

MC Jet Resolution Study

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Introduction

- ▶ MC jet resolution is used in:
 - determining whether a jet has a gen jet match
 - the smearing method for jets without a gen jet match
- ▶ We still have differences between analysis A & B in the $W \rightarrow \tau \nu$ background due to smearing
- ▶ Runmetuncertainty uses MC resolutions from Spring '10
- ▶ JetMET POG recommend measuring MC resolution yourself

Method

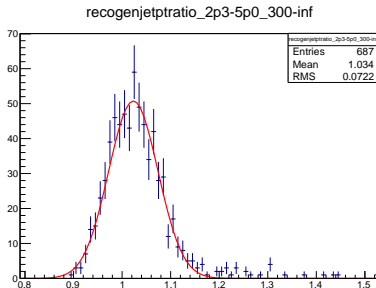
- ▶ JetMET recommended method is to fit a gaussian to $p_{T\text{reco}}/p_{T\text{gen}}$ in bins of pt and eta

- I have used all of our QCD W MC

- ▶ Resolution as a function of p_T is fit to:

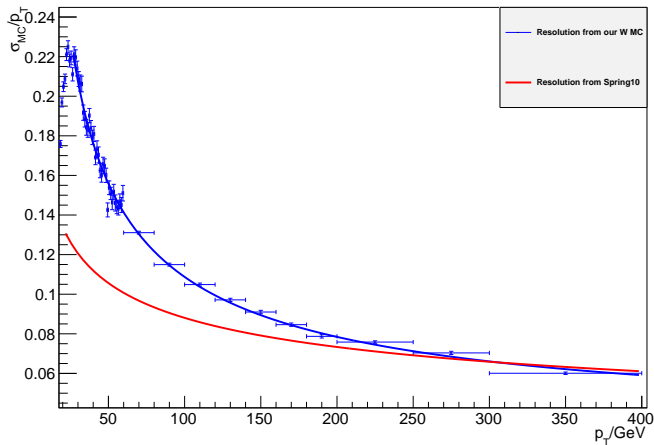
$$\sqrt{\text{sgn}(A) \frac{A^2}{p_T^2} + B^2 p_T^{m-1} + C^2}$$

[eqn. 21 from JME-10-011]



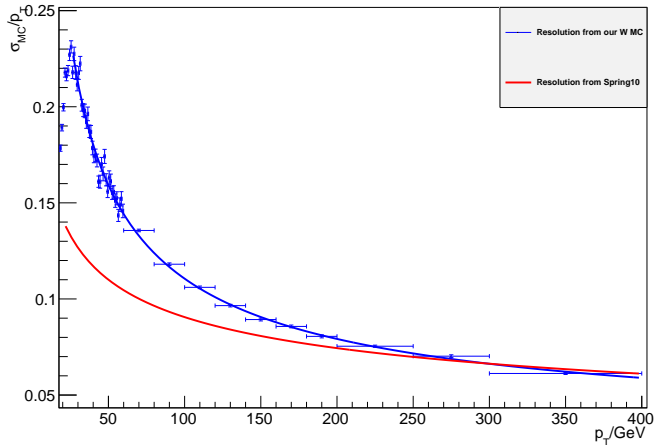
Plots

$0 < \eta < 0.5$



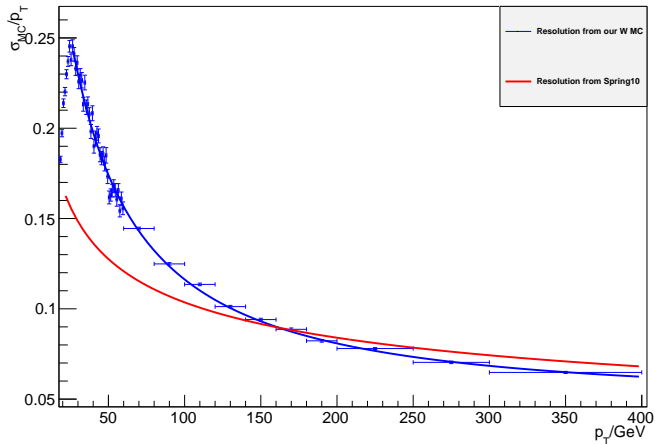
Plots

$0.5 < \eta < 1.1$



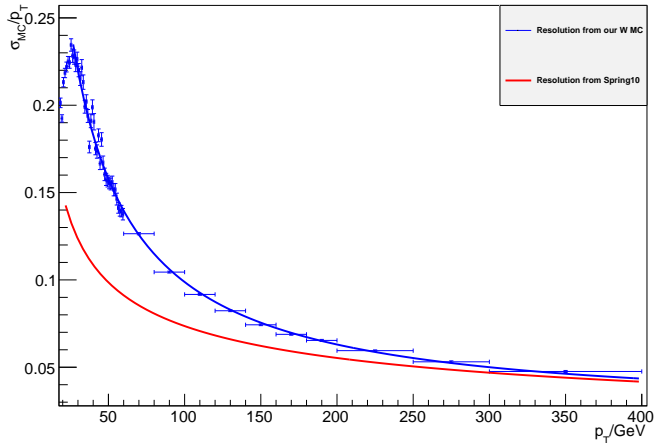
Plots

$1.1 < \eta < 1.7$



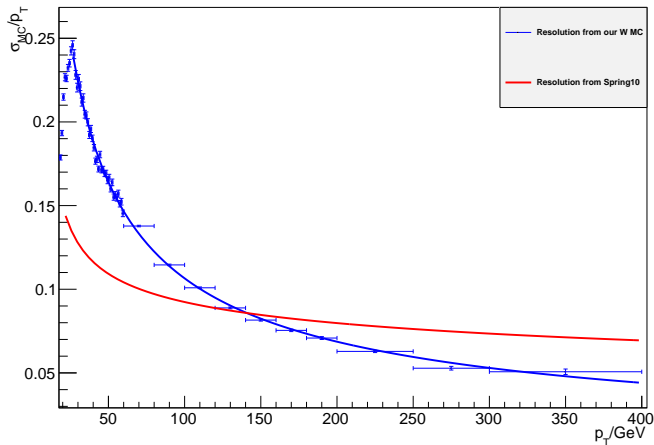
Plots

$1.7 < \eta < 2.3$



Plots

$2.3 < \eta < 5$



Turn on below 25 GeV

- ▶ Clear turn on in MC below 25 GeV
 - 2010 JetMET paper plots only go down to 40 GeV
 - Spring 10 Resolutions do not have a turn on
- ▶ To produce results two methods have been used:
 - Fit resolution down to 25 GeV and treat as constant below 25 GeV
 - Fit resolution down to 20 GeV and extrapolate to below 20 GeV

Results

Channel	No gaussian smearing	Spring 10 σ_{MC}	Measured σ_{MC} (flat below 25 GeV)	Measured σ_{MC} (extrapolate fit)
$W \rightarrow e\nu$	71.8	71.2	74.8	75.6
$W \rightarrow \mu\nu$	68.1	63.7	71.2	70.7
$W \rightarrow \tau\nu$	64.6	60.3	62.1	62.0

Conclusions

- ▶ Gaussian smearing can make a significant difference to the final result
 - $|p_{T reco} - p_{T gen}| < 3\sigma_{MC}$ matching condition used by runmetuncertainty is not implemented in analysis B
- ▶ The resolutions used by runmetuncertainty are very different to those in our MC especially at CJV and 50 GeV thresholds