Fast MC Simulation of the Scint/W EM Calorimeter

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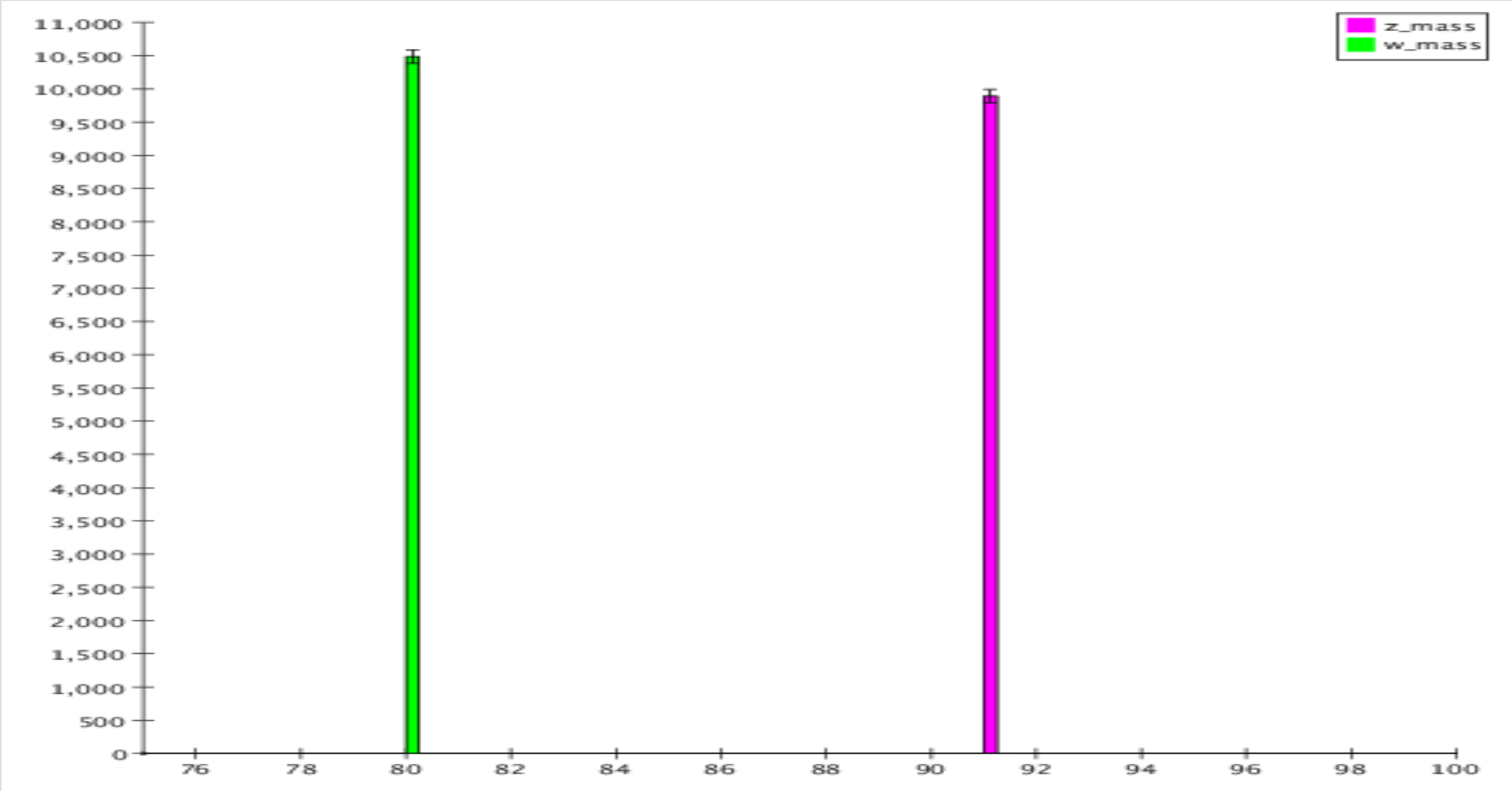
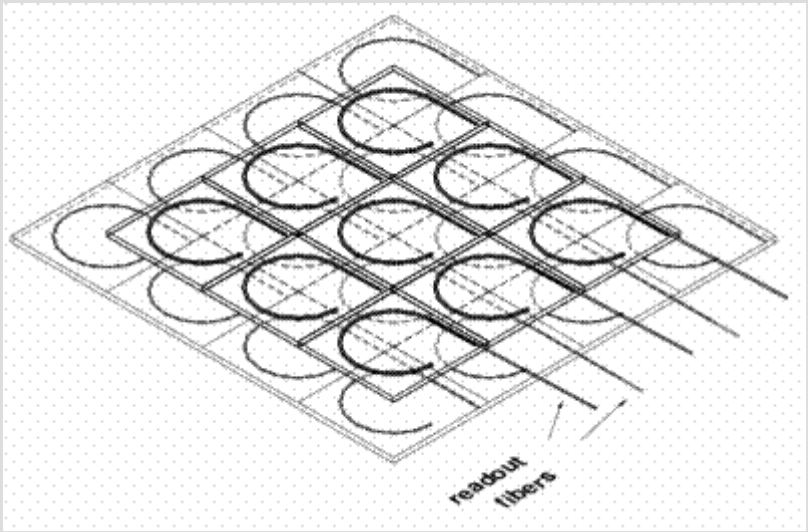
The Goal

W and Z mass peaks



The CU EM Calorimeter

- 40 layers, tungsten absorber and scintillator
- offset geometry
- projective geometry
- Segmentation: pi/128



Fast MC Overview

- Uses hep.lcd classes written by Tony Johnson Mike Ronan, et al
- Provides a less resource intensive alternative to full simulation
- assumes gaussian errors and smears particle data based on random numbers

Fast MC Methodology

- Charged particles leave tracks
- Photons leave EM Clusters
- Neutral hadrons leave HAD Clusters

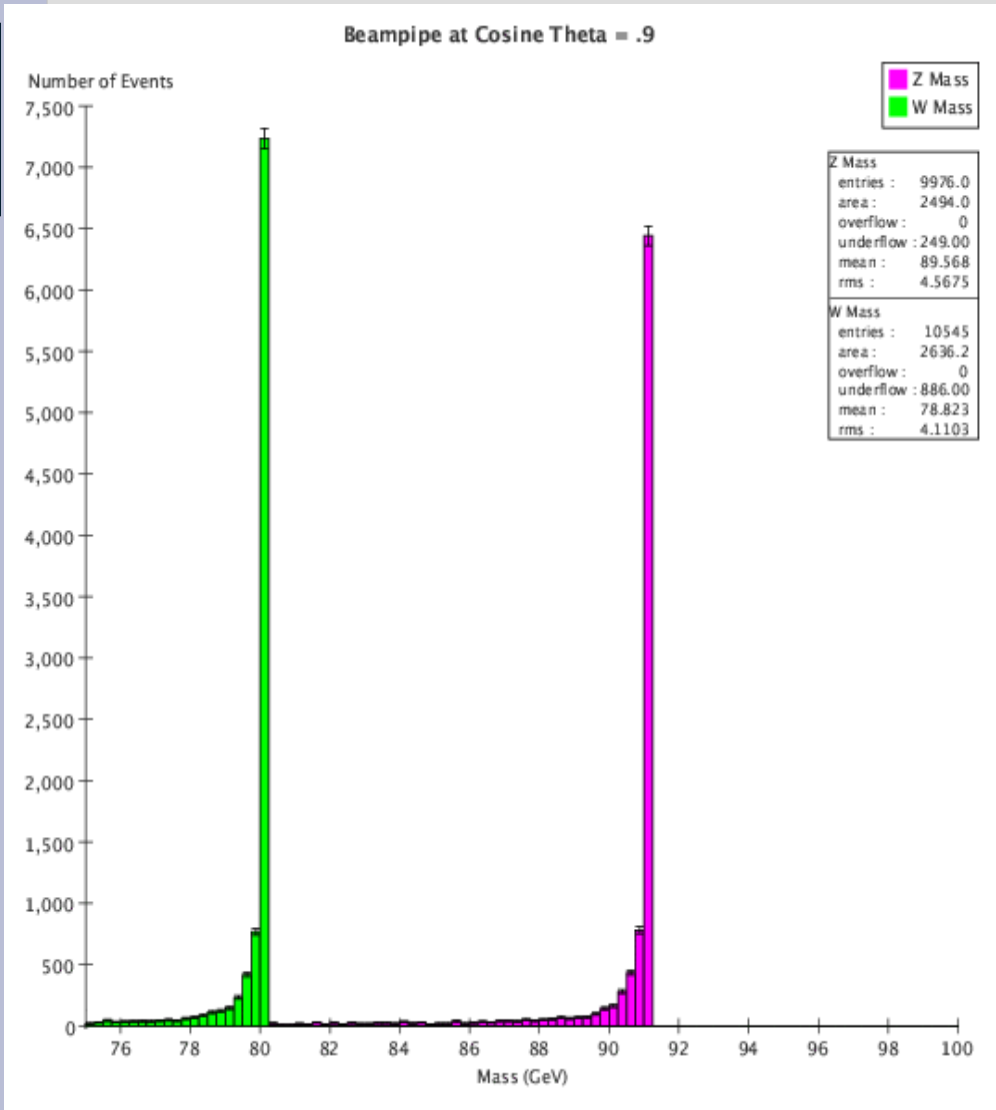
Modifications to FastMC

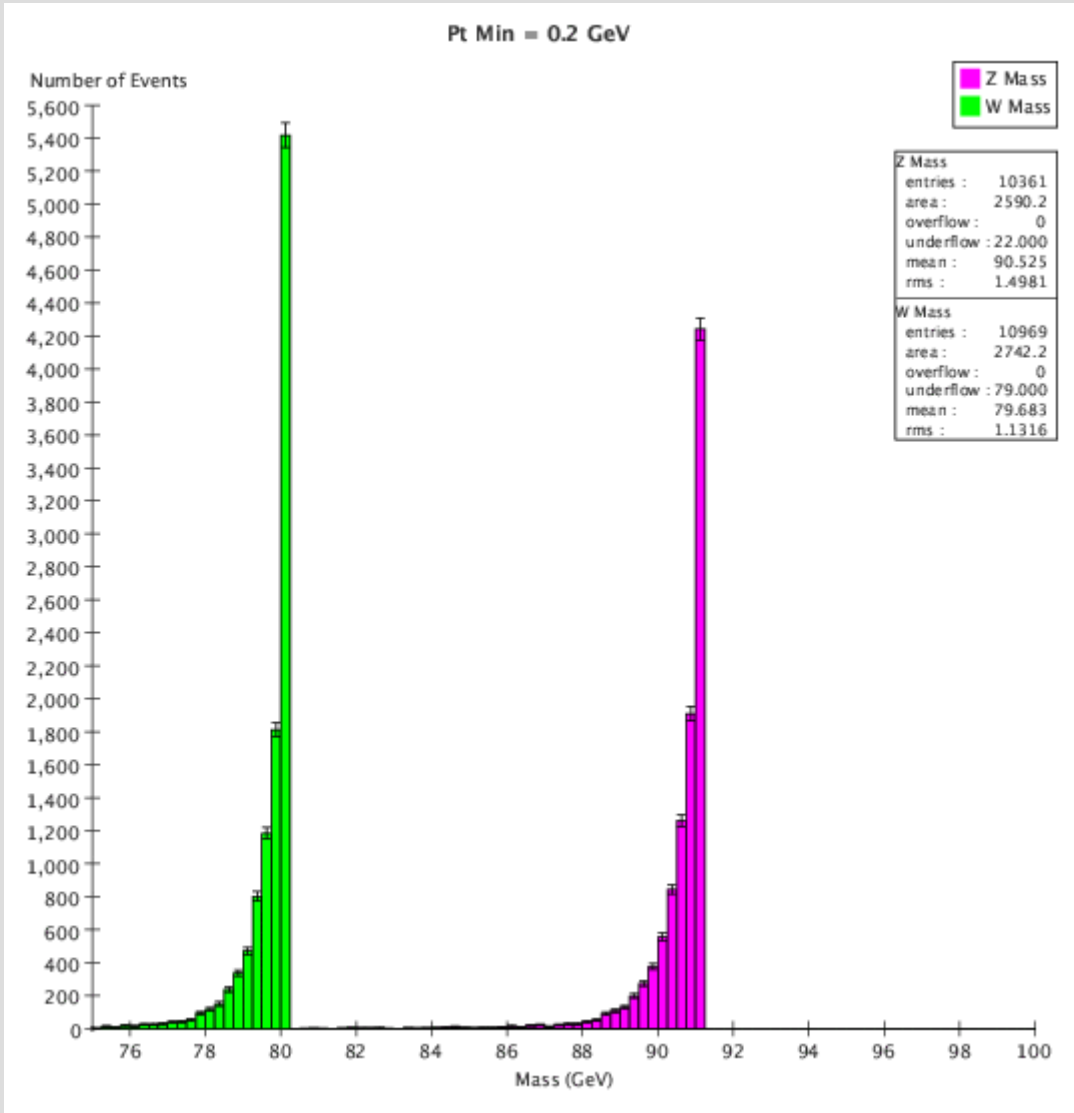
- Make EM Energy smearing a function cosθ
- Make EM spatial smearing a function of tile position

Inefficiencies

Beampipe

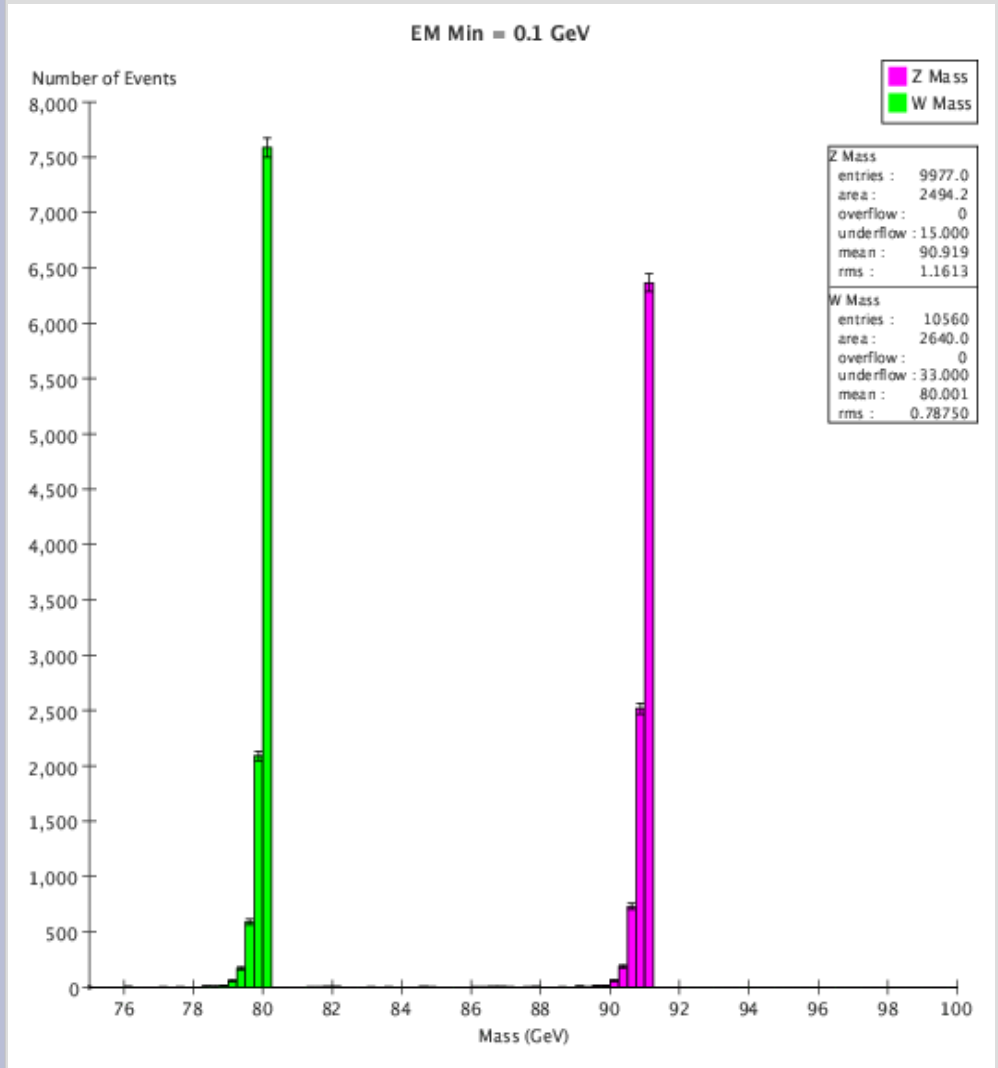
Pt min = 0.2 GeV



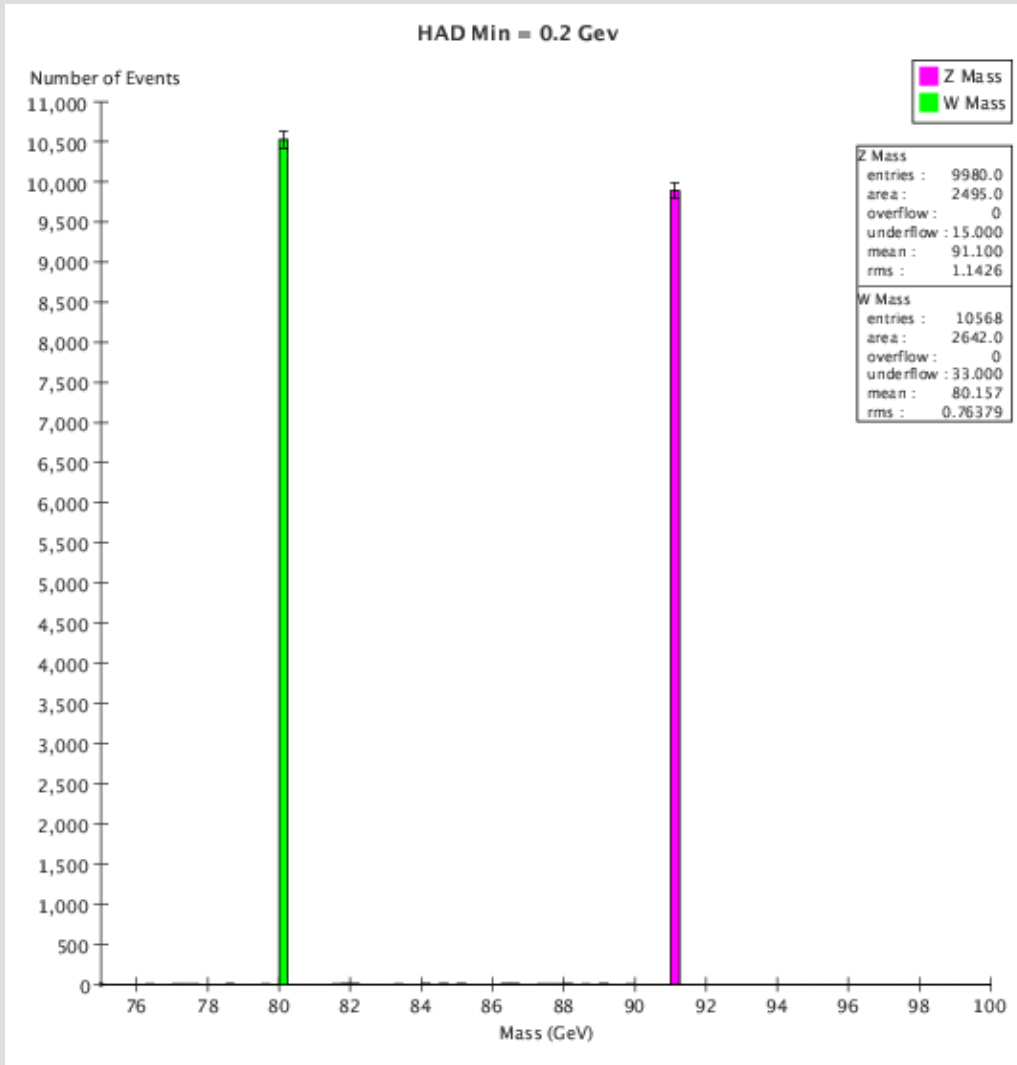


More Inefficiency

EM min = 0.2 GeV

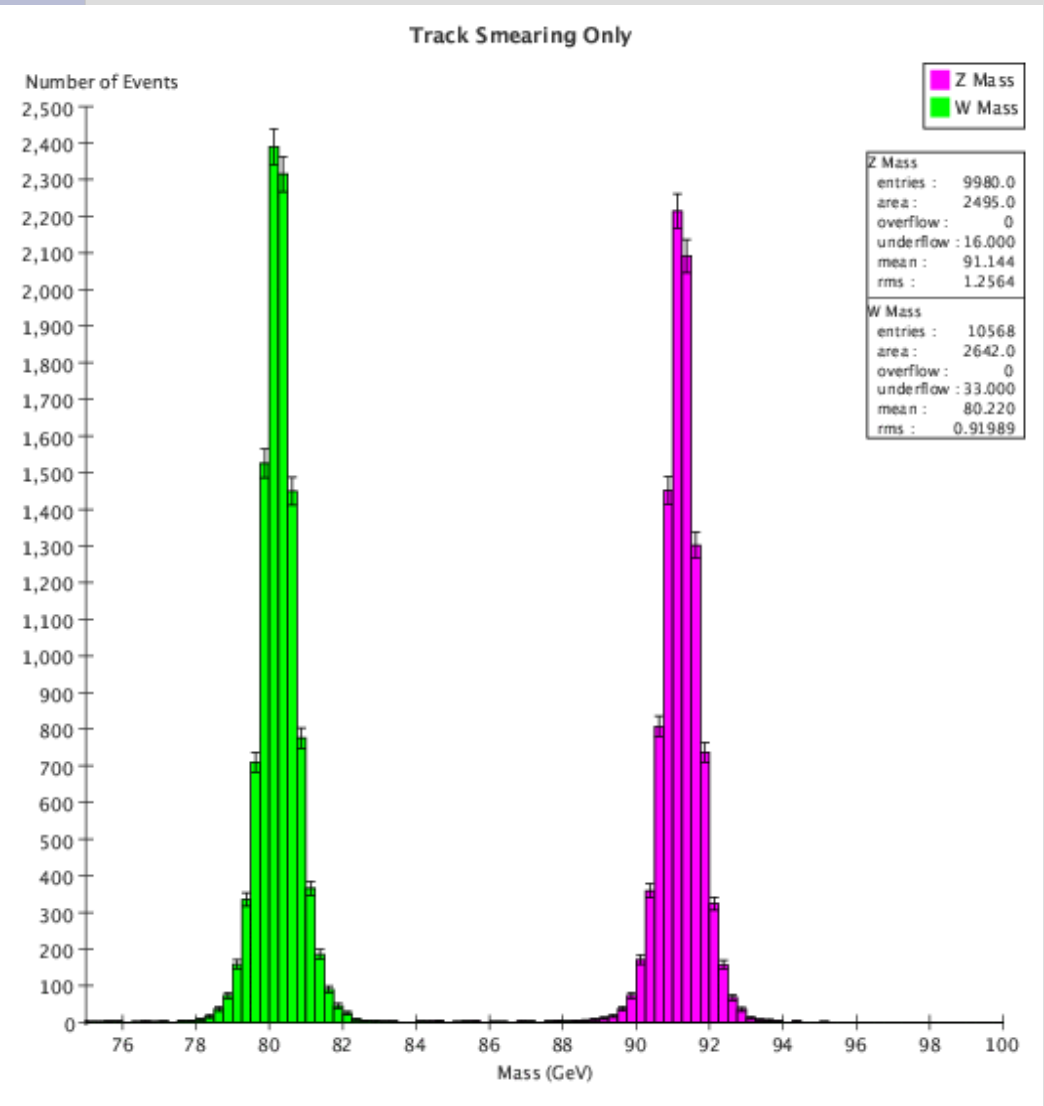


HAD min = 0.2 GeV

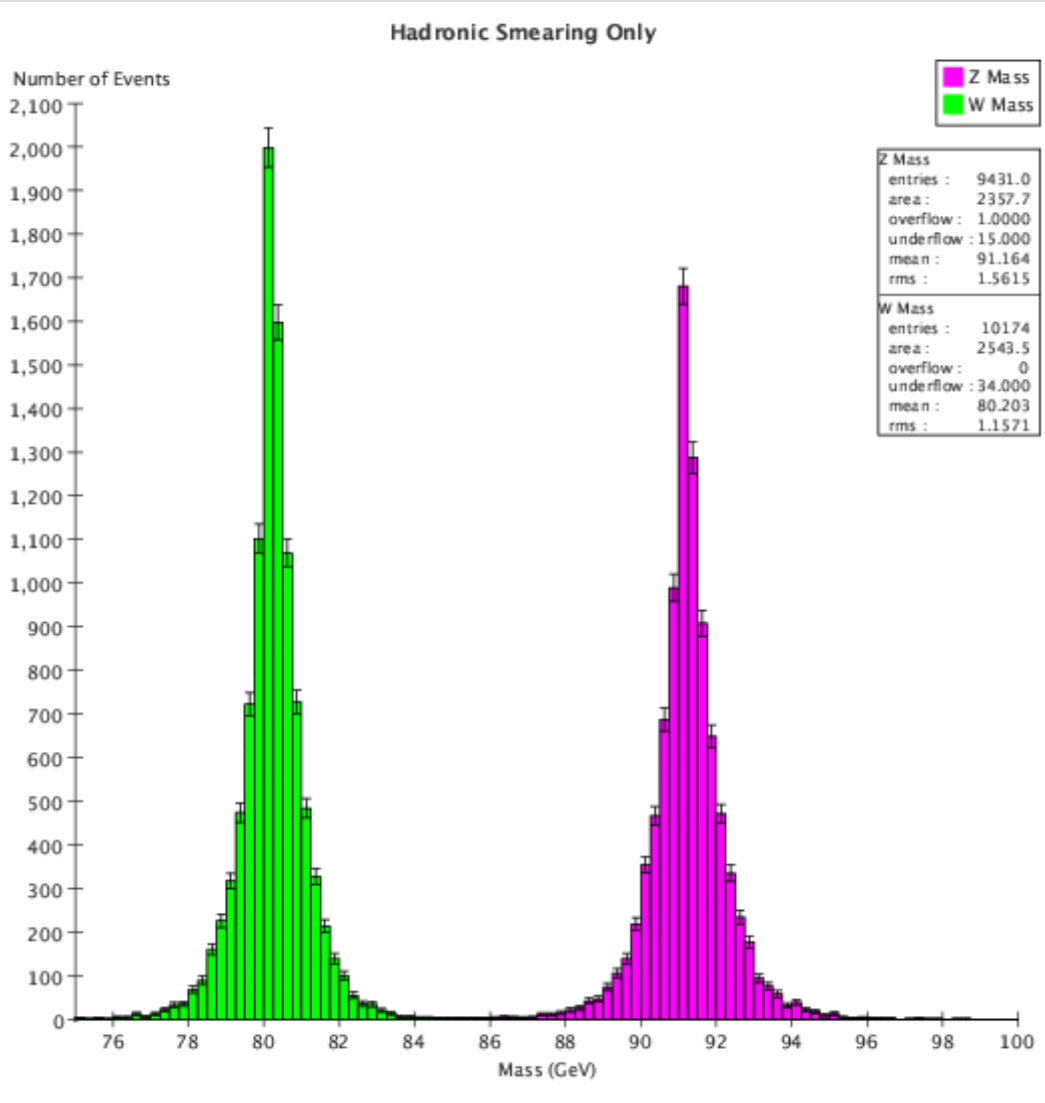


Track and HAD Smearing

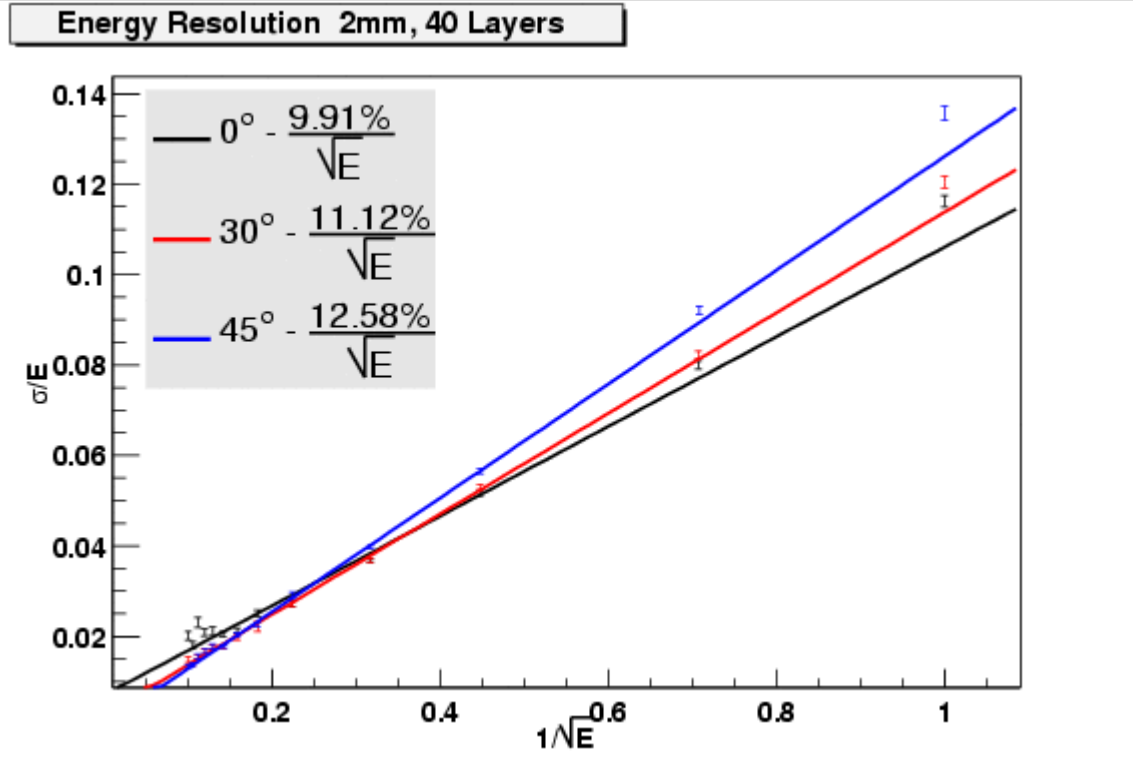
Track Smearing

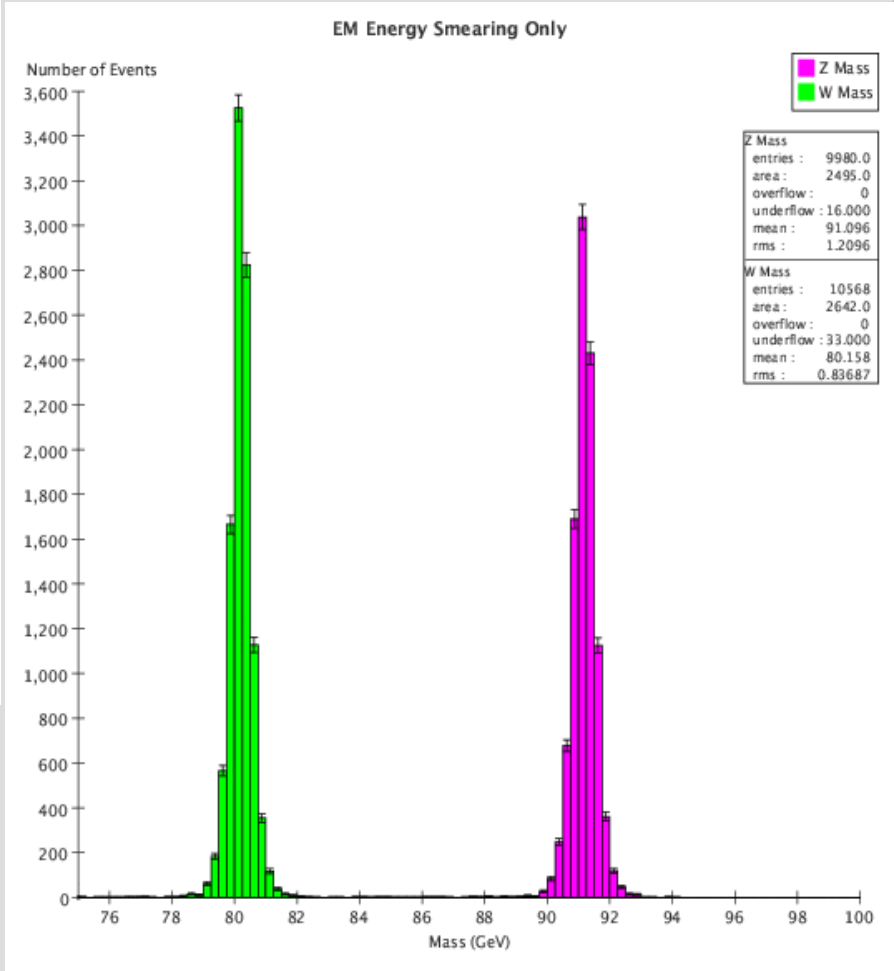


Hadronic Smearing



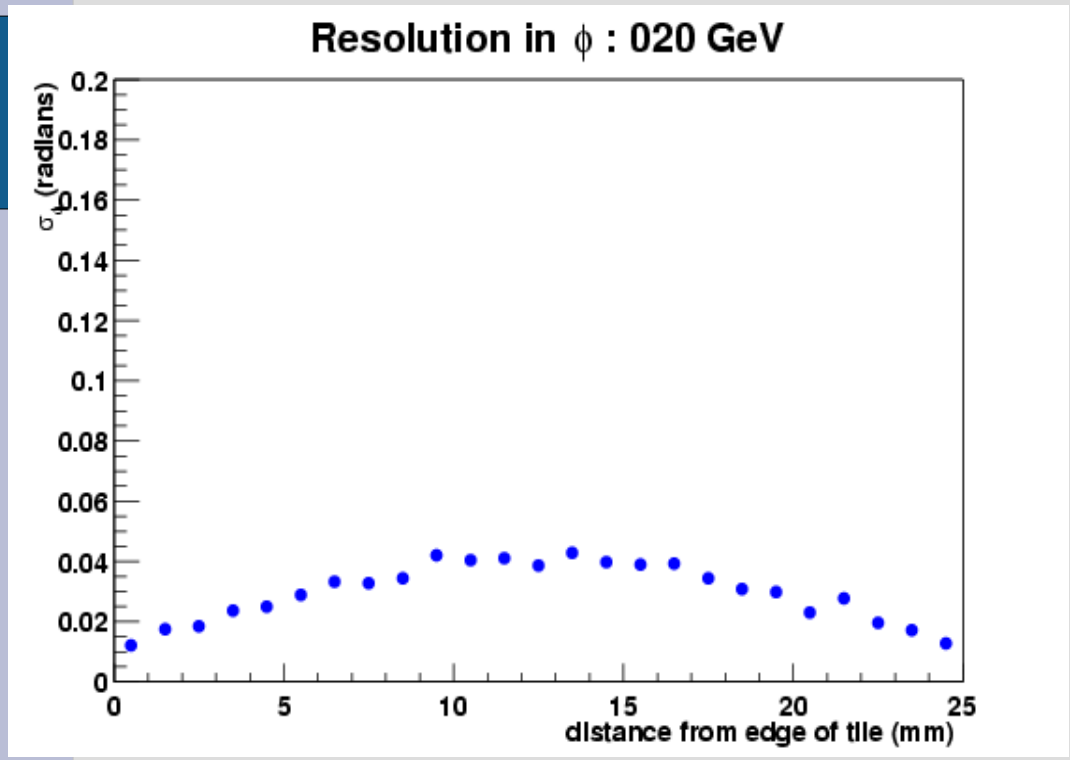
EM Energy Smearing

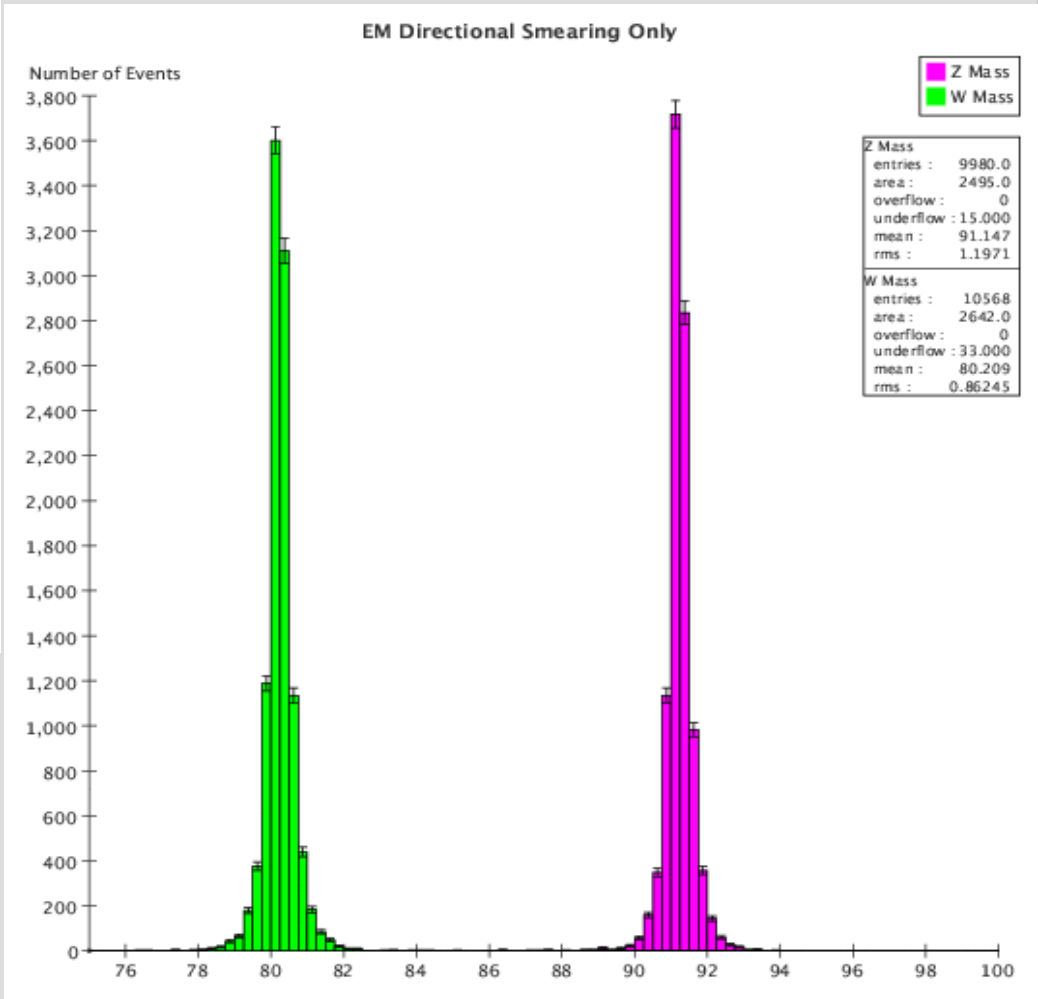




Attribution: Andrew Hahn, University of Colorado

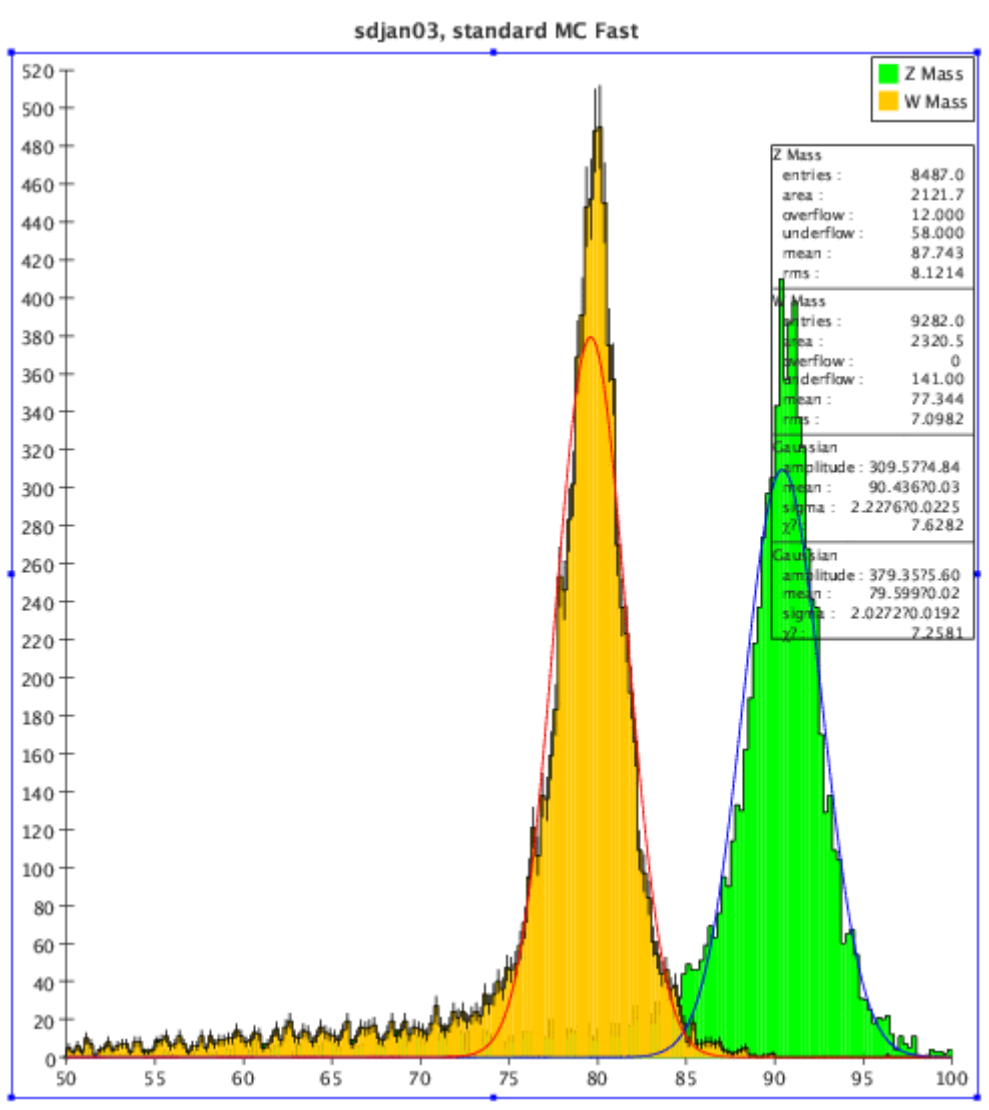
EM Spatial Smearing

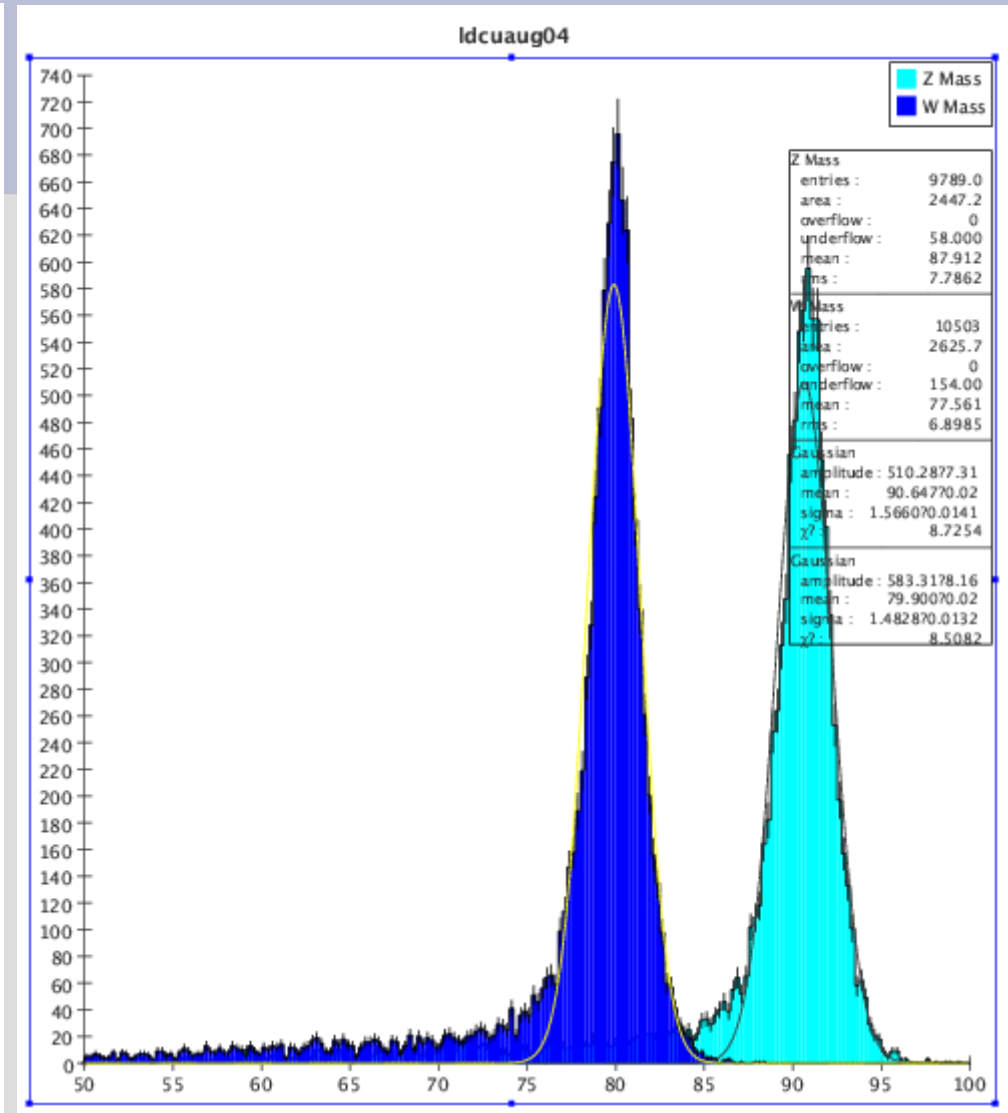




Attribution: Joseph Proulx, University of Colorado

Results





SDJan03:

W: Mean 79.6, Sigma 2.02

Z: Mean 90.4, Sigma 2.23

LDCUAug04:

W: Mean 79.9, Sigma 1.48

Z: Mean 90.6, Sigma 1.57