

Run 12 / Run 13
pp500 GeV BEMC
Calibration

Run13-W-Analysis Group

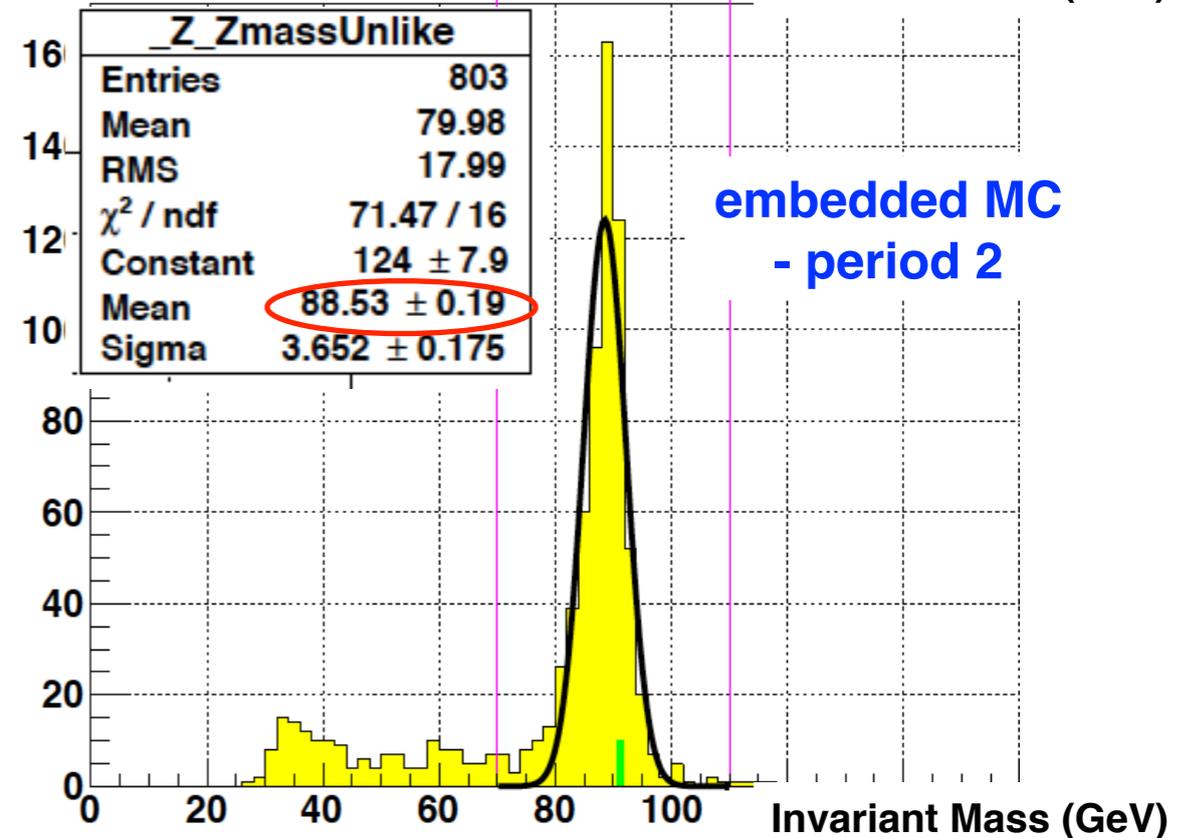
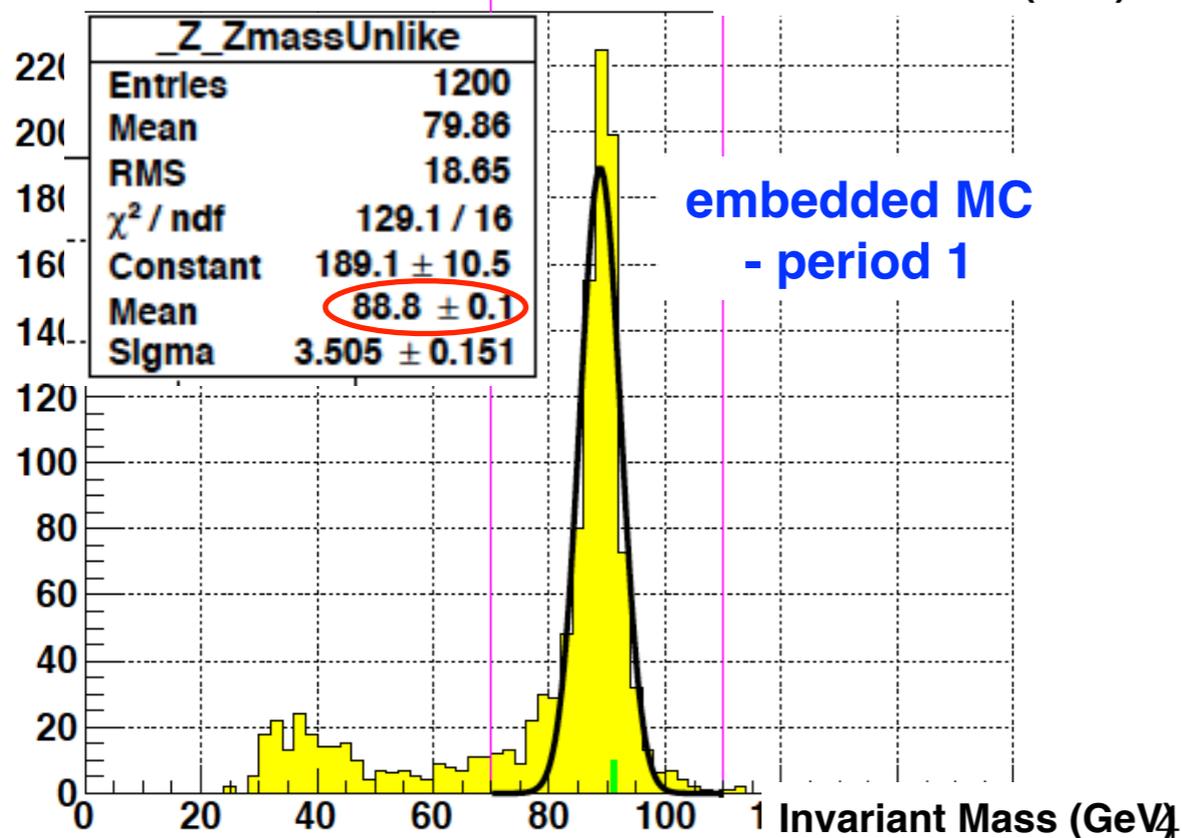
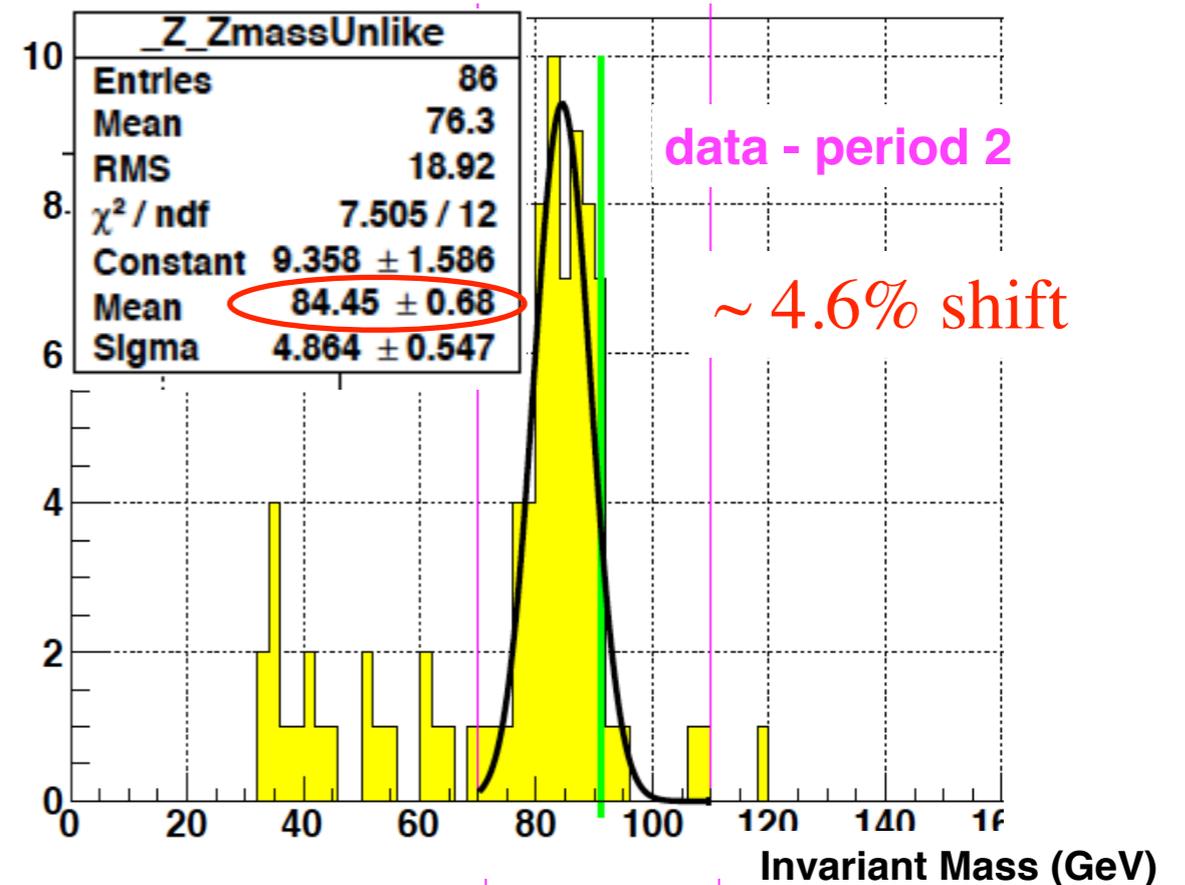
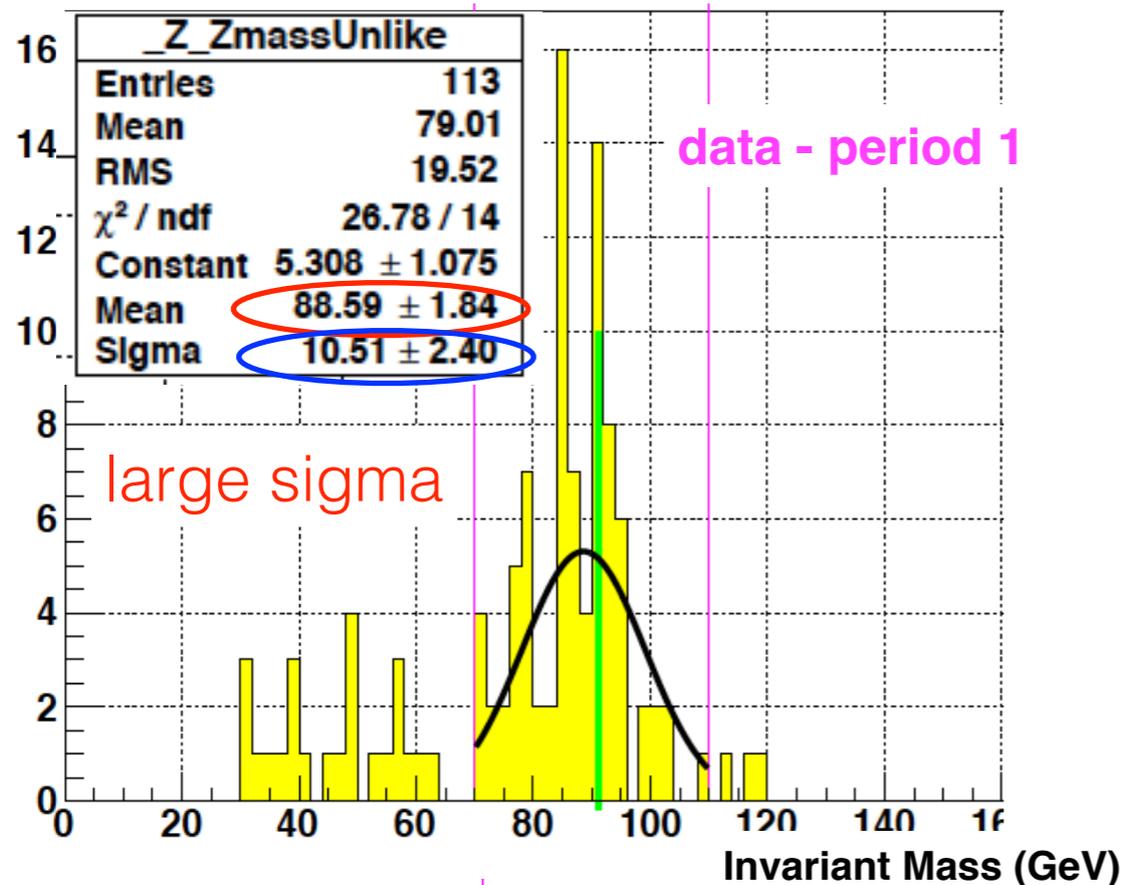
Outline

- ❖ Motivation
- ❖ Estimation of Disk Space
- ❖ Method of Calibration
- ❖ Summary

Motivation

- ❖ The **ONLY pp500 GeV BEMC calibration** at STAR so far, was done in **Run 9** by **Matt Walker, et al.**
- ❖ The total **integrated luminosity** is increased from run 9 to **run 12** by factor of **6** and to **run 13** by factor of **19**.
- ❖ An **updated calorimeter calibration** is clearly **needed** several years after the last calibration was done for the release of preliminary and in particular published results.
- ❖ In run 13 we observe that the **reconstructed invariant Z mass peak** is shifted by **$\sim 4.6\%$** towards low mass compare to embedded MC.
- ❖ Reconstructed **W Jacobian Peak position** in **run 13 data** sample (both period 1 and 2) is **shifted** compared to embedded MC and run 12 data.

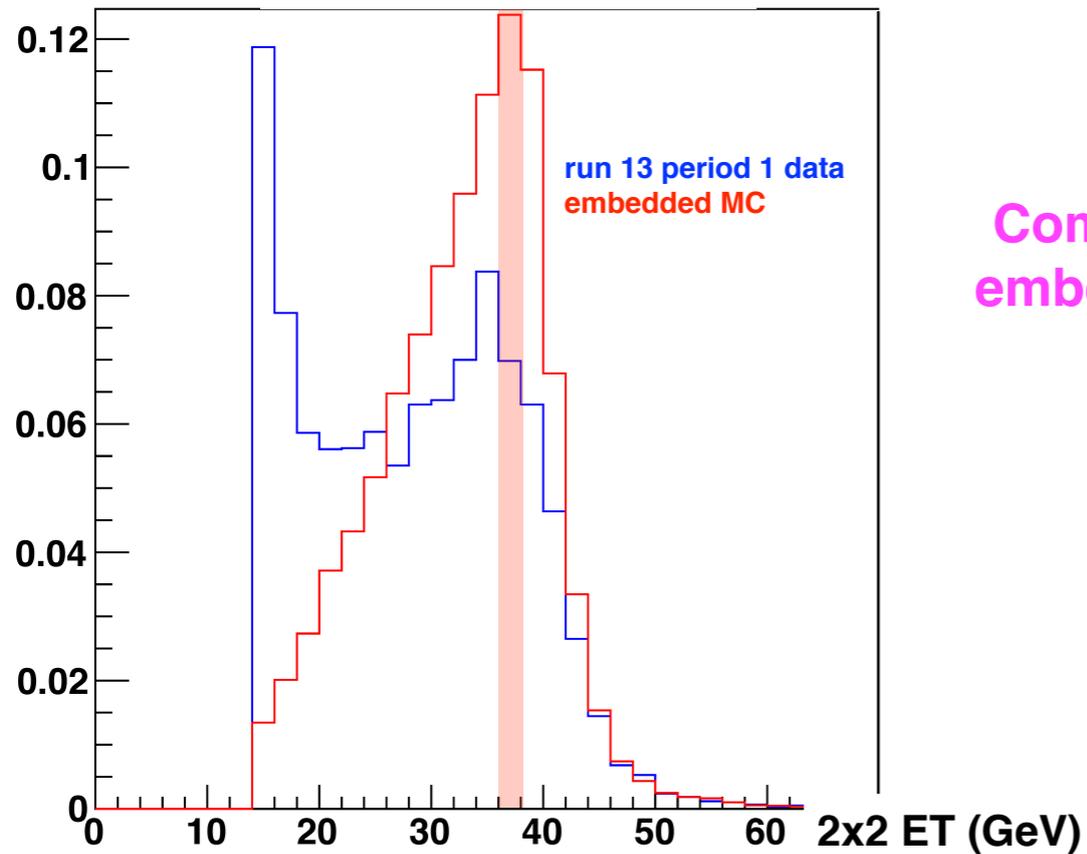
Z Invariant Mass Distribution



W - Jacobian Peak

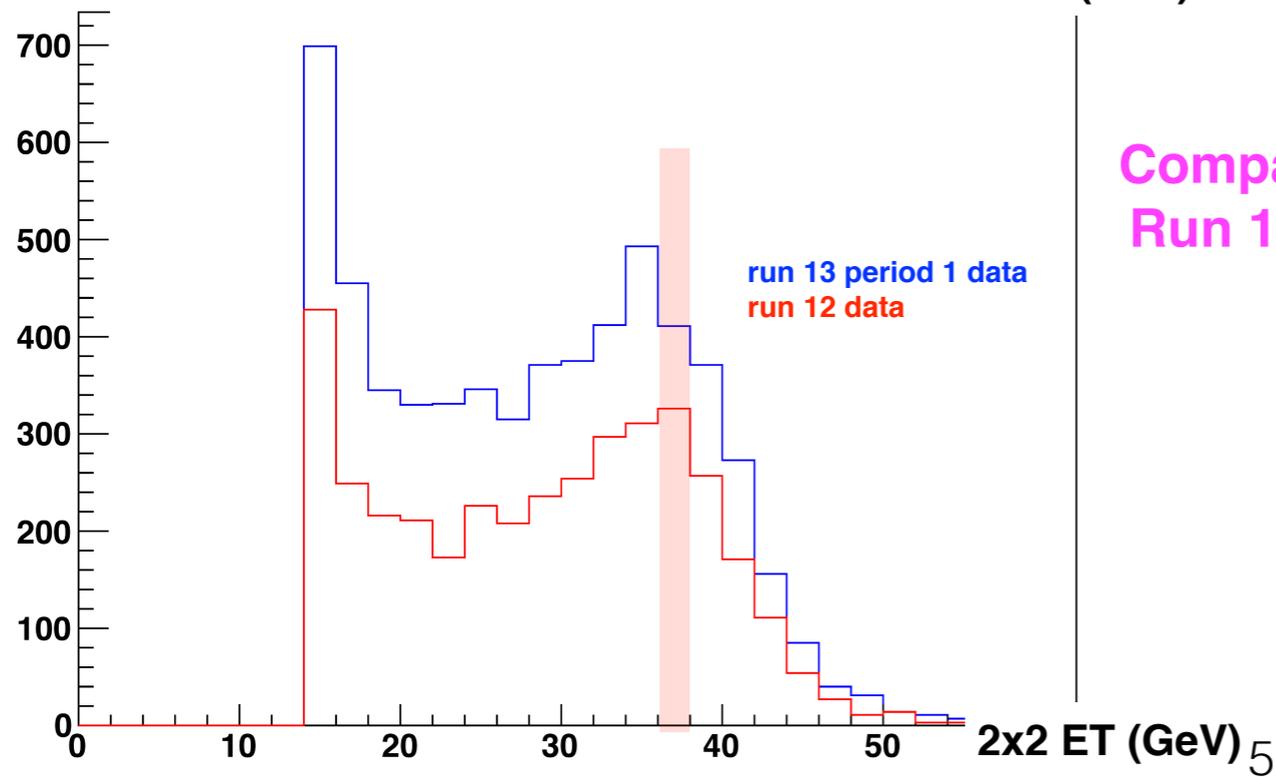
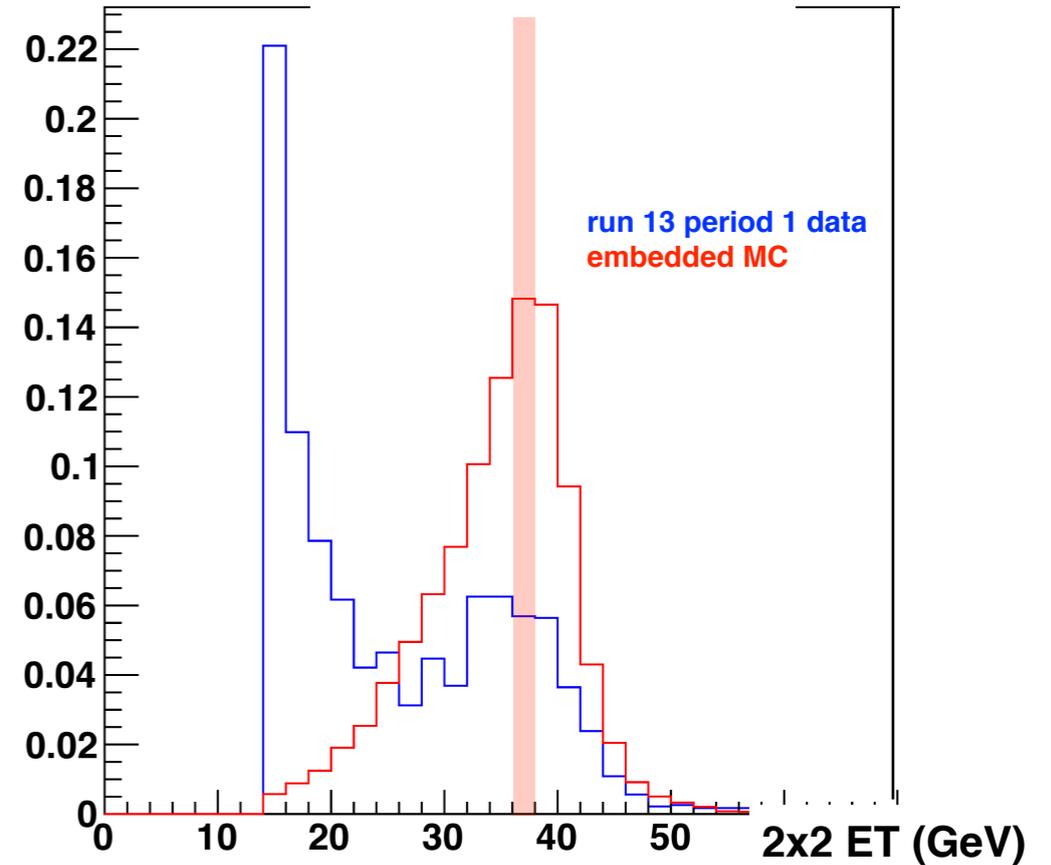
● run13 Period 1

W⁺ ET Distribution

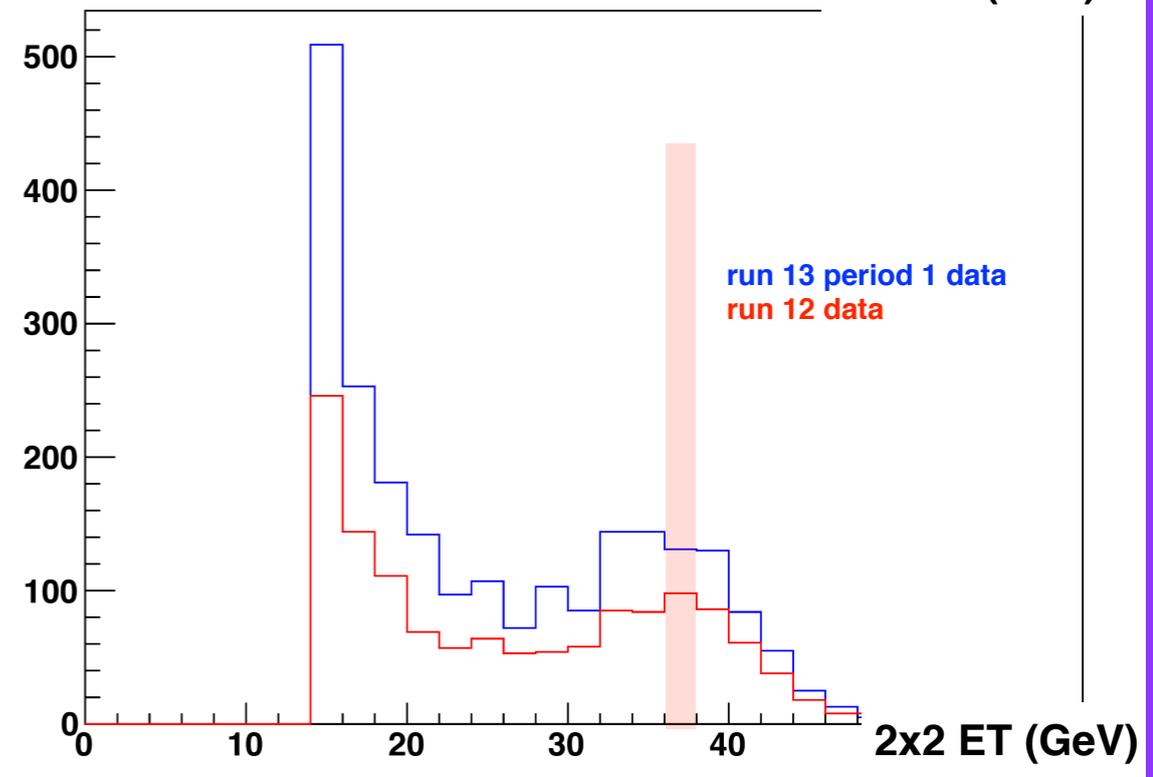


Compared to
embedded MC

W⁻ ET Distribution



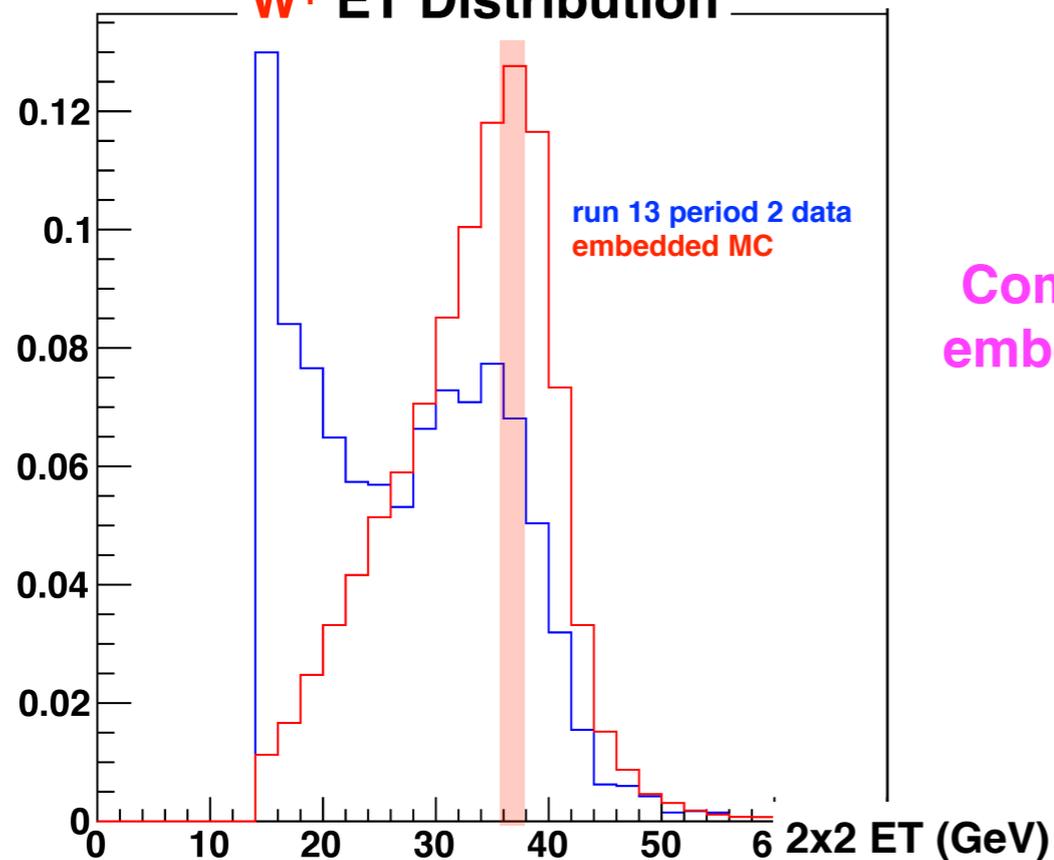
Compared to
Run 12 Data



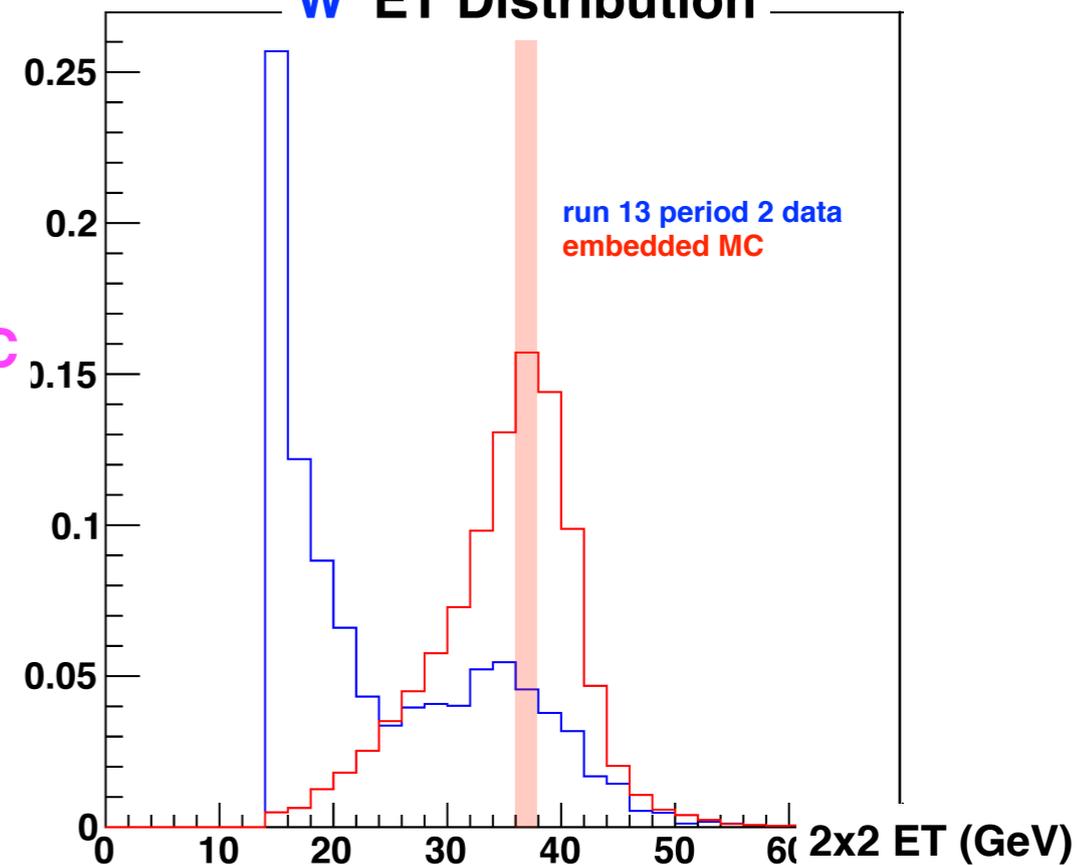
W - Jacobian Peak

● run13 Period 2

W⁺ ET Distribution

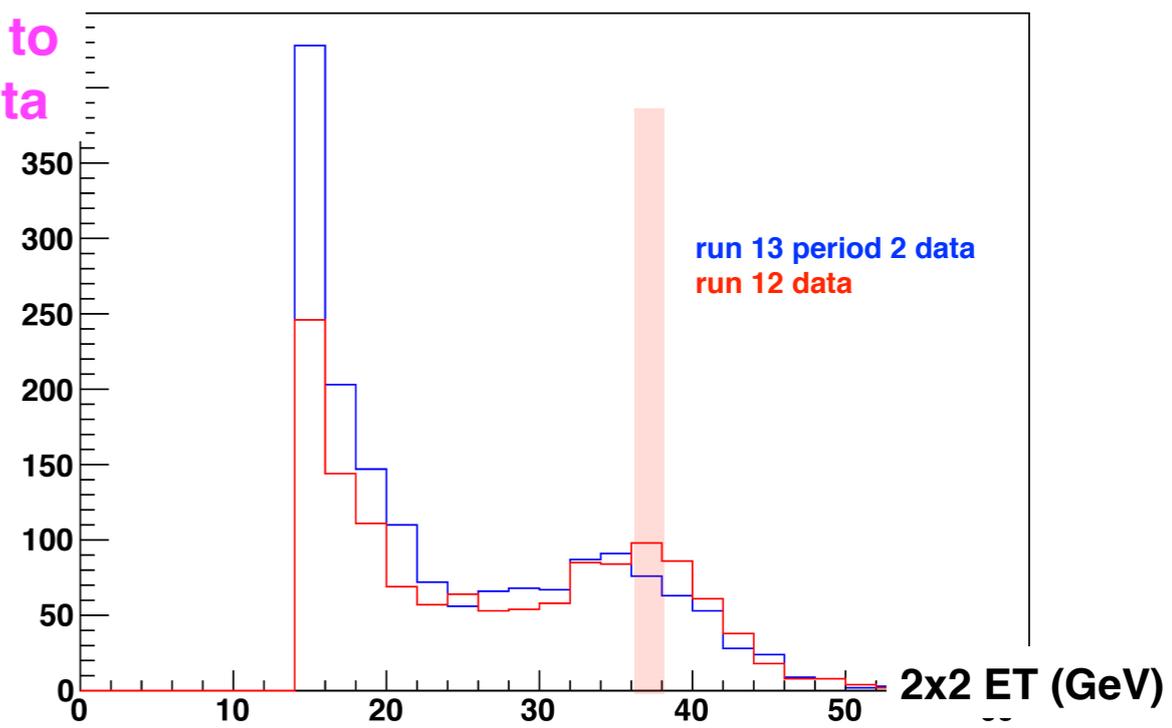
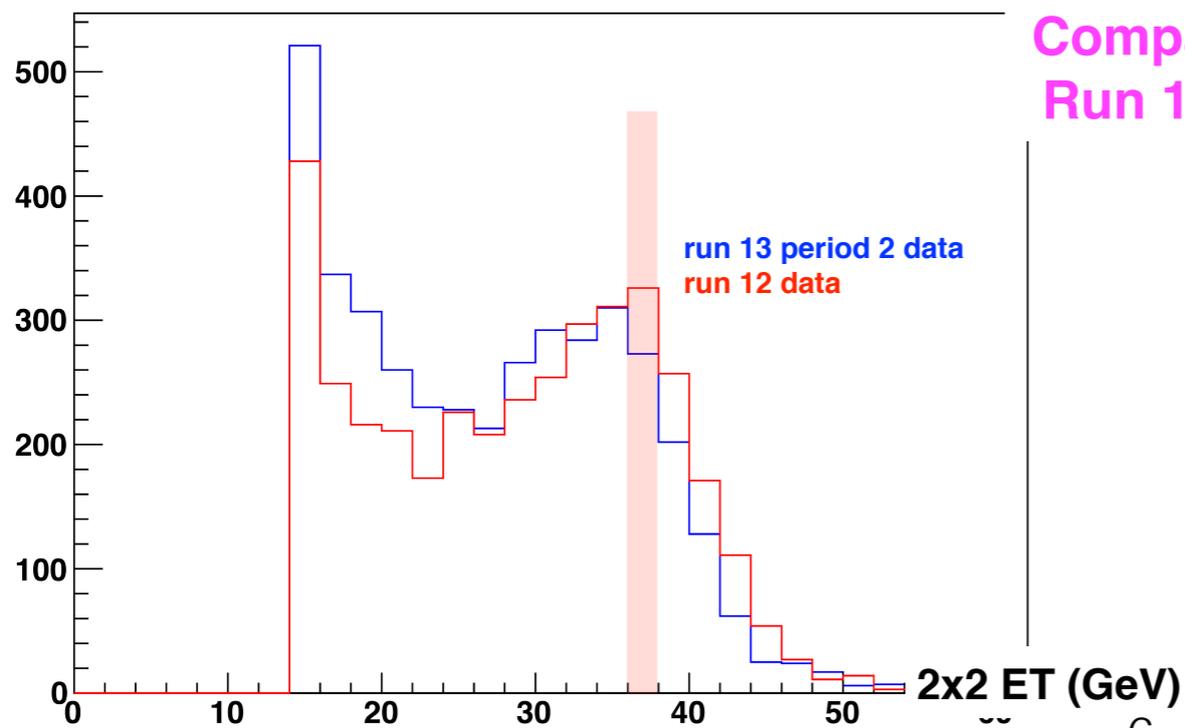


W⁻ ET Distribution



Compared to
embedded MC

Compared to
Run 12 Data



Estimation of disk space

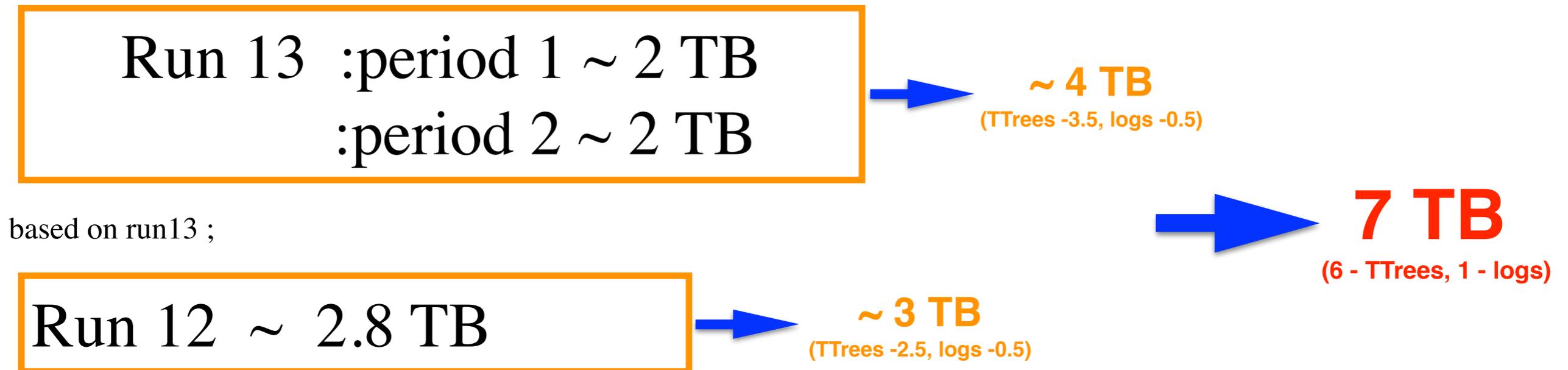
● **HT Trigger Options (BHT0, BHT1, BHT2)** [for QA'd W-AL-run lists]

	Run 12 pp200 GeV	Run 12 pp500 GeV	L (pb-1)	Run 13 pp500 GeV period 1	L (pb-1)	Run 13 pp500 GeV period 2	L (pb-1)
1	BHT0*VPDMB	BHT0*VPDMB	188.92	BHT0*VPD	43.43	BHT0*VPD	43.45
2	BHT1*VPDMB	BHT1*VPDMB	188.81	BHT1*VPDMB	43.50	BHT1*VPDMB	44.12
3	BHT2	BHT2	79.55	BHT2	126.55	BHT2	122.00
4	BHT2*BBCMB	BHT2*BBCMB	79.55	BHT2*BBCMB	90.59	BHT2*BBCMB	118.75
5		BHT2*JP1	77.57	BHT2*JP1	121.08	BHT2*JP1	118.58
	Total		614.0		425.14		446.89

Cont...

● Run 13 / Run 12 Estimated Disk Space

Disk space is estimated based on the disk space consumed by the produced TTrees / log /etc for test samples and summed total integrated luminosity of each HT triggers of QA'd run list used for W AL analysis.



Luminosity Information :

<http://www.star.bnl.gov/protected/common/triggerPages.html>

Method of Calibration

● Relative Calibration : MIP

- Determine relative calibration constant for each BEMC tower using MIP ADC values.
- Fit MIP ADC spectrum with appropriate fitting function and extract ADC value from fitted parameters. (“gaus” + “Landau”)
- QA fit results in order to find good / bad towers.

● Absolute calibration : Electrons

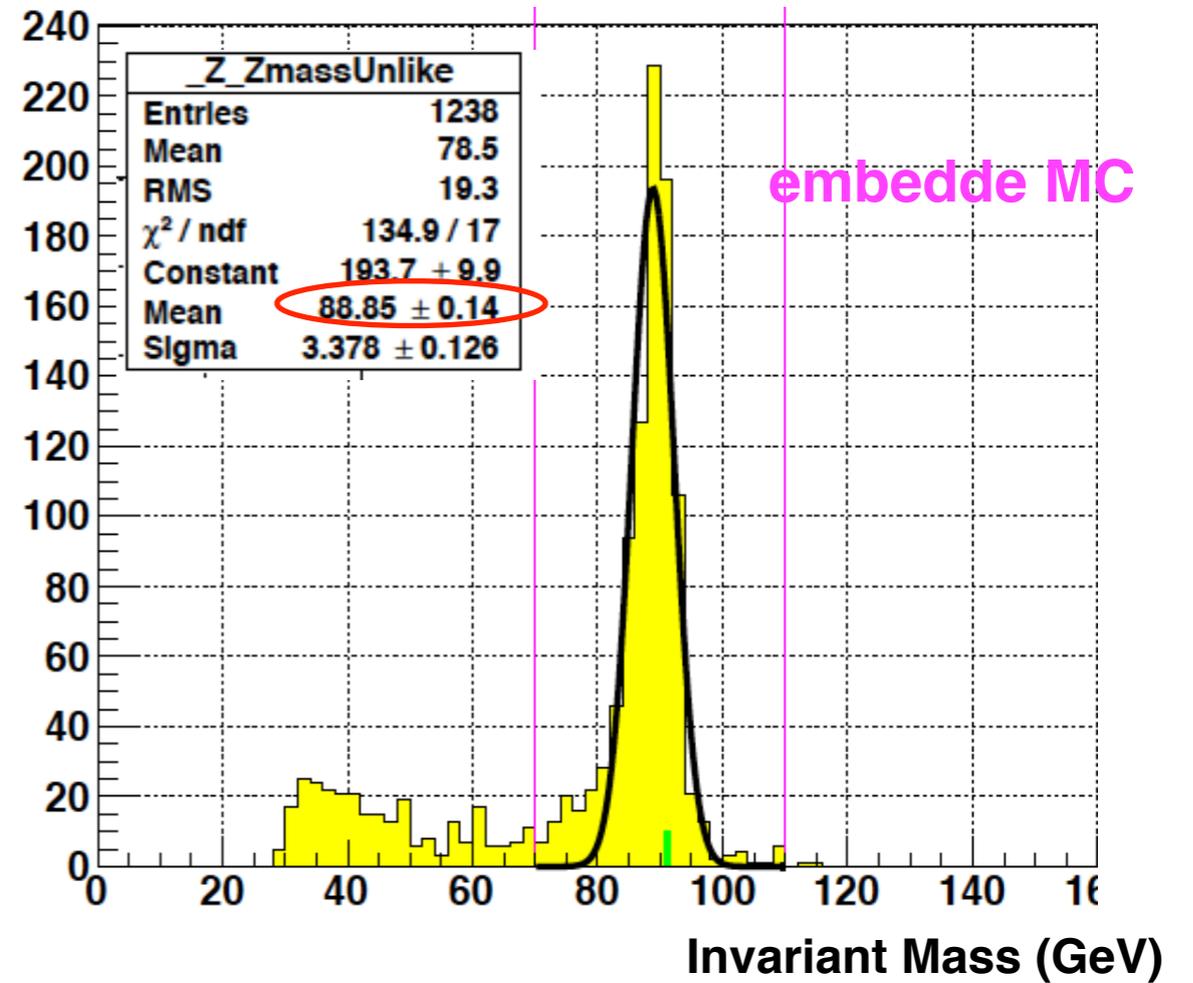
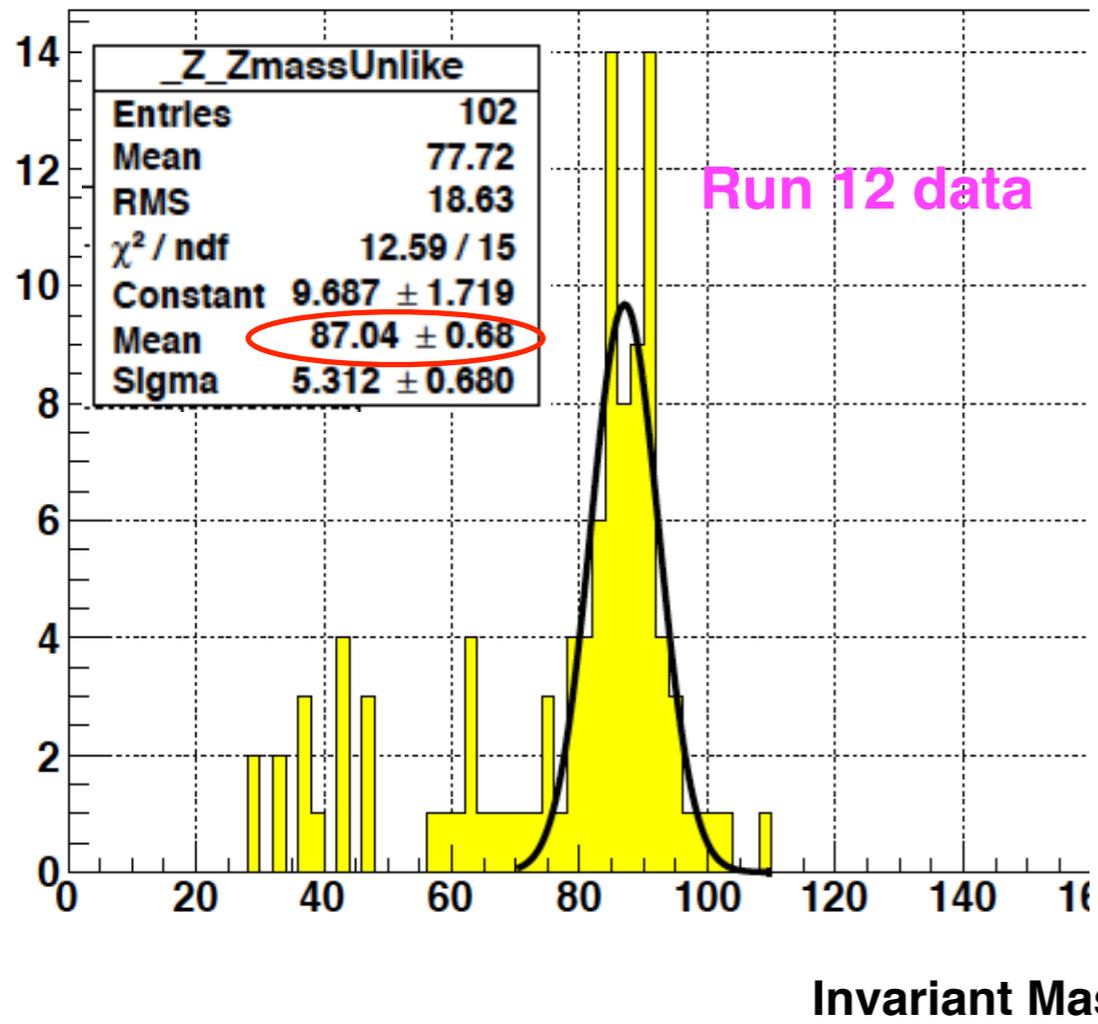
- Group electrons by eta ring (120 towers at same eta) and crate slices (8 towers at same eta and same crate)
- Obtain E/P distribution (in different track momentum region required by the final trigger options used) for these electrons and fit with appropriate fitting function. (gaus +expo)
- Extract mean value of E/P [ratio between relative and absolute gain constant] from E/P distribution .

Summary

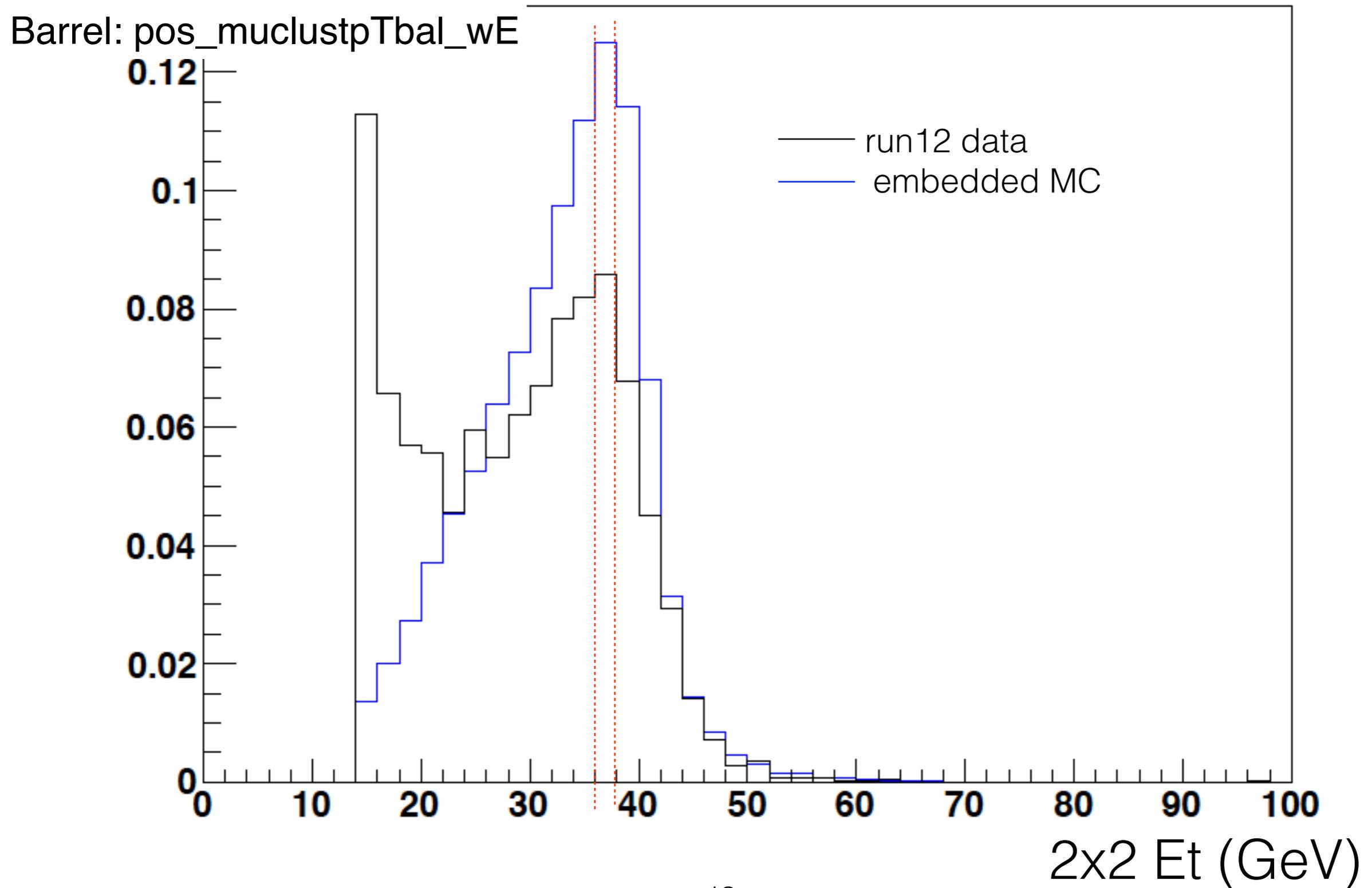
- ❖ Collected total integrated Luminosity at STAR increased enormously since the only/ last pp500 BEMC calibration.
- ❖ Run 13 W AL analysis shows evidence (Z invariant mass peak shift, W-jacobian peak position shift) for the need of a new calibration beyond the last Run 9 calibration.
- ❖ Estimated disk space for Run13 / Run12 BEMC calibration is ~ 7 TB.
- ❖ An updated calibration software / method is available from Kevin's run 12 pp200 GeV calibration.
- ❖ An updated calorimeter calibration is clearly needed for analyses like W-analysis which drastically depend on BEMC.
- ❖ Questions:
 1. Documentation of pedestal behavior (Stability etc.) of BEMC and EEMC tower response and comparison to data base entries ?
 2. Status of EEMC tower calibration? Who?
 3. Status of EEMC SMD calibration? Who?
 4. When will 200GeV / Run 12 calibration tables be uploaded?

Back up

Run 12 Z Mass Distribution

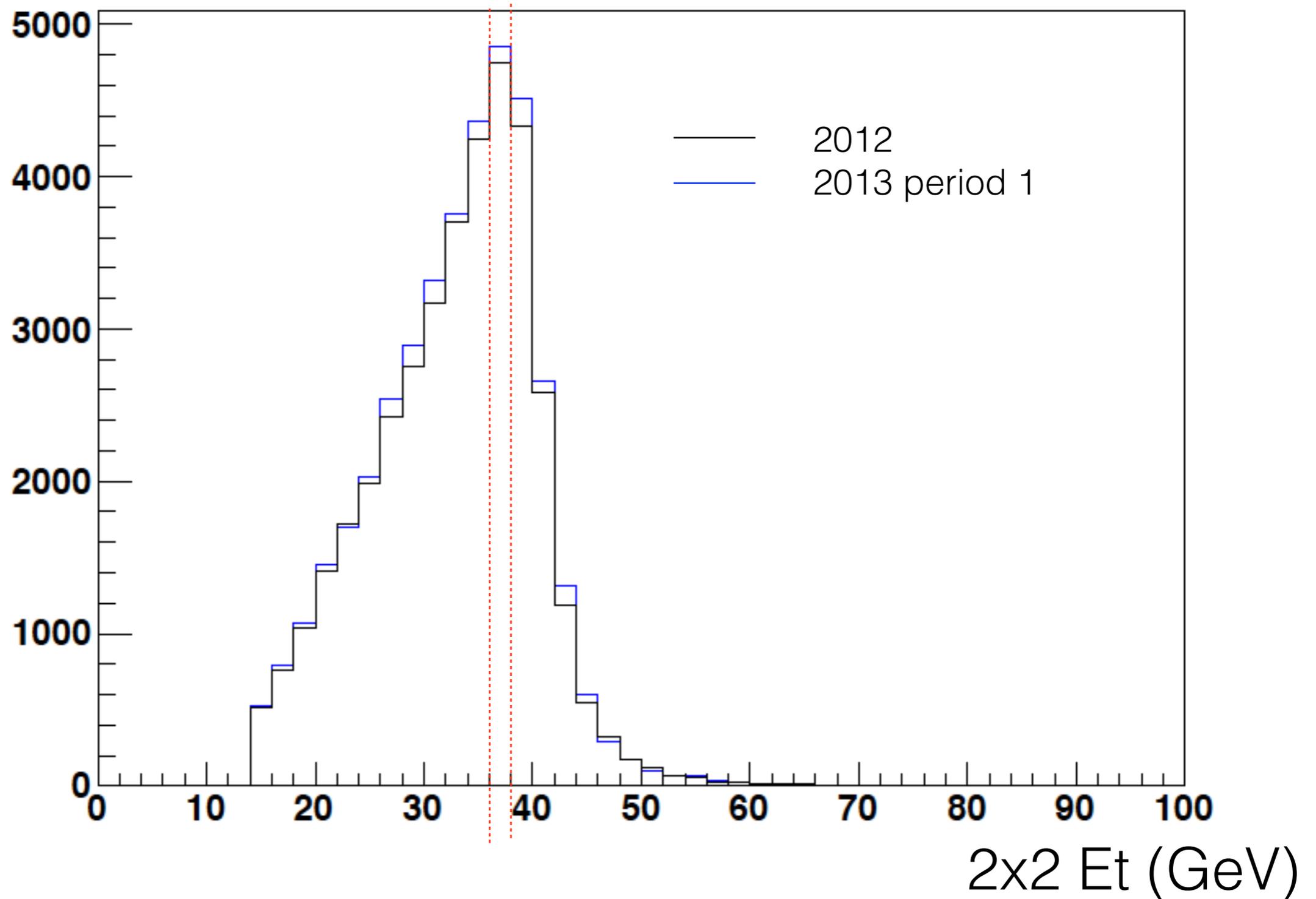


Run 12 - Jacobian peak



Run12 / Run 13 $W^+ \rightarrow e^+ \nu$ MC

Barrel: pos_muclustpTbal_wE



If BHT2*JP1 is excluded....

Disk -space

- run 13 - period 1 : 1.5 TB
- run 13 - period 2 : 1.6 TB
- run 12 : 2.5 TB

Total ~ 5.5 TB