W asymmetry studies

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What we have

- **Volodymyr and I met W/Z analysis people at CERN.**
- **05.07.2017 I was given a full set of codes and Maria helped me to run it.**
- **One of the main parts dedicated to signal extraction. It selects ntuples and performs a signal extraction to get yield values for the various decay products:**

  1) **For Wenu, the yield is calculated from a fit to the recoil-corrected signal MC template, an analytic QCD background model, and other background templates from MC with a fixed cross section ratio to our signal.**

  2) **For Wmunu, the yield is calculated from a fit to the recoil-corrected signal MC template, a QCD background model generated from an anti-isolation selection sample, and other background templates from MC with a fixed cross section ratio to our signal.**

- **Existing code produces plots of missing E_T for the whole eta region. Maria suggested that I might be needed to determine eta region and make same plots but for each region**

Missing transverse energy

- The recoil to the vector boson is defined as the negative of the vector sum of transverse energy vectors of all particles reconstructed with the PF algorithm in W and Z events, after subtracting the contribution from the daughter leptons(s).
- Then, the distribution of the recoil components are fitted (parallel and perpendicular to the boson p_T direction) with a triple Gaussian , whose mean and width vary with the boson transverse momentum.

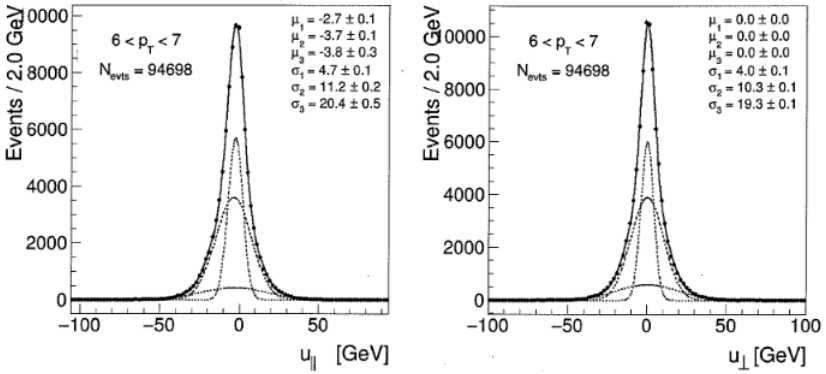


Figure 2: Results of the recoil calibration using events in data. 2a and 2b are examples of the double Gaussian fits.

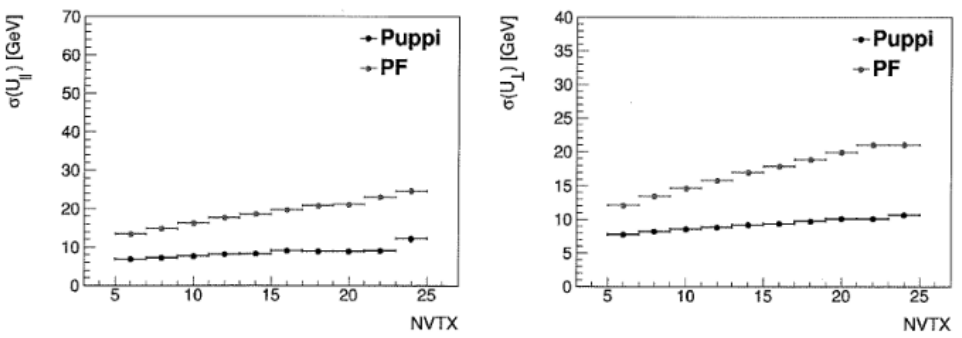


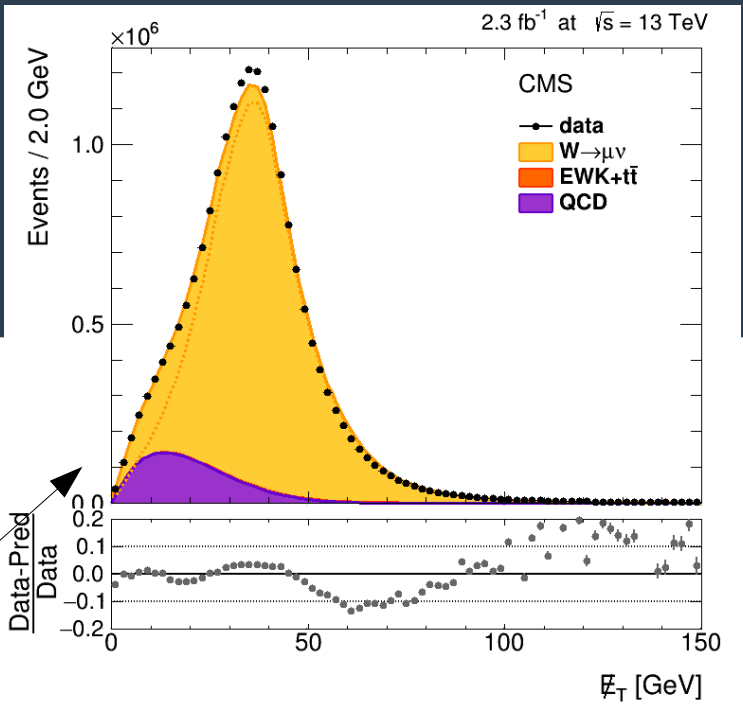
Figure 3: Results of the recoil calibration using events in data. 3a and 3b are the response of the recoil parallel and perpendicular components.

Signal extraction

- **The W boson candidate events are required to have an identified electron or muon**
- **The W boson signal and background yields are obtained from the $E_{miss\ T}$ distributions using a unbinned maximum likelihood fit. Background from W→tau nu , Drell_yan, diboson and ttbar became significant in at high $E_{miss\ T,}$ contributing about 10% of the total selected yield.**
- **The $E_{miss\ T}$ model is fitted to the observed distribution as the sum of three contributions:**

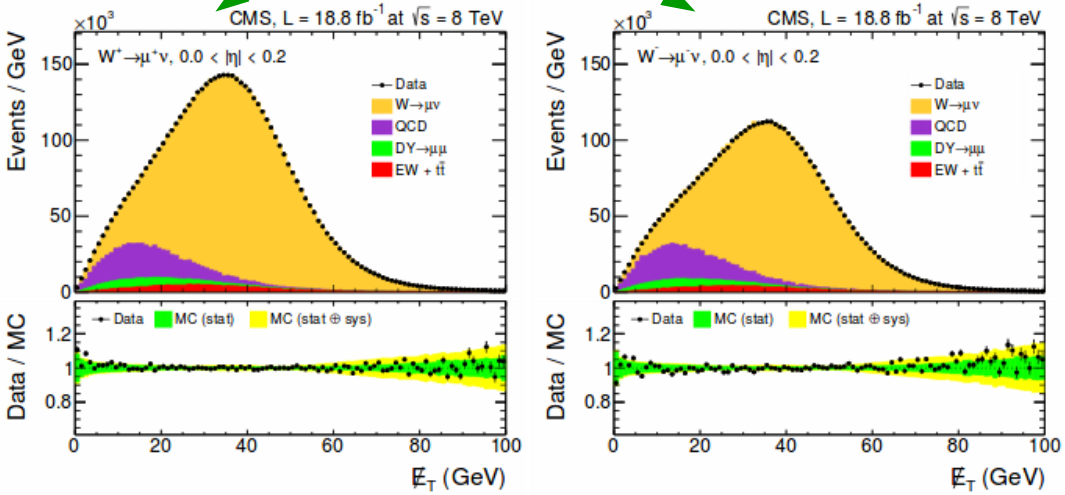
  1) **The W boson signal**
  2) **QCD background**
  3) **Other backgrounds**

What we have



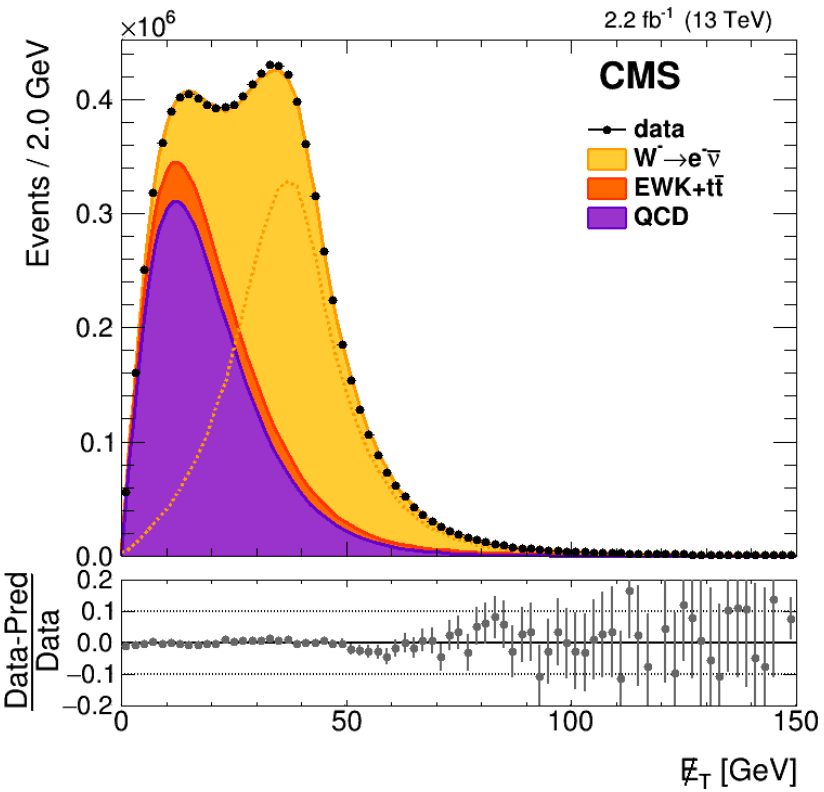
- **Existing code produces plots of missing E_T for the whole eta region. Maria suggested that I might be needed to determine eta region and make same distributions but for each region.**

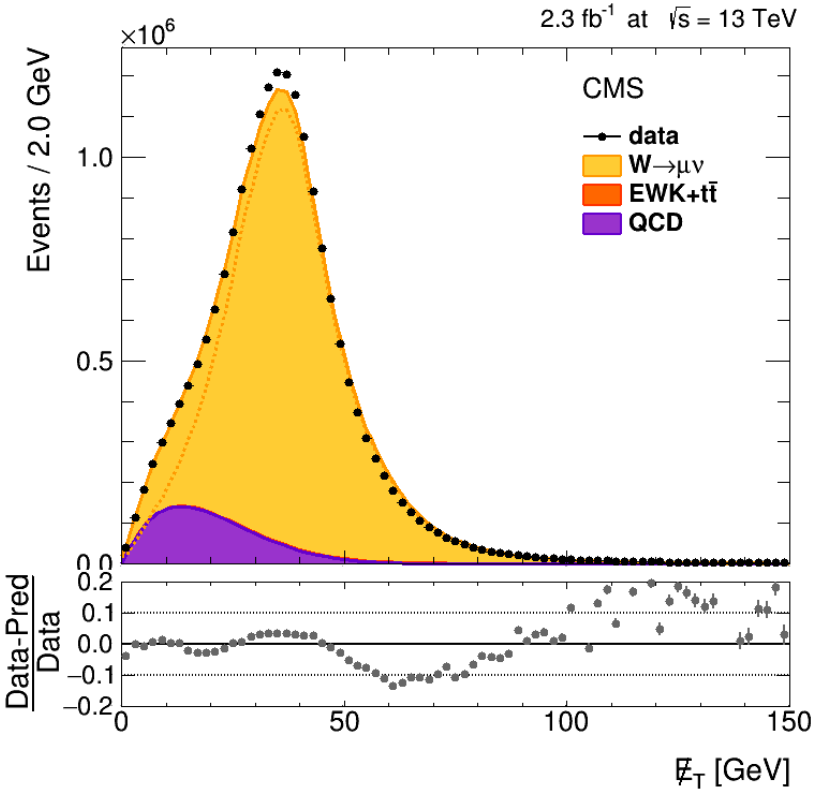
$\|\eta\|$ bin	χ^2 ($n_{dof} = 197$)	N^+ (10^3)	N^- (10^3)	$\rho_{+,-}$ (%)
0.00–0.20	238	4648.5 ± 4.2	3584.9 ± 3.8	18.9
0.20–0.40	242	4414.5 ± 4.0	3360.9 ± 3.7	18.8
0.40–0.60	248	4893.8 ± 4.3	3692.5 ± 3.9	18.9
0.60–0.80	199	4900.1 ± 4.3	3621.3 ± 3.8	19.2
0.80–1.00	218	4420.8 ± 4.0	3218.0 ± 3.6	18.7
1.00–1.20	204	4235.7 ± 3.9	2949.2 ± 3.4	18.5
1.20–1.40	193	4176.8 ± 3.9	2827.0 ± 3.5	19.3
1.40–1.60	213	4351.2 ± 4.2	2864.7 ± 3.7	19.3
1.60–1.85	208	4956.2 ± 4.4	3134.1 ± 3.9	19.5
1.85–2.10	238	5292.9 ± 4.4	3229.6 ± 3.8	18.5
2.10–2.40	229	4023.7 ± 3.9	2428.2 ± 3.3	17.6



What we can produce

- **The codes that works and produces plots**
- **Needed to be improved Chi/ndf**
- **Needed to be chosen eta regions**





Thank you for attention!