

# Study of Single-W process

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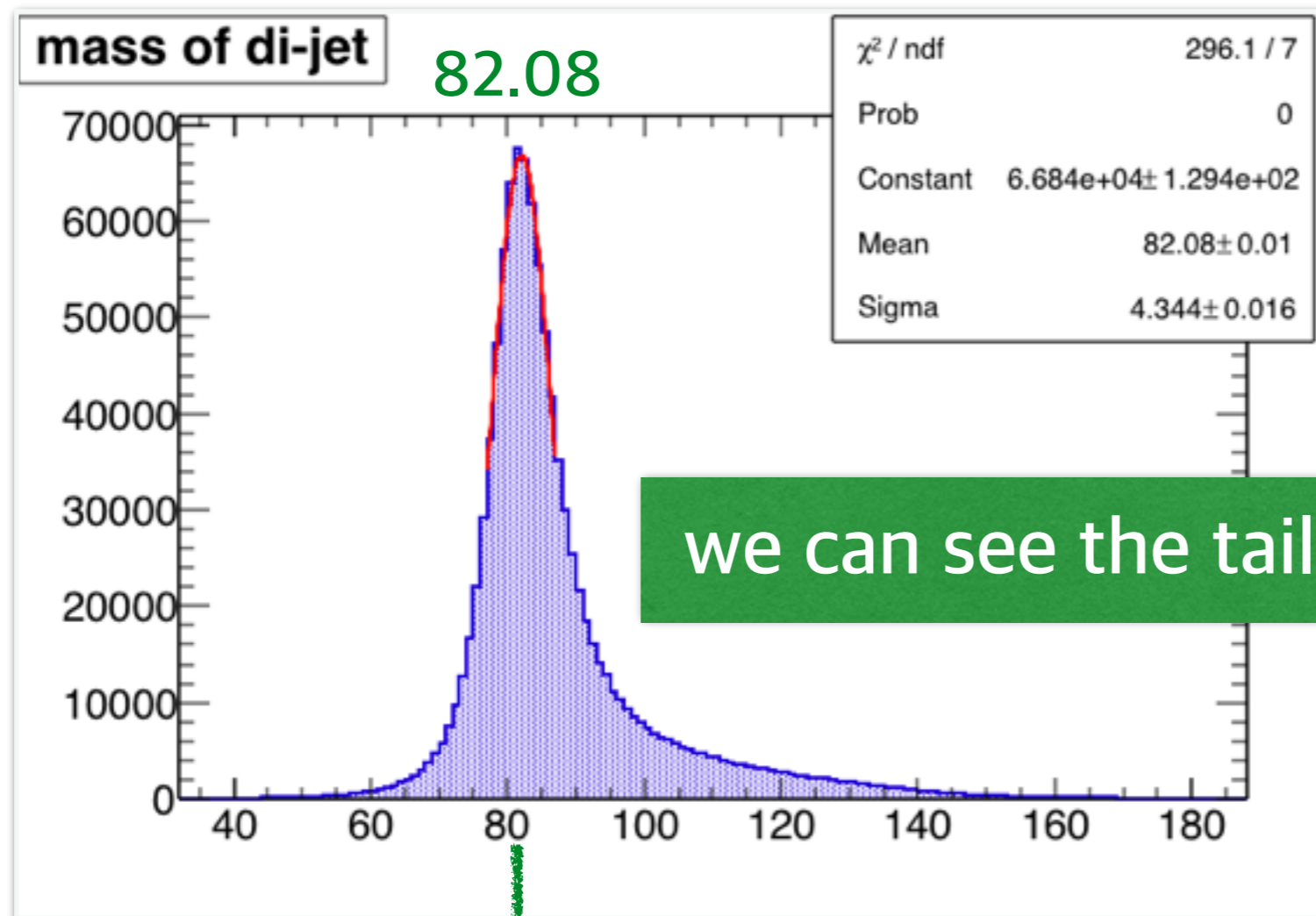
28th, November 2014 :

—> Current status & progress of my study

# Status

- generate 2 types of single W process events
  - $ee \rightarrow evqq$  (same as before)
  - $ee \rightarrow evW \rightarrow evqq$  (with restriction qq lines must be from W)
  - then, generator level analysis to compare them
- additional procedure for W mass reconstruction
  - ISR, overlays & isolated lepton have already been tagged
  - in addition to these, tag FSRs which came from isolated lepton

# Reconstructed W mass (last week)

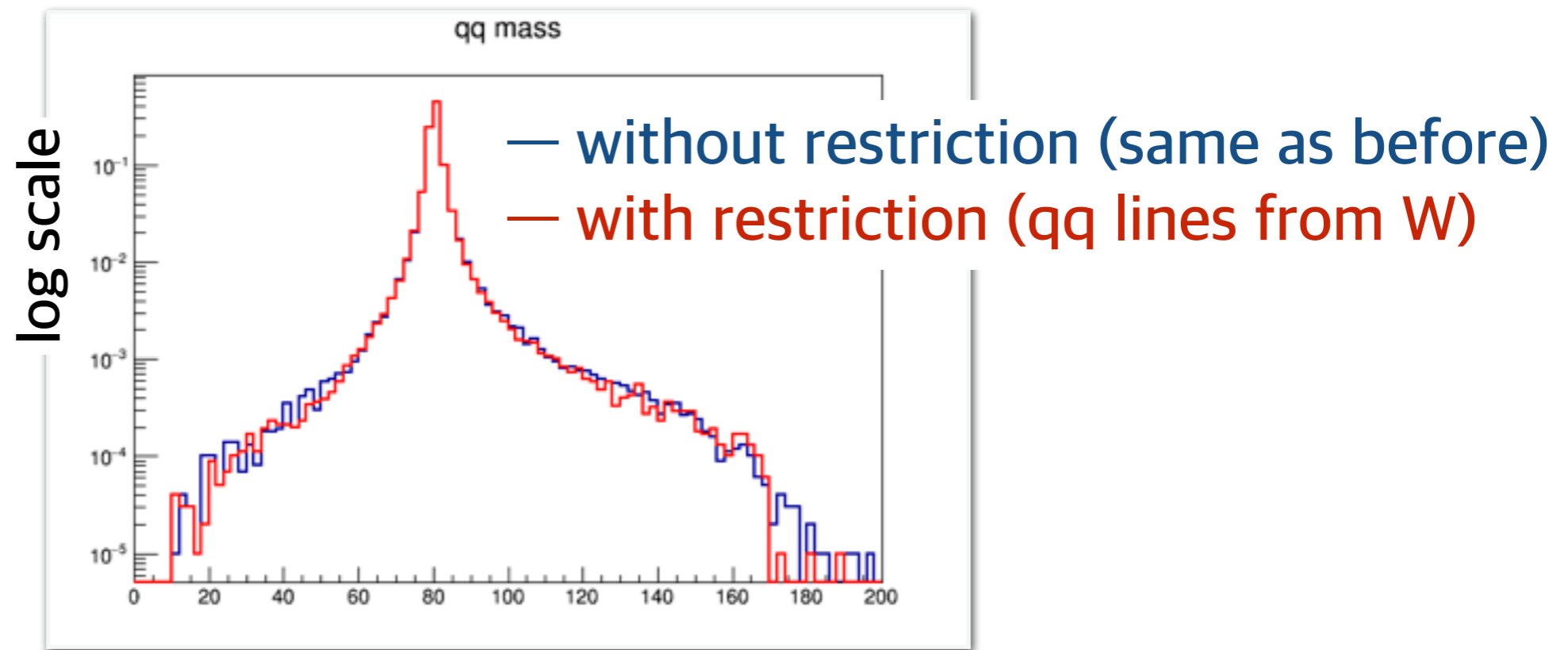


W mass = 80.5 (generator input)

There are still large( $\sim 2\text{GeV}$ ) systematic shifts

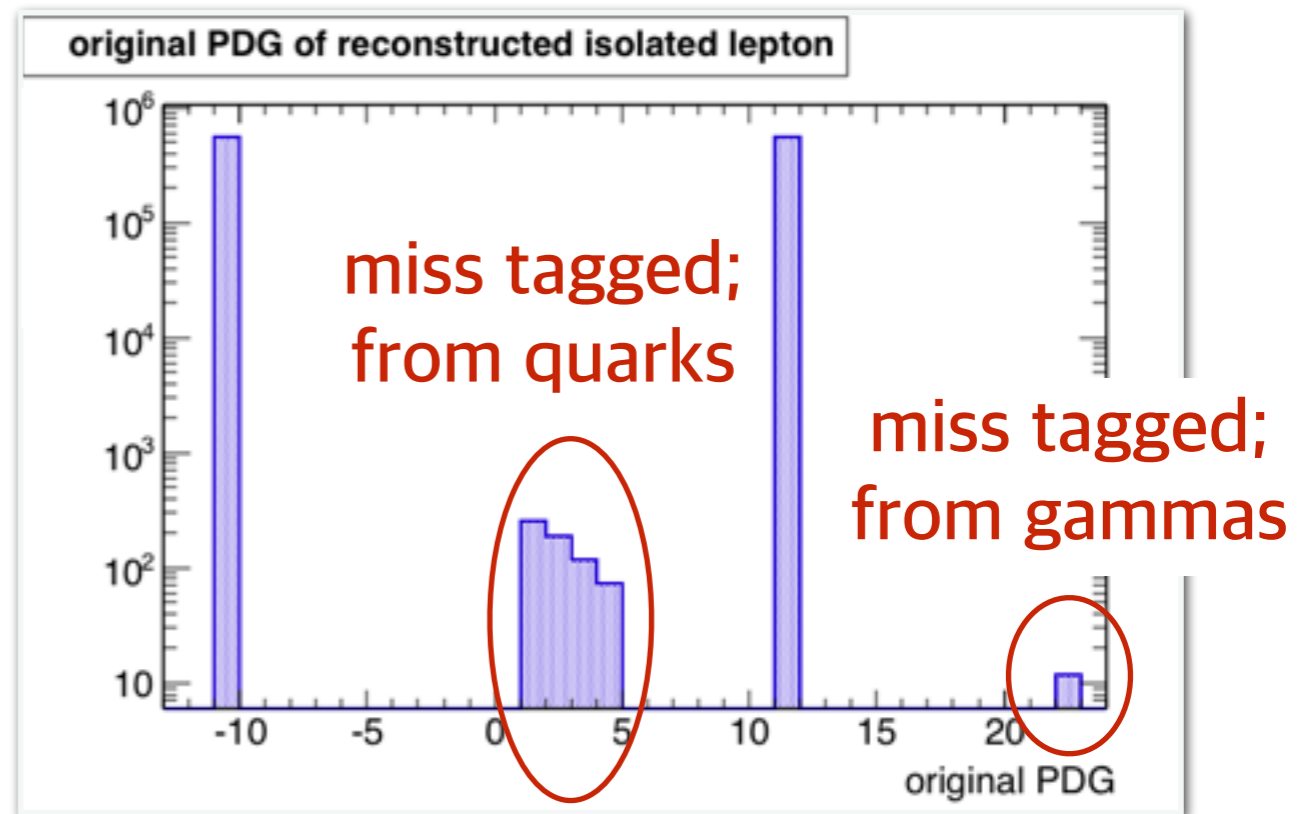
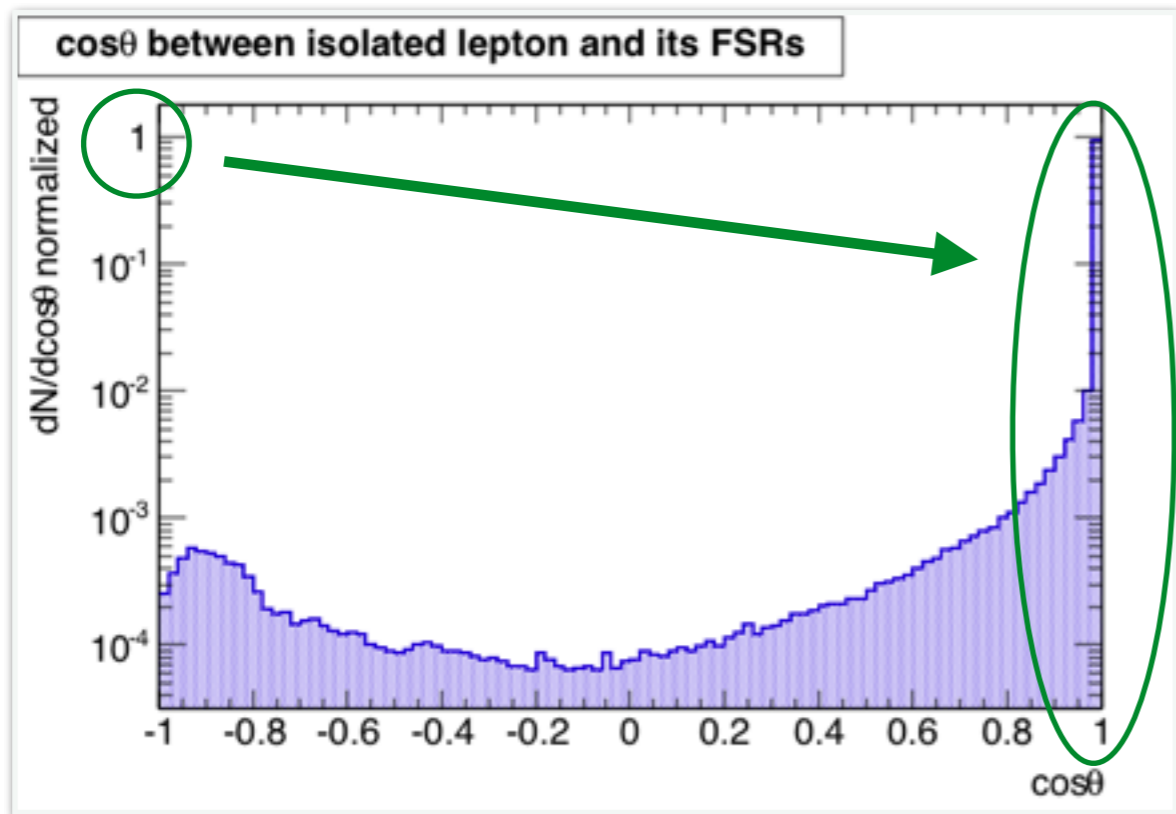
I need to investigate what these are caused by and their behaviors

# Generator level study



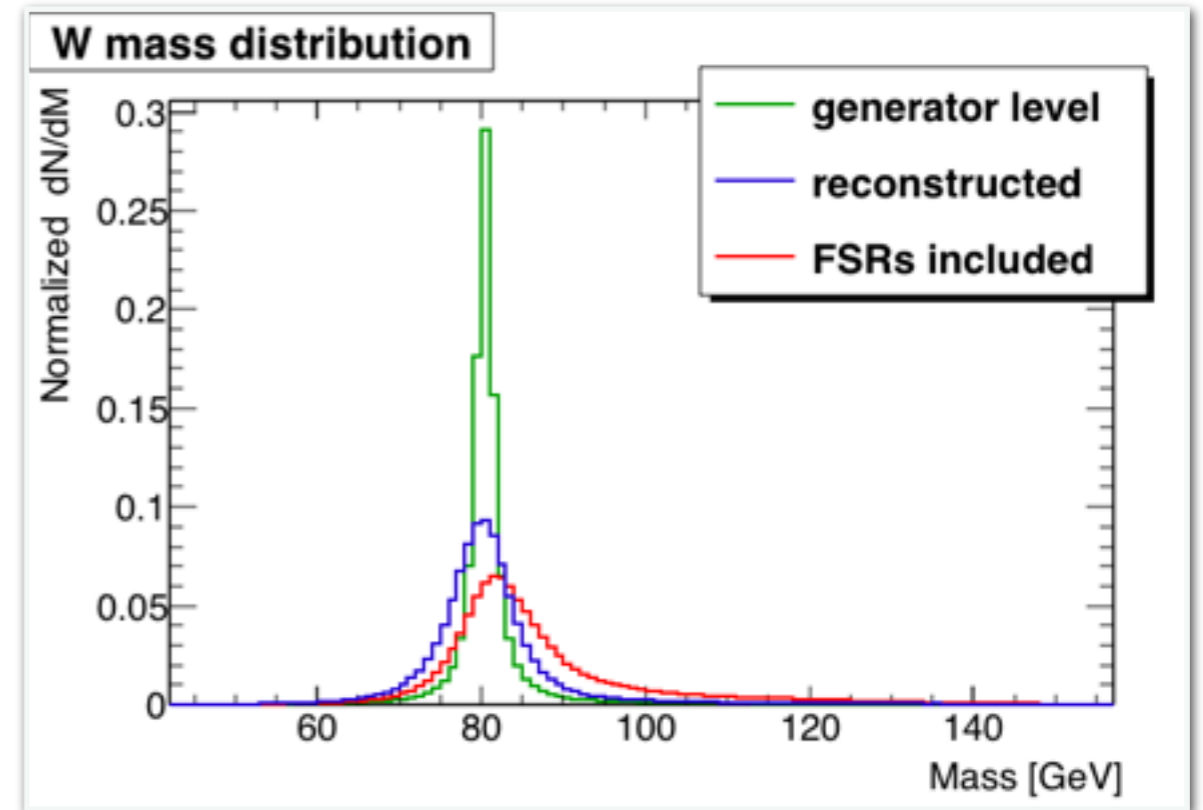
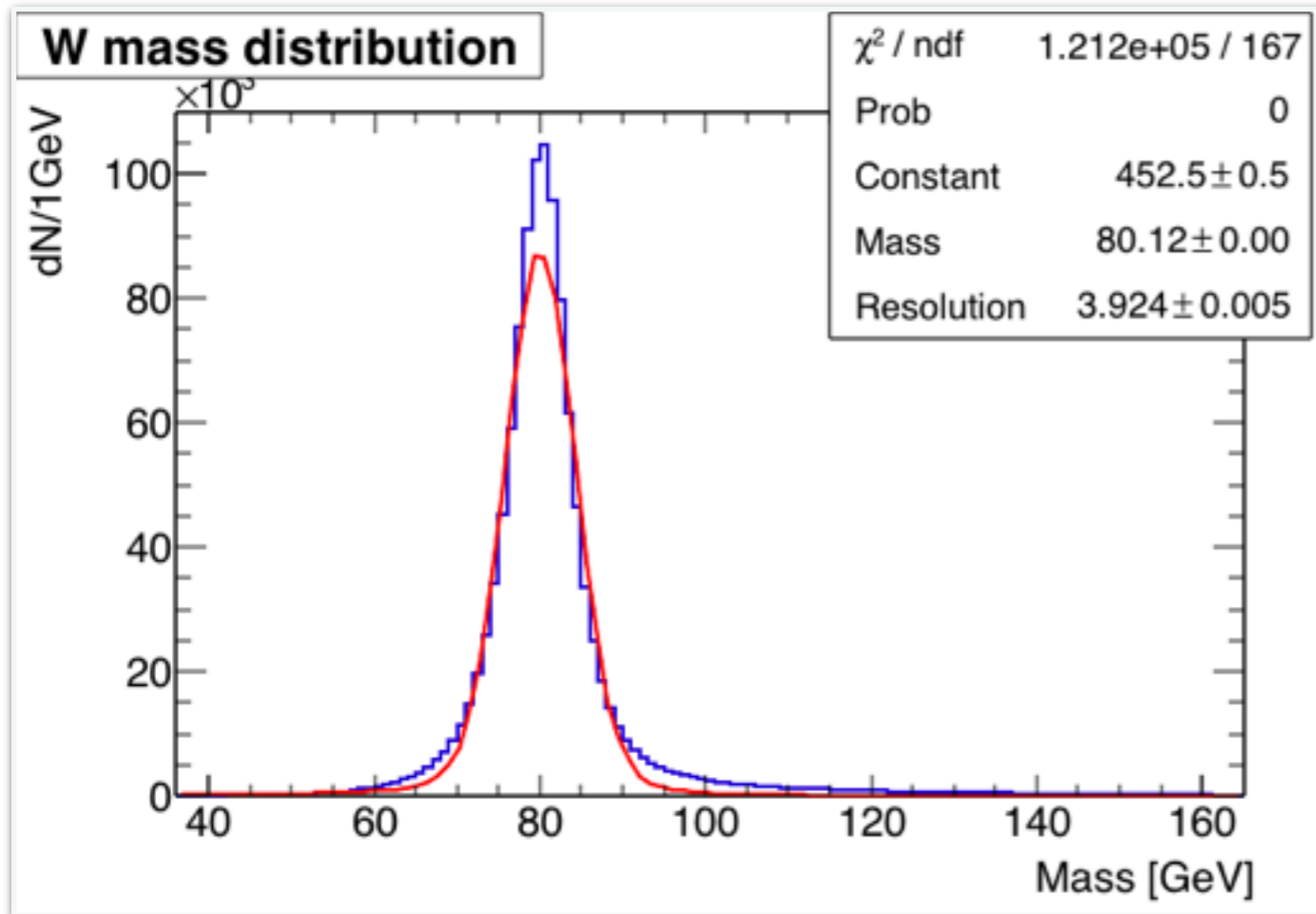
- contribution of  $ee \rightarrow qqW \rightarrow evqq$  diagrams are small enough
- so that the large tail shown in previous page doesn't come from these contributions
  - it is the matter of reconstruction scheme

# Tagging FSRs



- isolated lepton tag purity  $\sim 99.9999\%$   $\text{purity} = \frac{N_{MC\text{true}} \cap N_{\text{reconstruction}}}{N_{\text{reconstruction}}}$
- cosine of isolated lepton and its FSRs = 0.99
  - $\sim 95\%$  of FSRs are included
  - so I set this cut value to 0.99 (tagged FSR > 0.99)
- and simple particle identification cut (if photon)

# W mass distribution



comparison

$$m_w = 80.118 \pm 0.005 \text{ [GeV]}$$

fitted with convolution of relativistic Breit-Wigner  
plus interference term with Gaussian

**FSR tagging seems to work well !**

# Summary & Next

- generator level study
  - influence of the diagrams which have qq lines not from W propagator are small enough
- I tagged the FSRs of isolated lepton with cosine  $> 0.99$ 
  - ~95% of FSRs included in this cone
  - it seems to work well
  - but I have not check tag efficiency yet
- TO DO
  - realistic reconstruction for tagging ISR and overlays
  - systematic and statistic error study