also verify that the abstract does not use any user defined symbols

- PAS status:
  - on svn version0,
  - need to be completed, cleaned
  - and fill with incoming plots (to be updated later)
- WARNING: AN(s) are expected to support the PAS from various groups
  - Brief description of selection, dataset
  - Full list of plots (on PAS possibly only a fraction)
  - And possible issue found/solved.