

Vertexing issues

Norman Graf

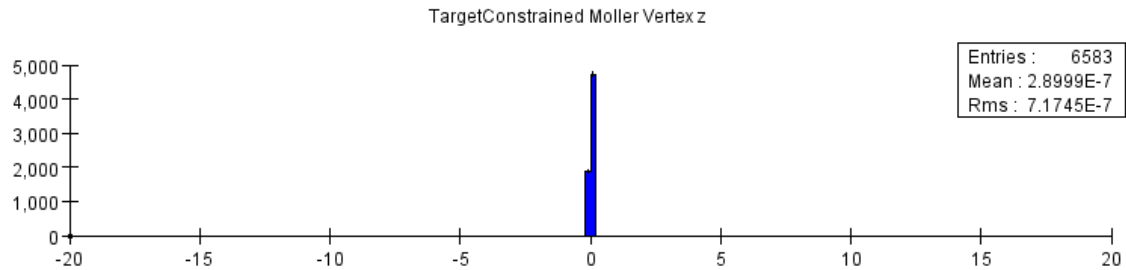
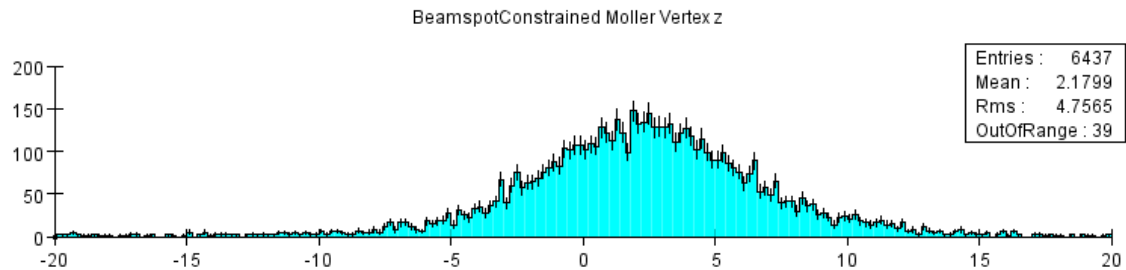
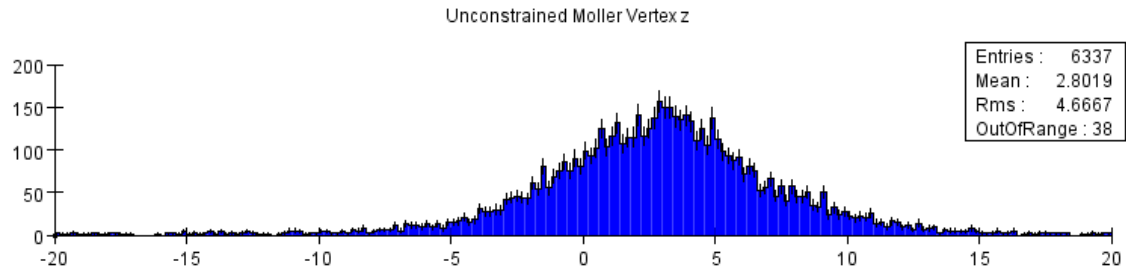
HPS Software Meeting

May 31, 2017

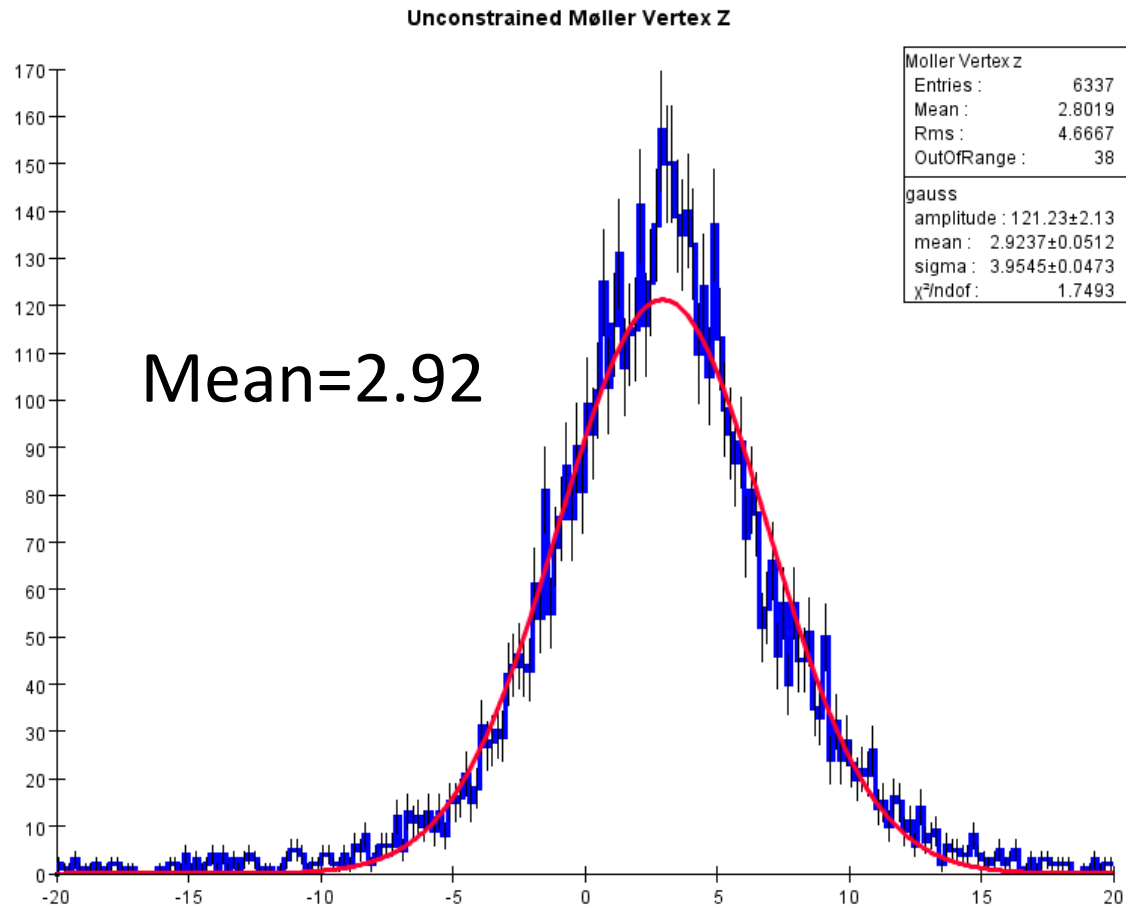
2016 Data tpass1 Møller Analysis

- Run over Møller candidates from 2016 tpass1
- Check possible improvements due to new alignment

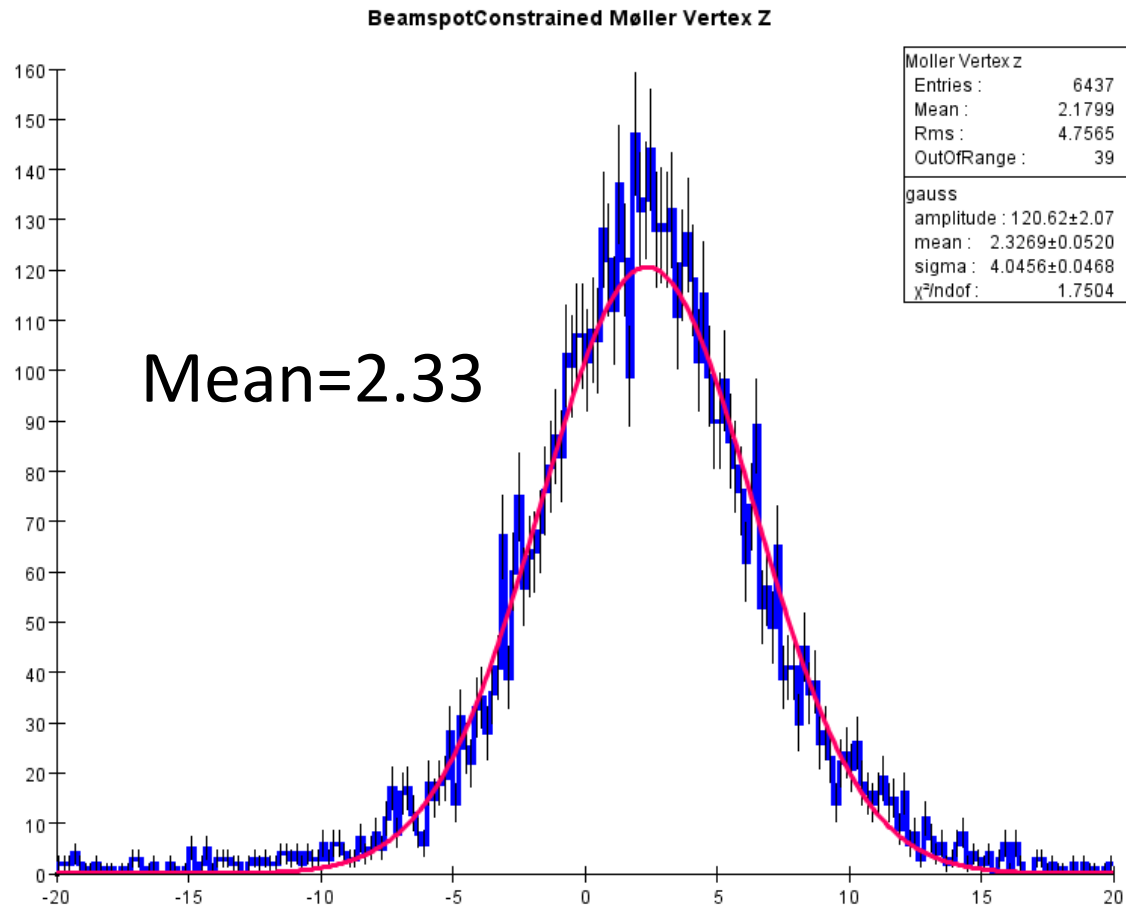
Møller Vertex Position



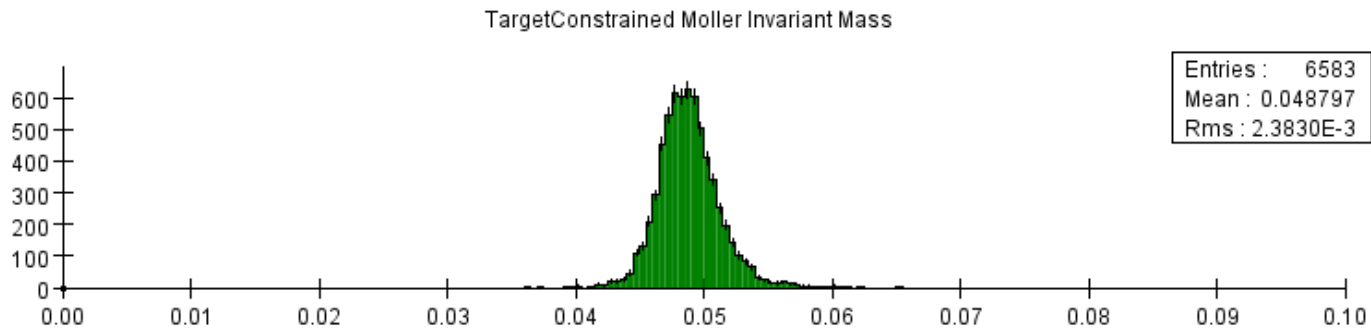
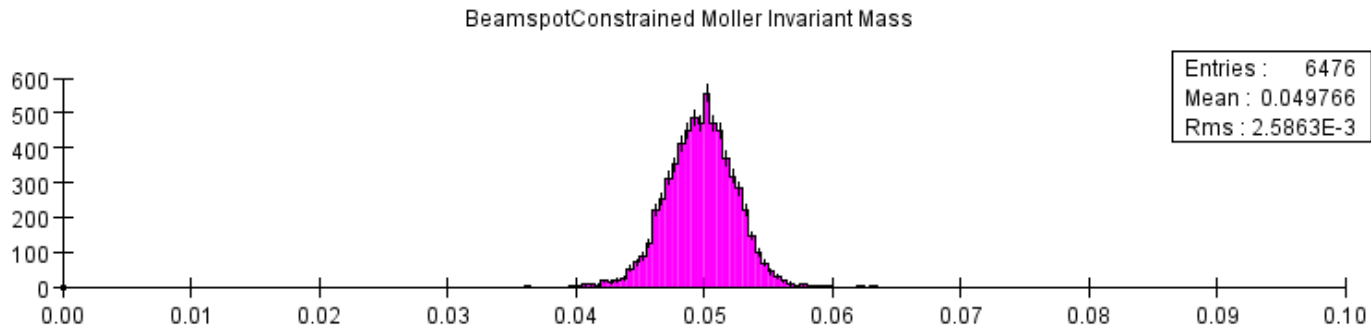
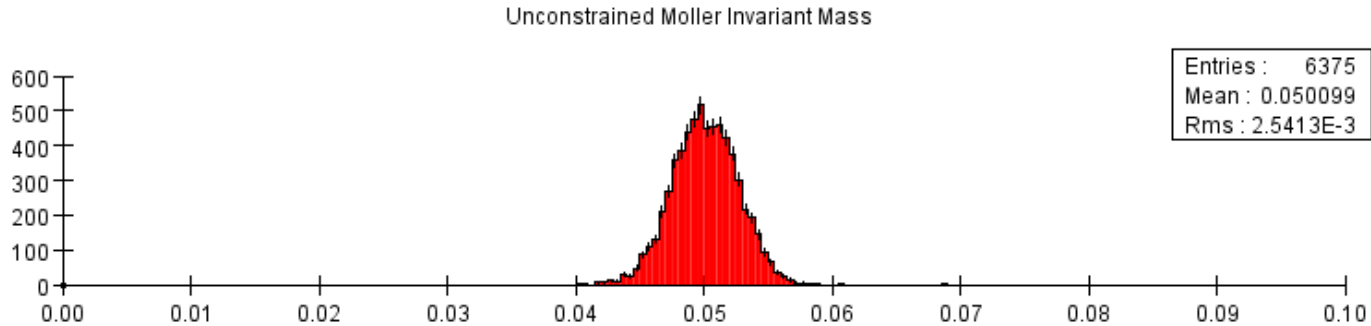
Unconstrained vertex z



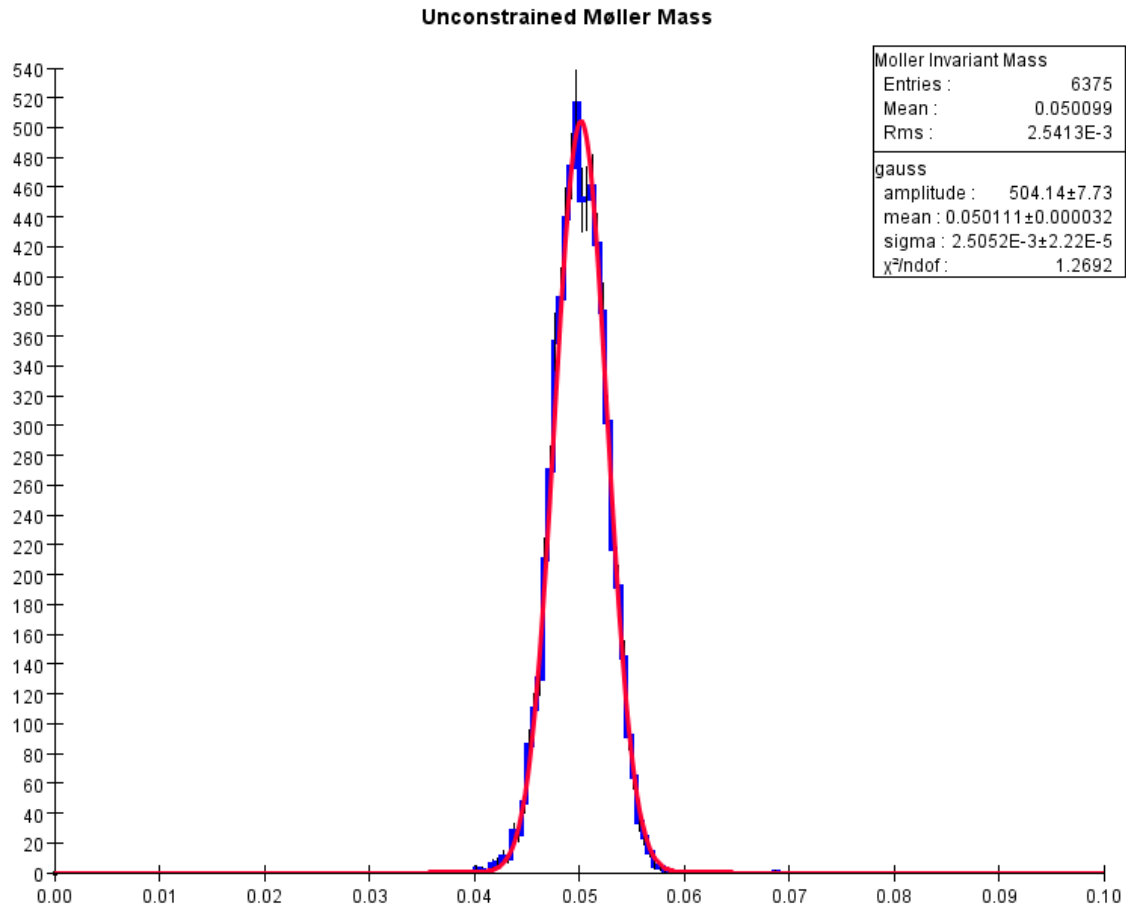
BeamspotConstrained Vertex z



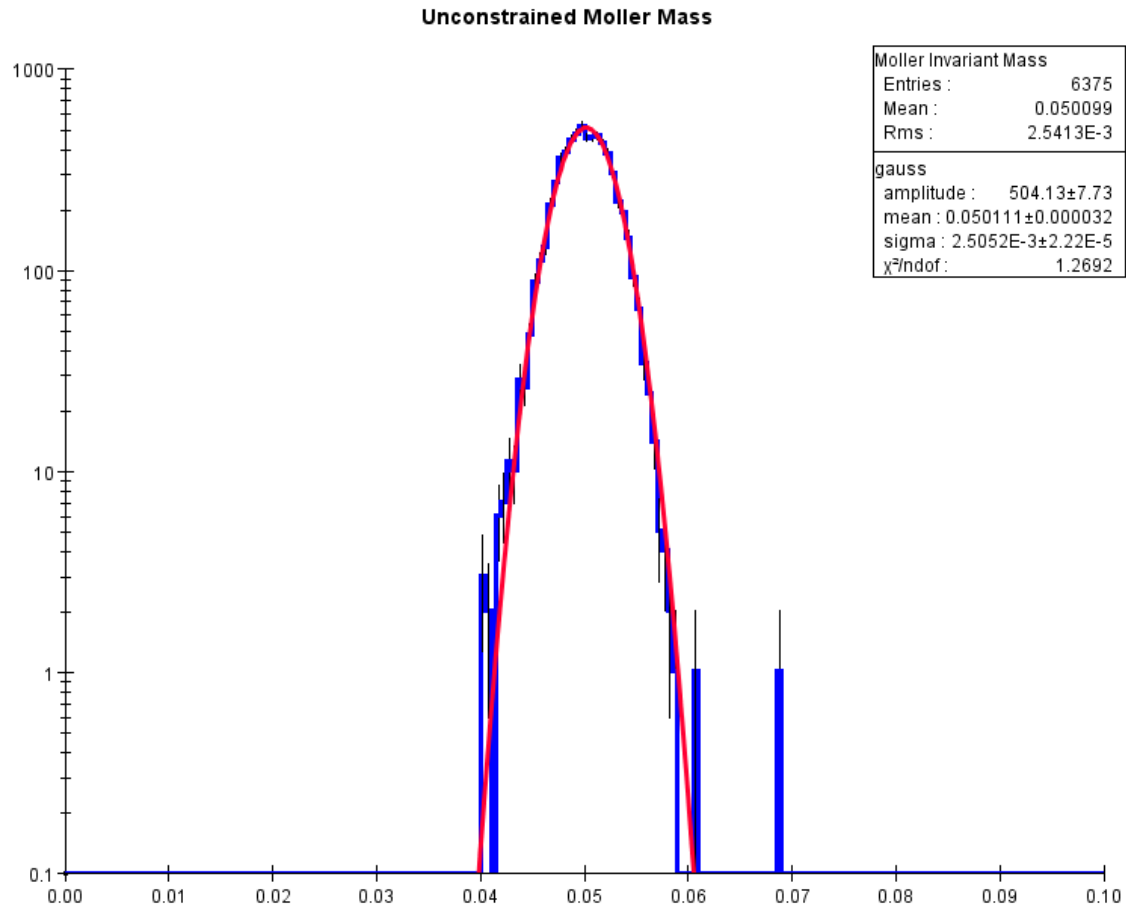
Møller Invariant Mass



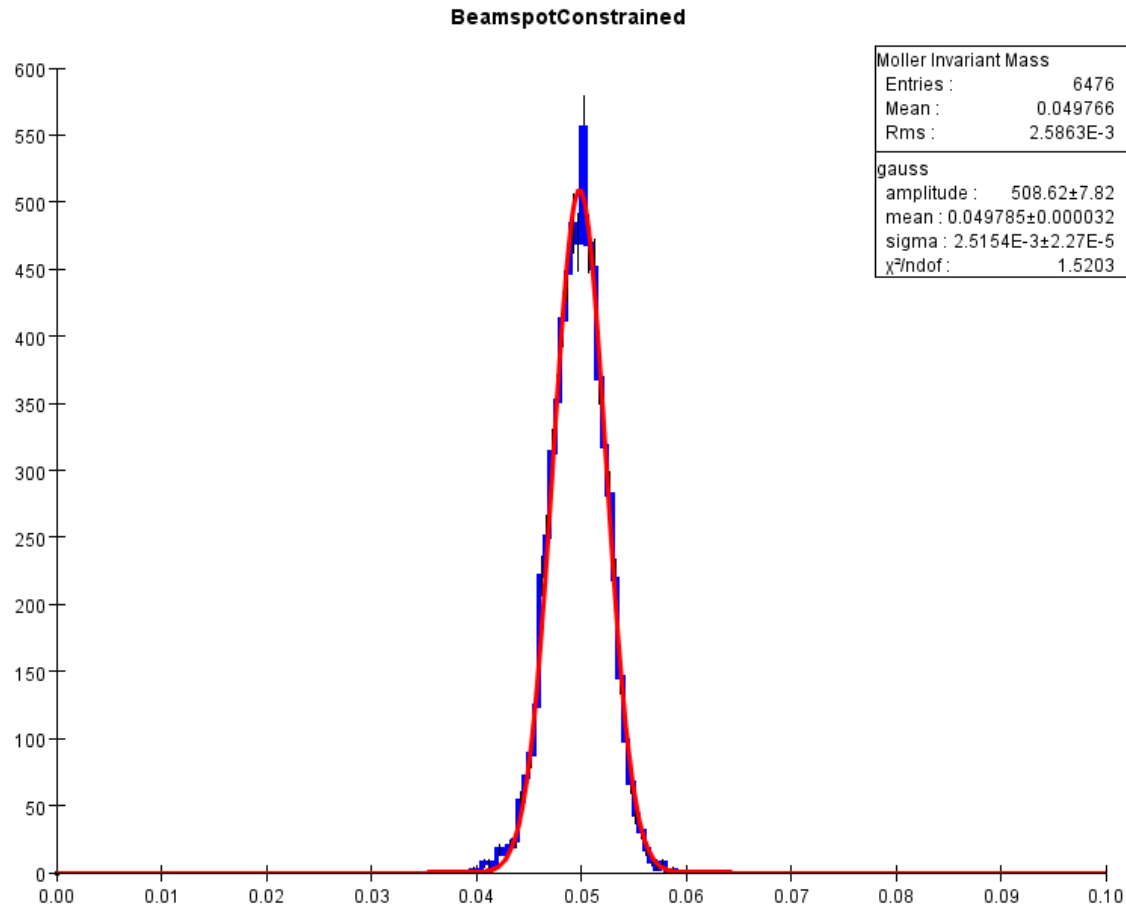
Unconstrained Møller Mass



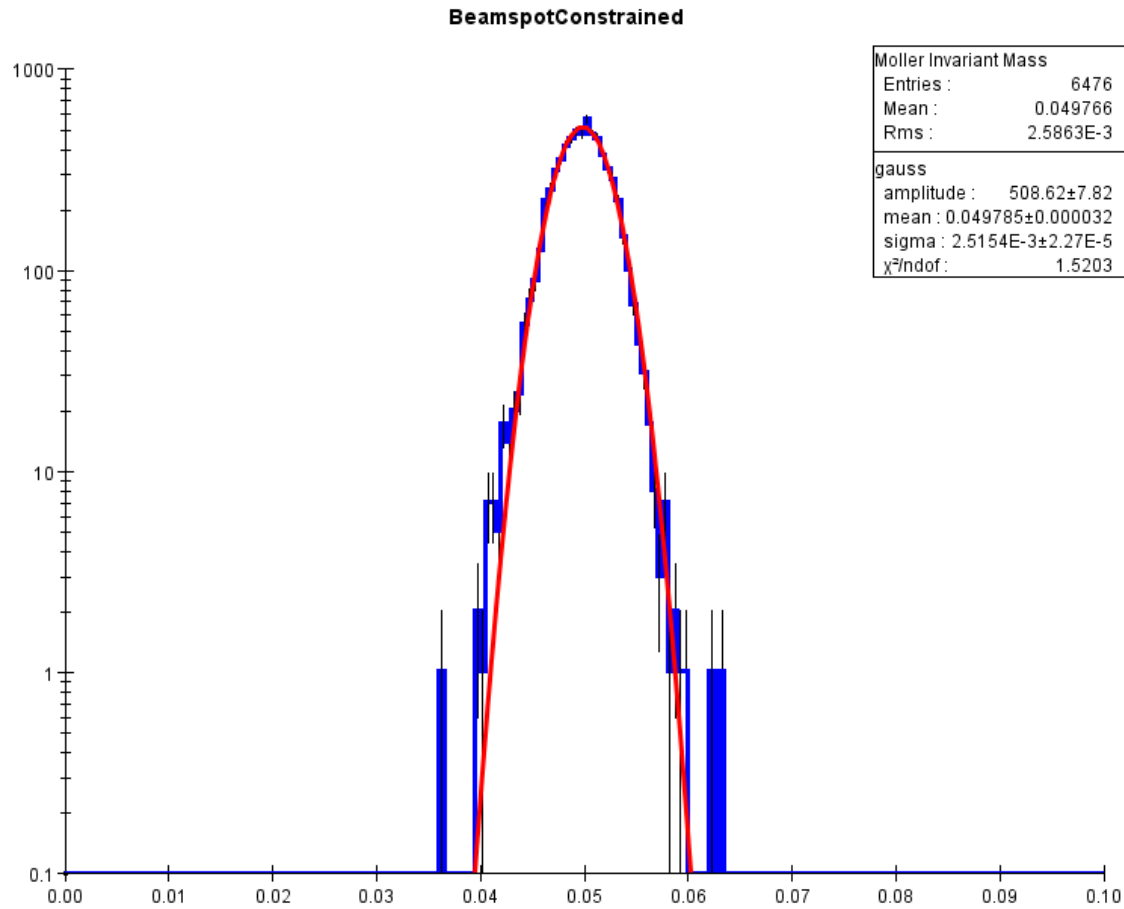
Unconstrained Møller Mass



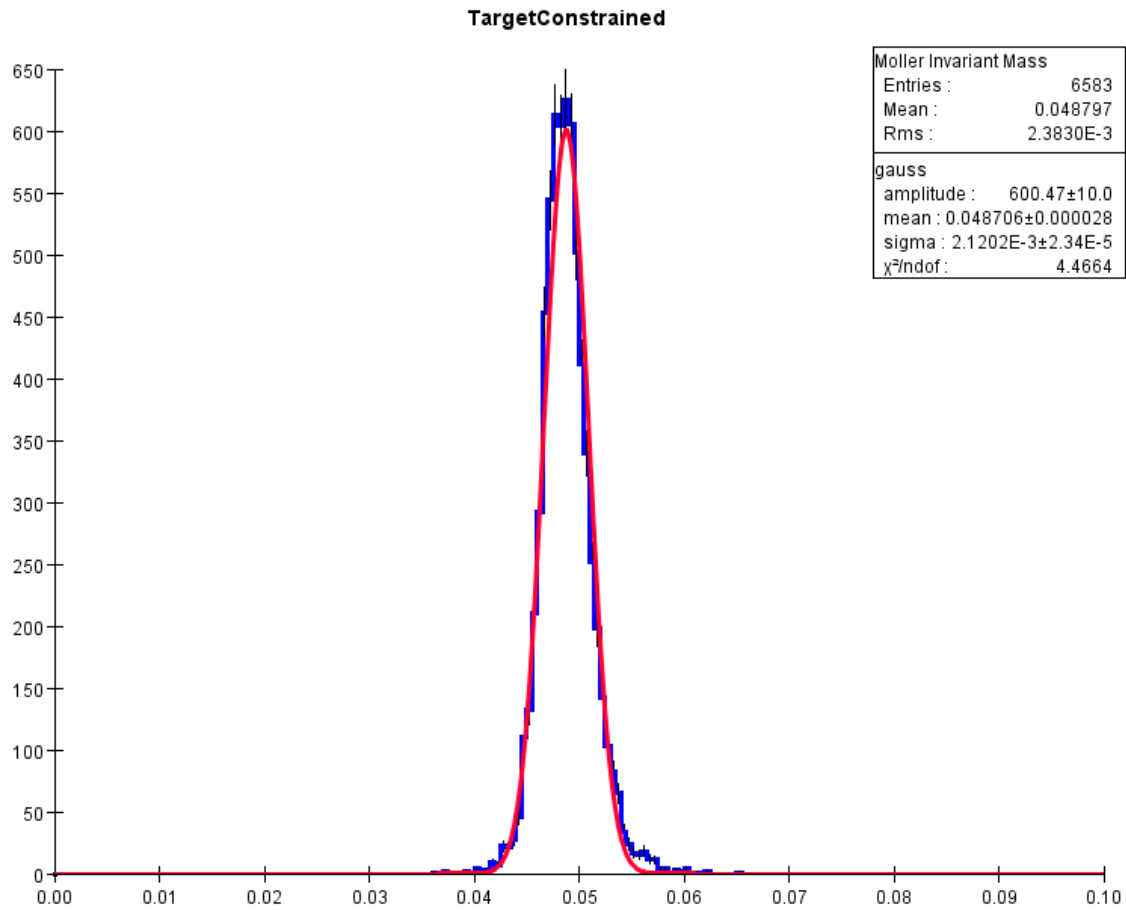
BeamspotConstrained Møller Mass



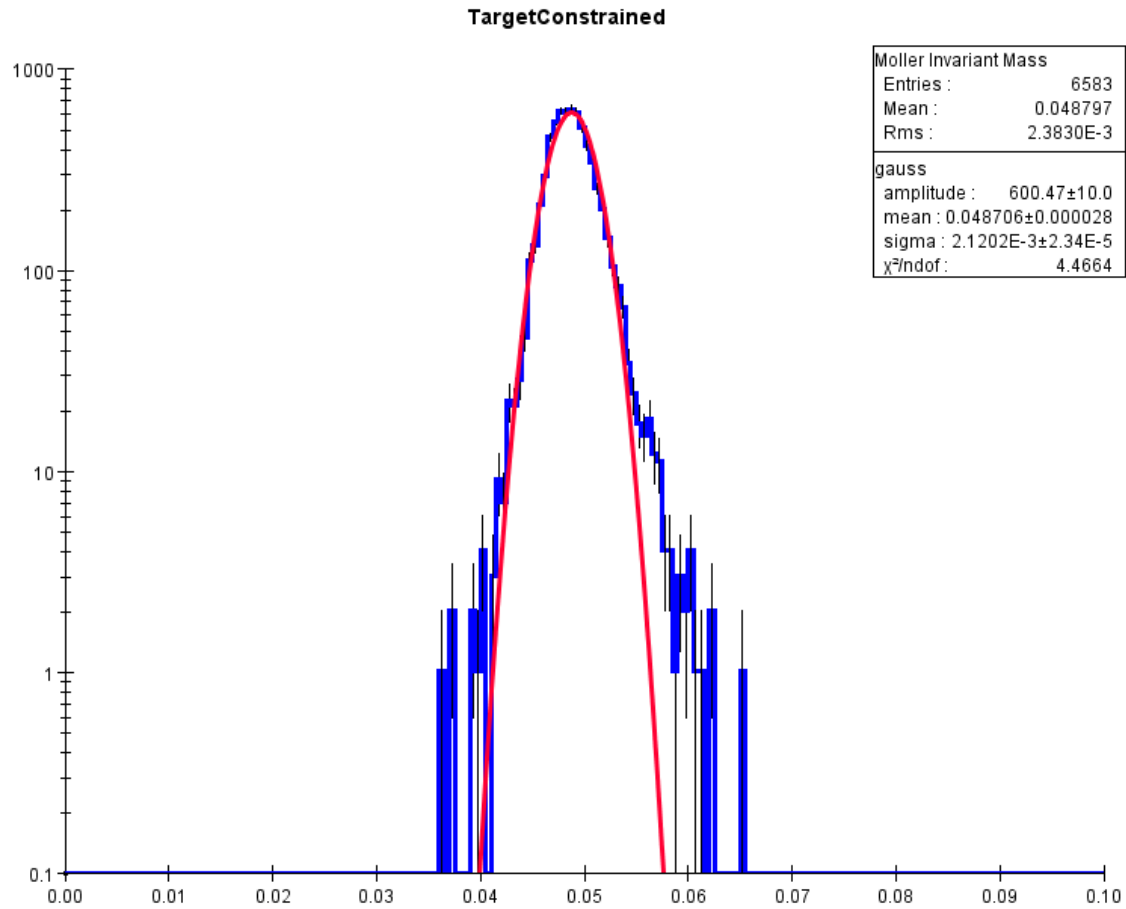
BeamspotConstrained Møller Mass



TargetConstrained Møller Mass



TargetConstrained Møller Mass



Møller Mass

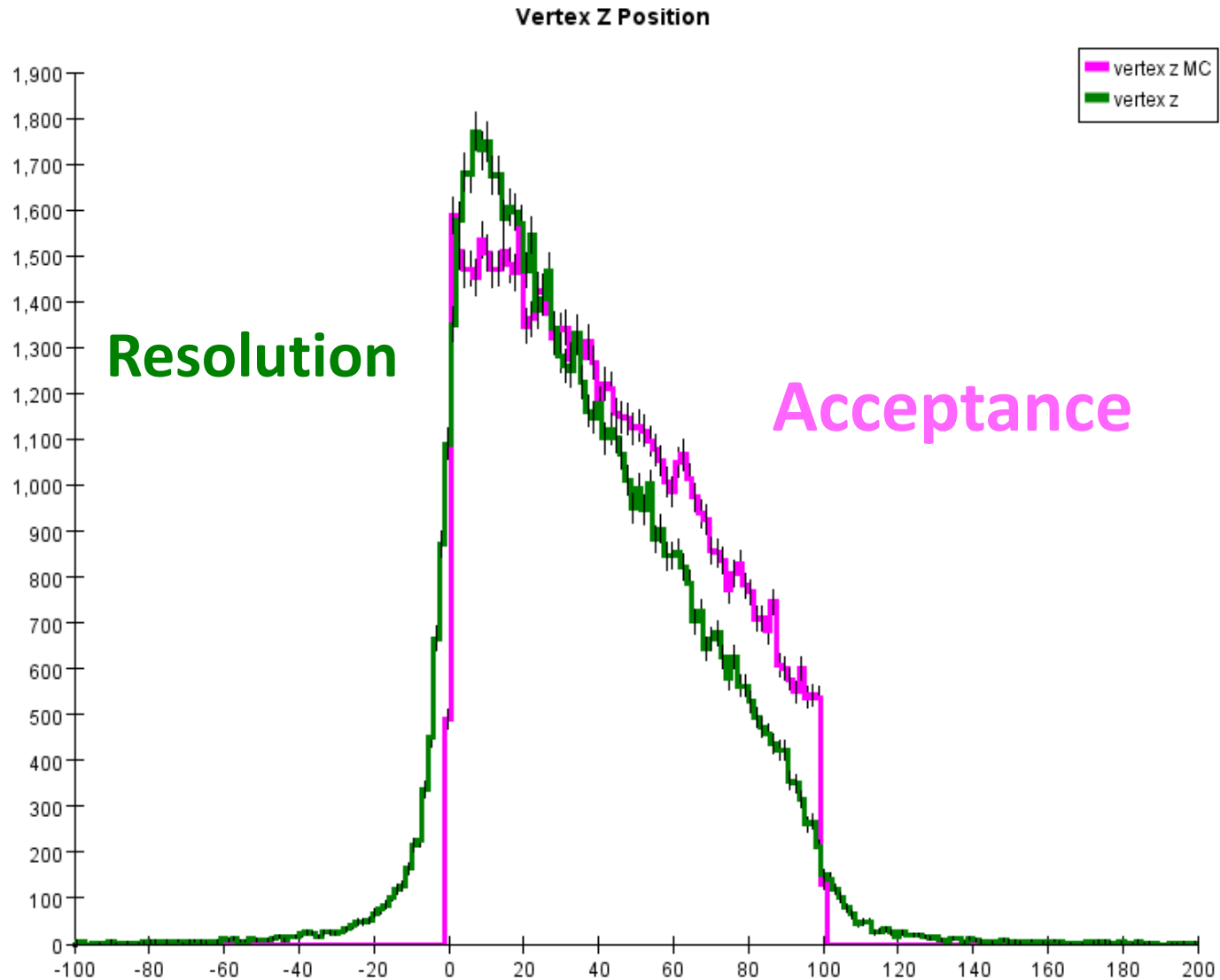
	mean	sigma
• Unconstrained	.0501	2.5
• BeamspotConstrained	.0498	2.5
• TargetConstrained	.0487	2.1

- Should be .04848
- Constraining vertex to $z=0$ instead of $z=3$ reduces opening angle, reduces mass
- Target constraint mass shift is commensurate with a positive vertex position.

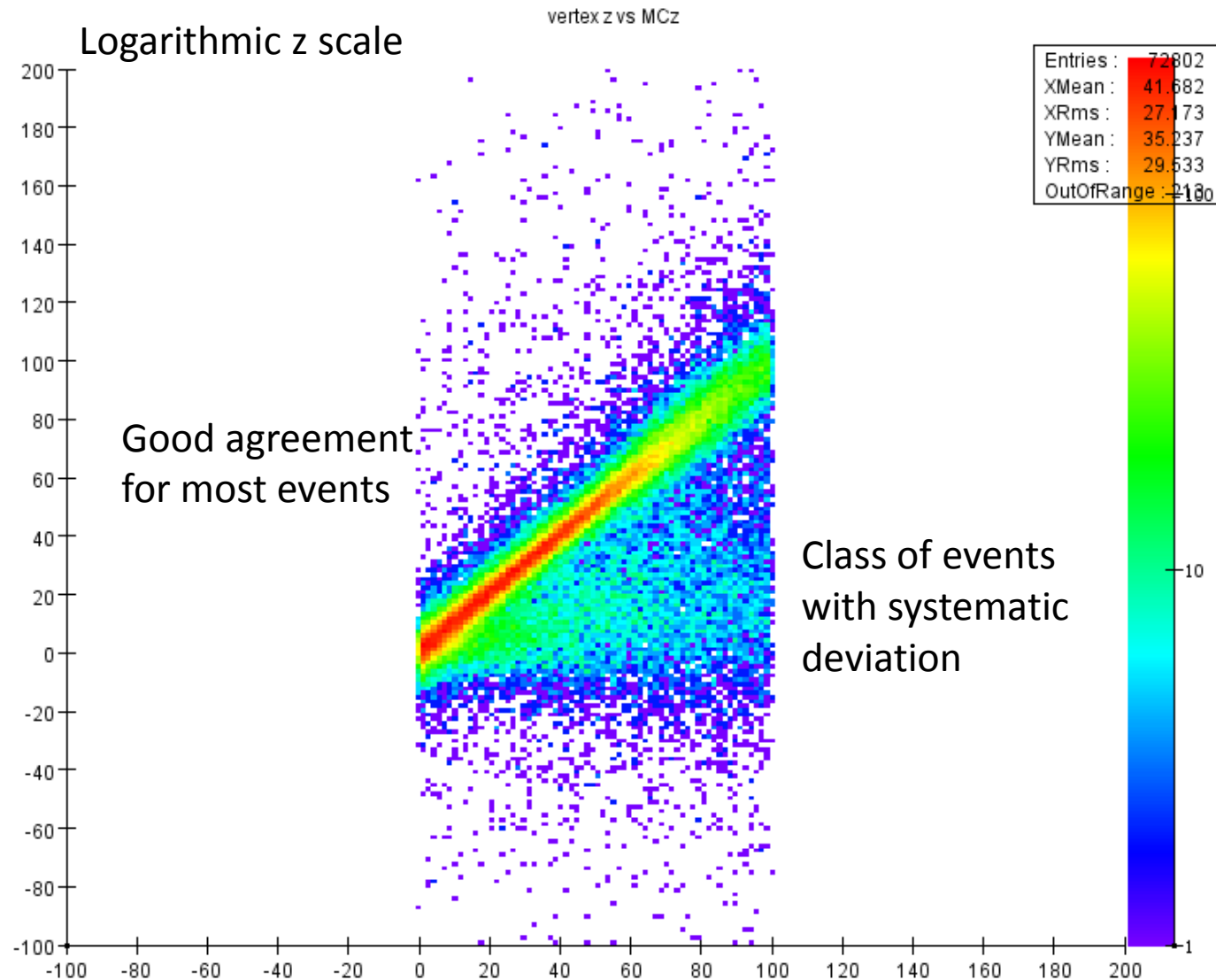
A' MC Vertexing

- Get a sample of 40MeV A' events with decay vertices flat in z between 0 and 100mm from Takashi.
- Process through HPS-EngRun2015-Nominal-v5-0-fieldmap detector and simple recon
- Analyze vertexing.

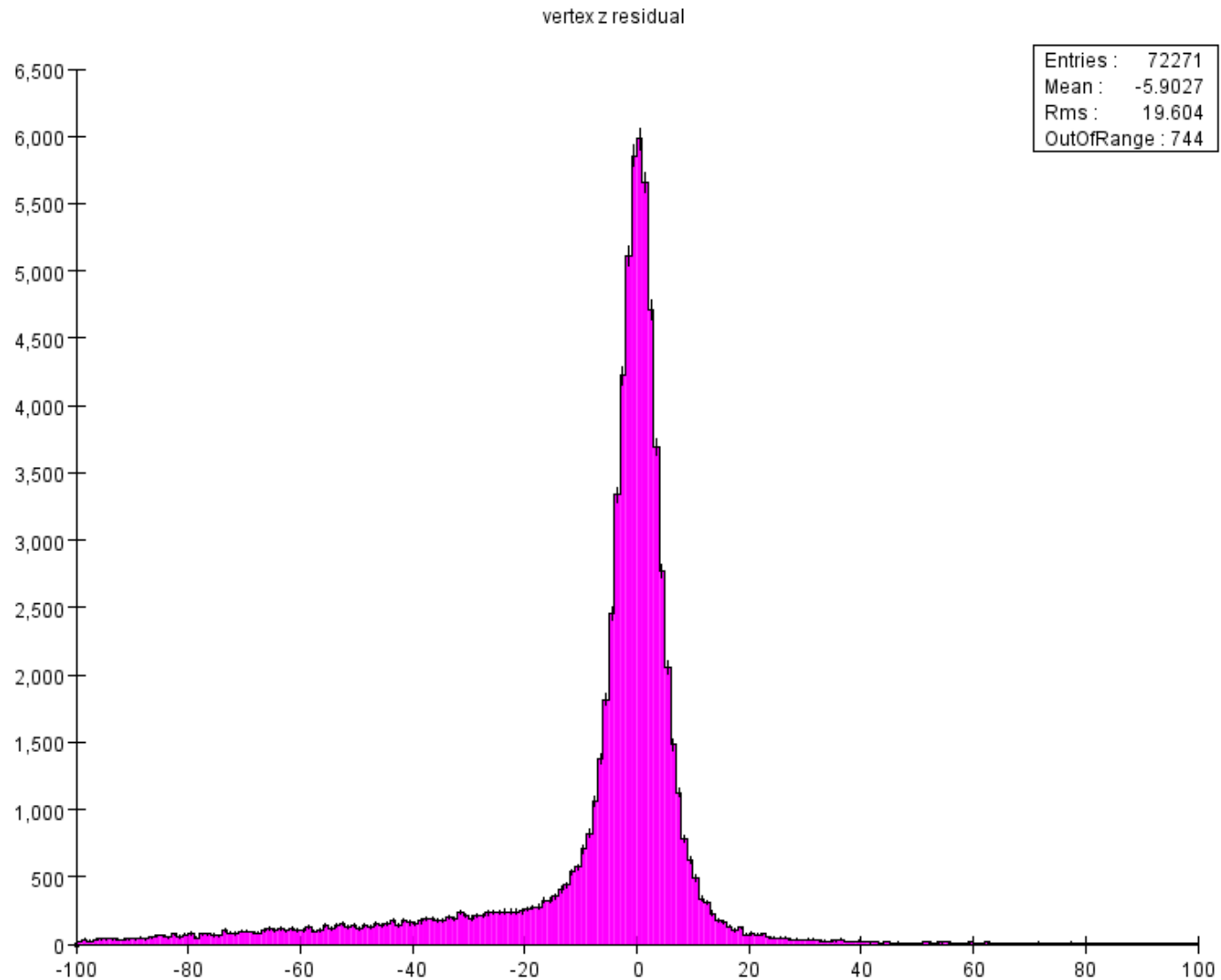
A' Vertex position



MC Vertex vs Recon Vertex

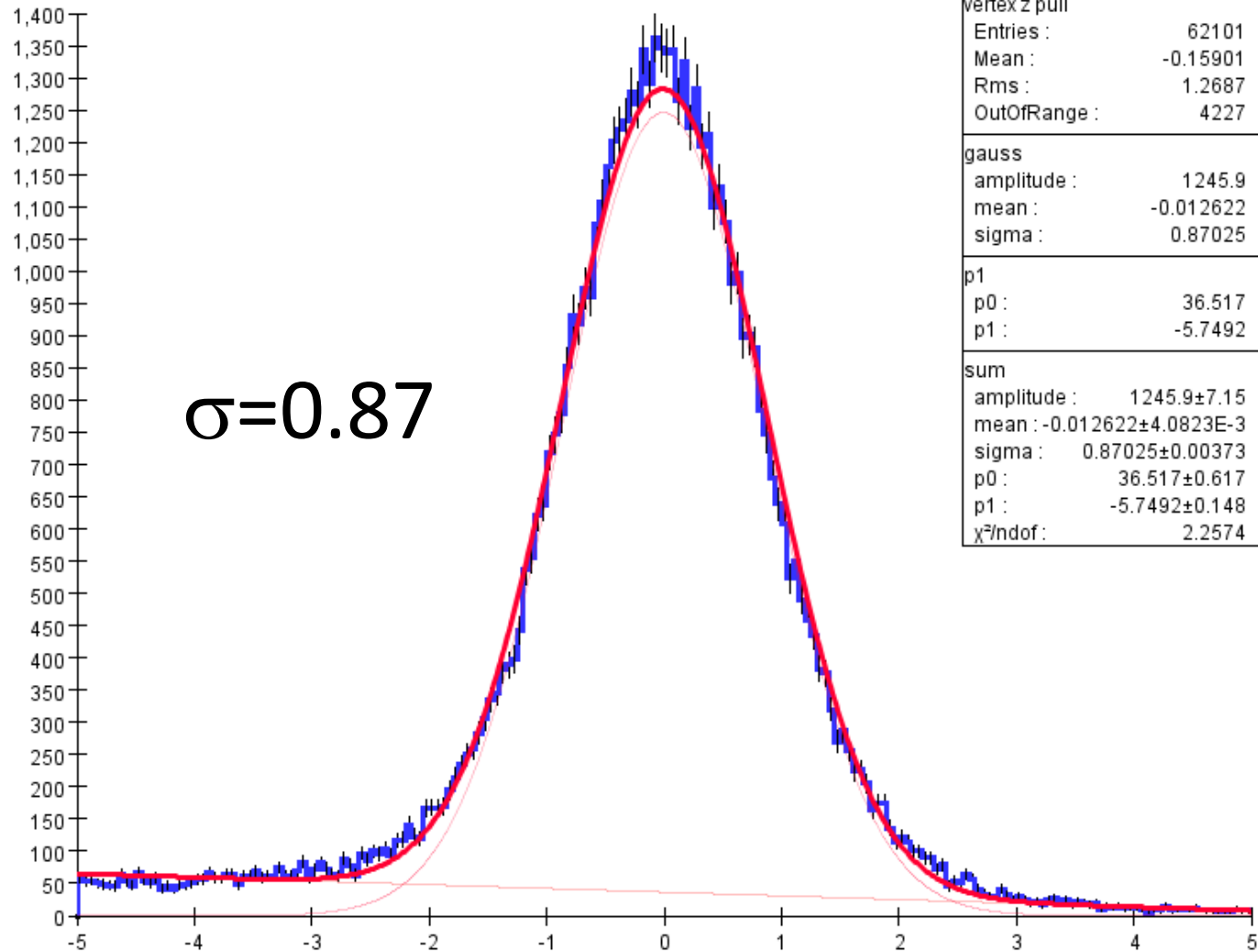


Vertex z residual

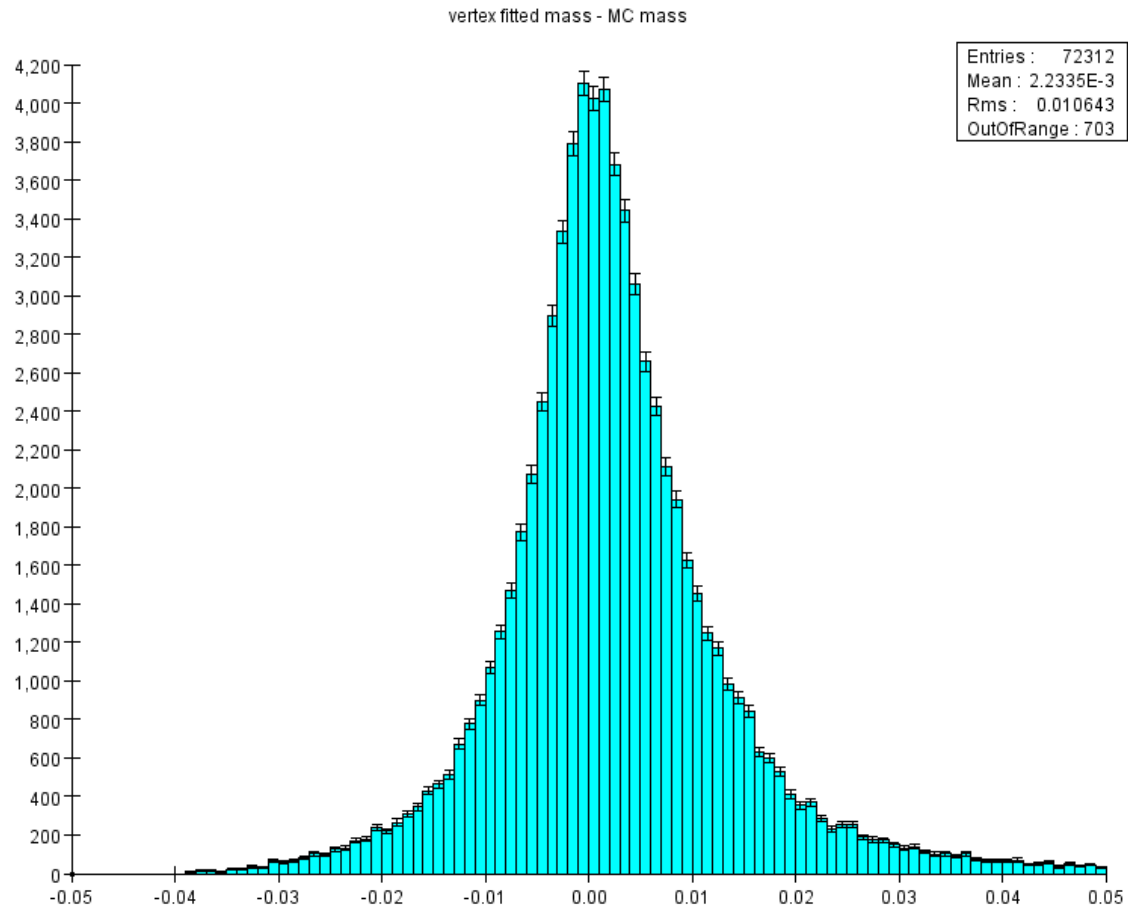


Vertex z pull

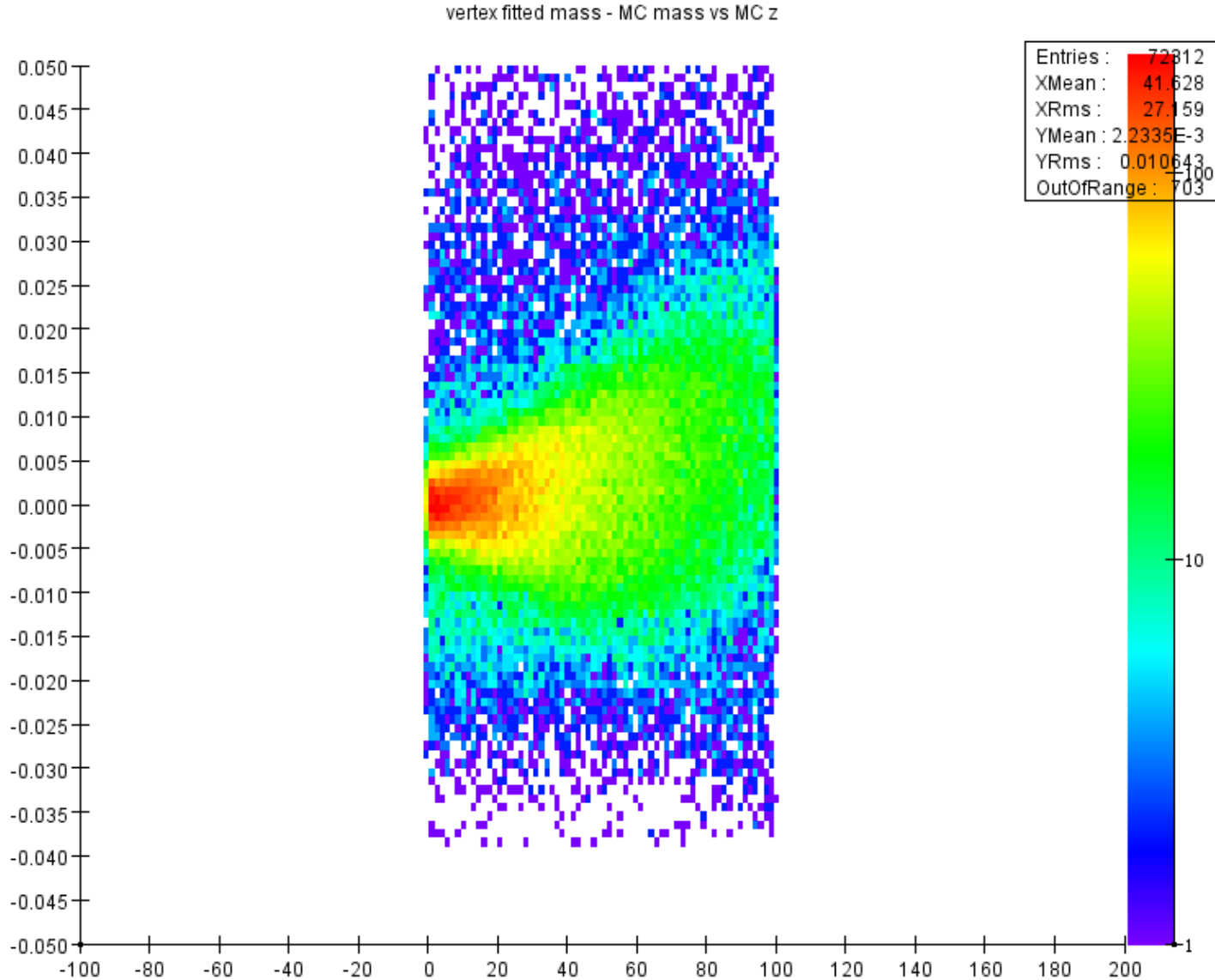
Unconstrained Vertex Z Position Pull



Mass Residual



Mass Residual vs MC z



Vertex Recalculation

- Vertex stores the results of the invariant mass calculation and the track momentum components.
- Double-checked that this information is correct.
- Propagating tracks to the vertex position resulted in minimal changes to vertex position or mass
 - Perhaps due to not updating the covariance matrix

To-Do

- Git issue #71 closed. Can now set the vertex z position used in the TargetConstrained vertex fit.
 - What value(s) to use for 2015 pass7 and 2016 pass1?
- Git issue #89. Extrapolating track parameters to the found vertex position and revertexing has a minimal affect on position and mass. Need to update covariance matrix (iss54) and check whether this changes.