

# 2016 Data Pass1 tests

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# Calibration Files

- Have selected calibration events from run 7796
  - FEE (Full Energy Electrons)
  - Møller Candidates
  - V0 Candidates
- Have skimmed off the events in evio format
- Run a test of what we currently imagine Pass1 will be over these events.

# Testing the software

- Running from the master branch:

> java

```
-cp hps-distribution-3.11-SNAPSHOT-bin.jar
```

```
org.hps.evio.EvioToLcio
```

```
-x /org/hps/steering/recon/PhysicsRun2016FullRecon.lcsim -r
```

```
-d HPS-PhysicsRun2016-v5-3-fieldmap_globalAlign
```

```
-DdisableSvtAlignmentConstants=true
```

```
-DoutputFile=testPass1
```

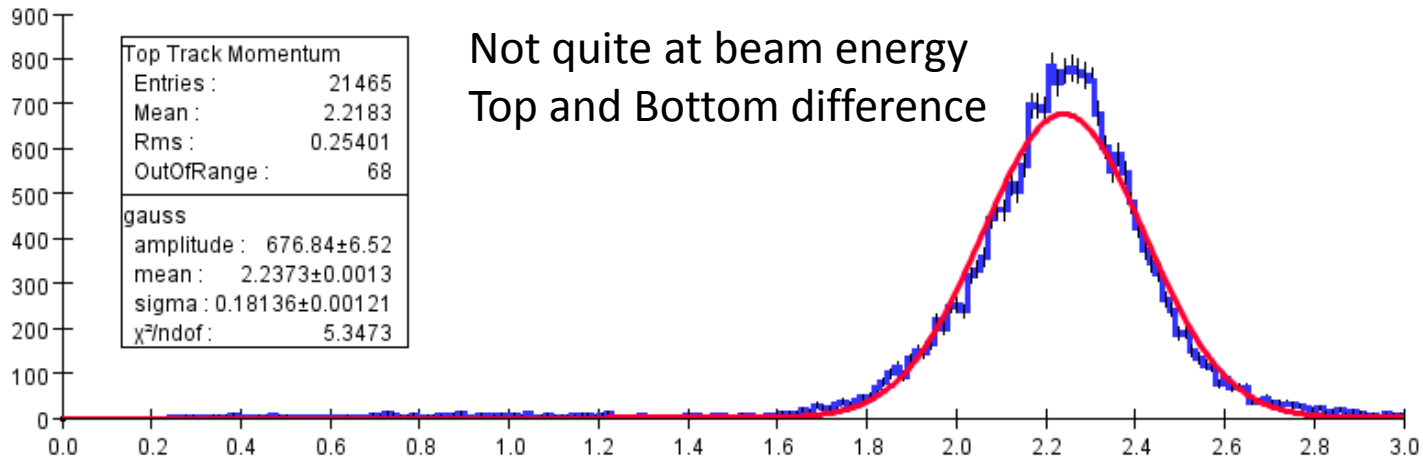
```
/path/to/evioFile
```

# Analysis

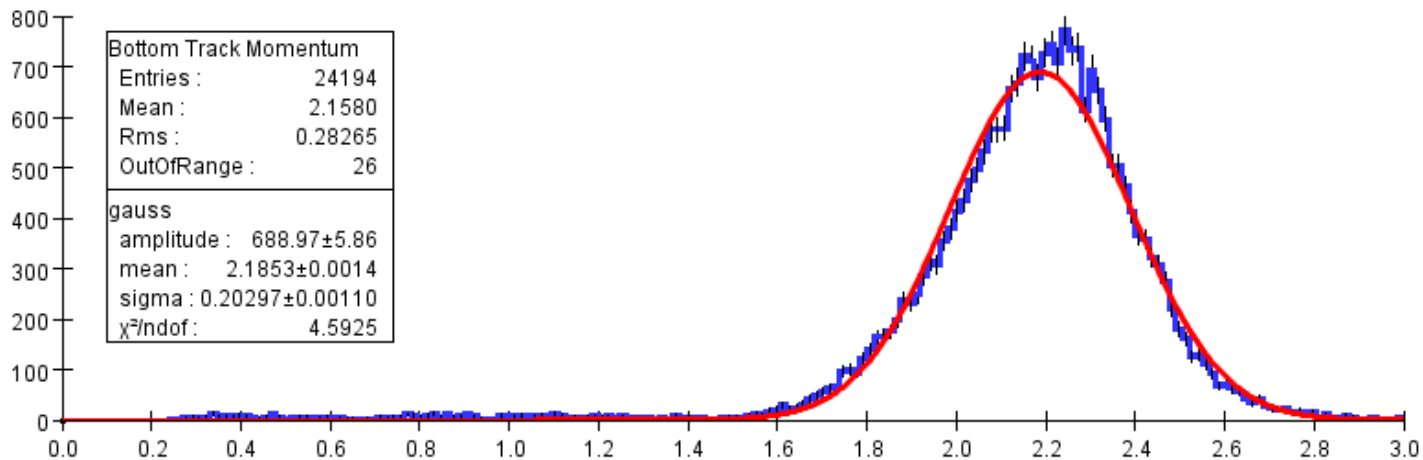
- Concentrating on target position determination
  - FEE: plot track  $y$  intercept vs  $z$ 
    - $y=0$  gives  $z$  of target
    - Location where top and bottom agree
  - Møller:
    - plot unconstrained vertex  $z$ 
      - Evidence for a bias in the vertex location since both tracks have same curvature (osculation problem)
    - Plot mass of target constrained vertex as function of  $z$ 
      - Møller mass @2.3GeV = .04848 solve for  $z$ .
  - V0:
    - Plot unconstrained vertex  $z$  position

# FEE Track Momentum

2016 Run 7796 FEE Top Tracks

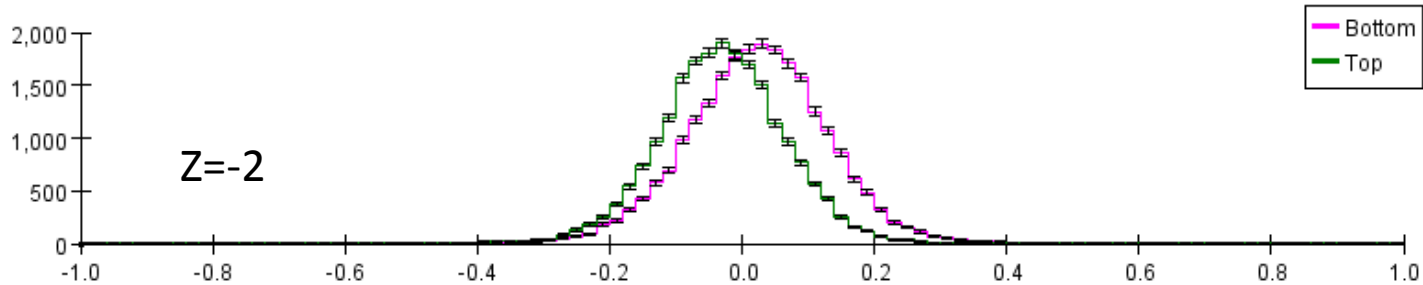


2016 Run 7796 FEE Bottom Tracks

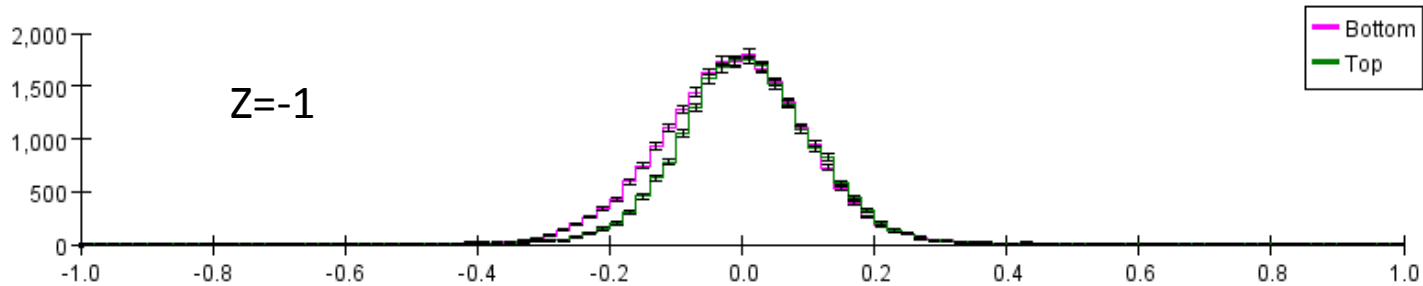


# FEE Y Intercept as function of Z

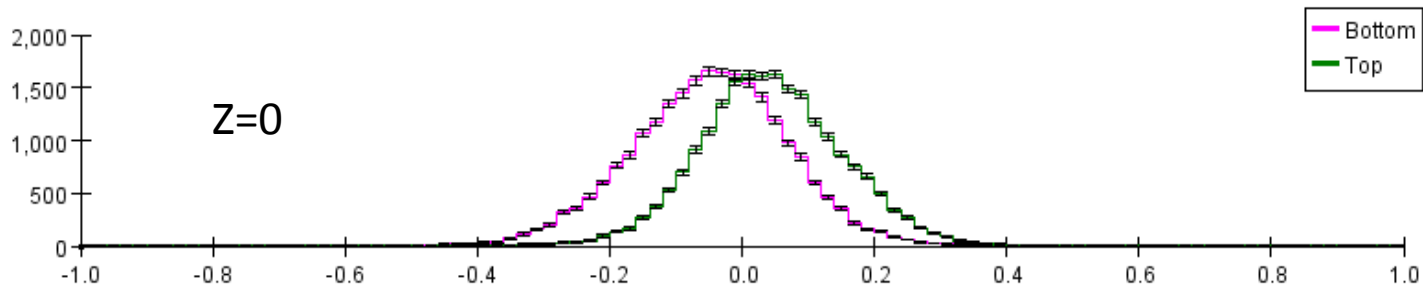
aida4553251623675168487.aida --2.0 - Track extrap Y at -2.0



aida4553251623675168487.aida --1.0 - Track extrap Y at -1.0

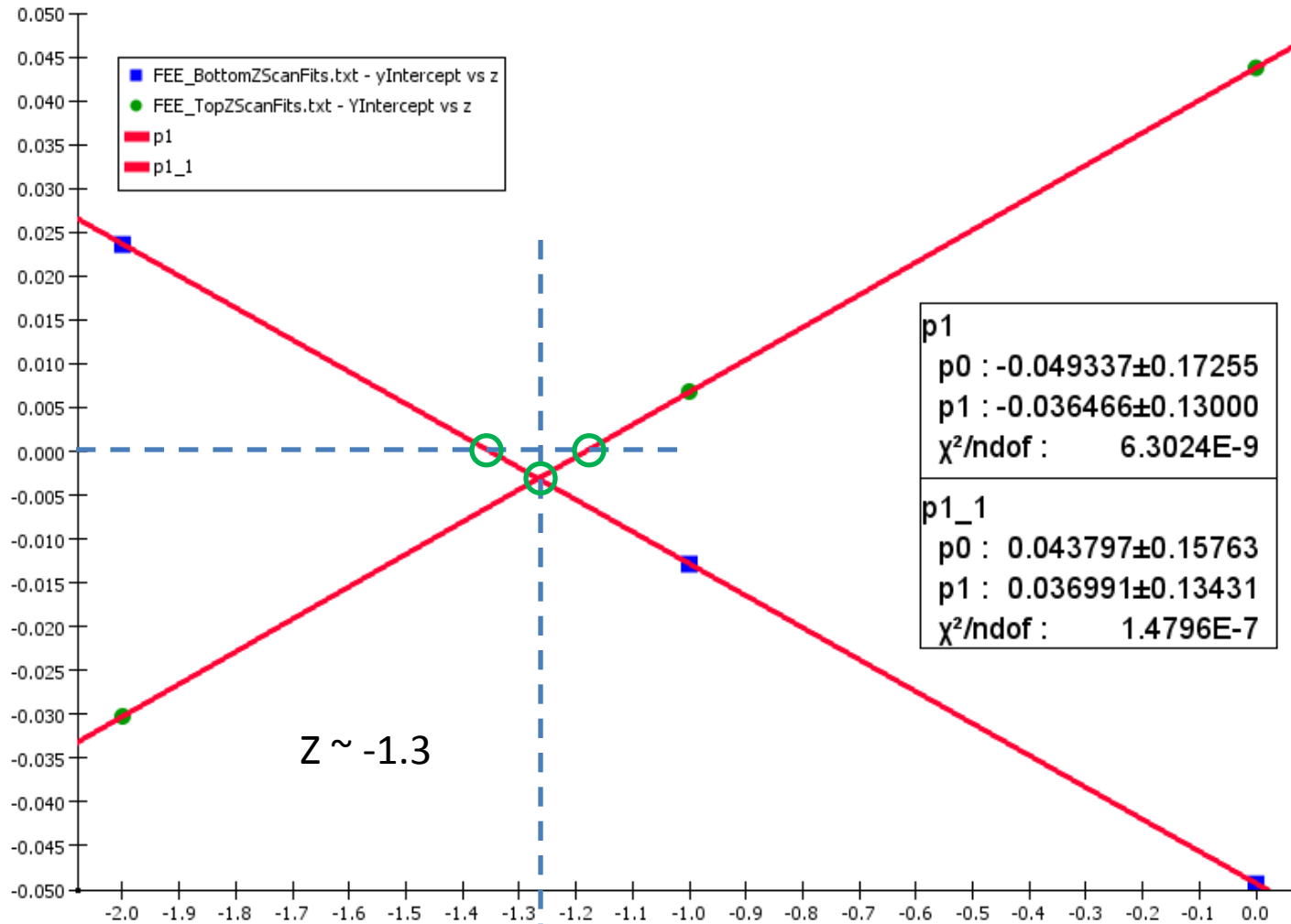


aida4553251623675168487.aida - 0.0 - Track extrap Y at 0.0



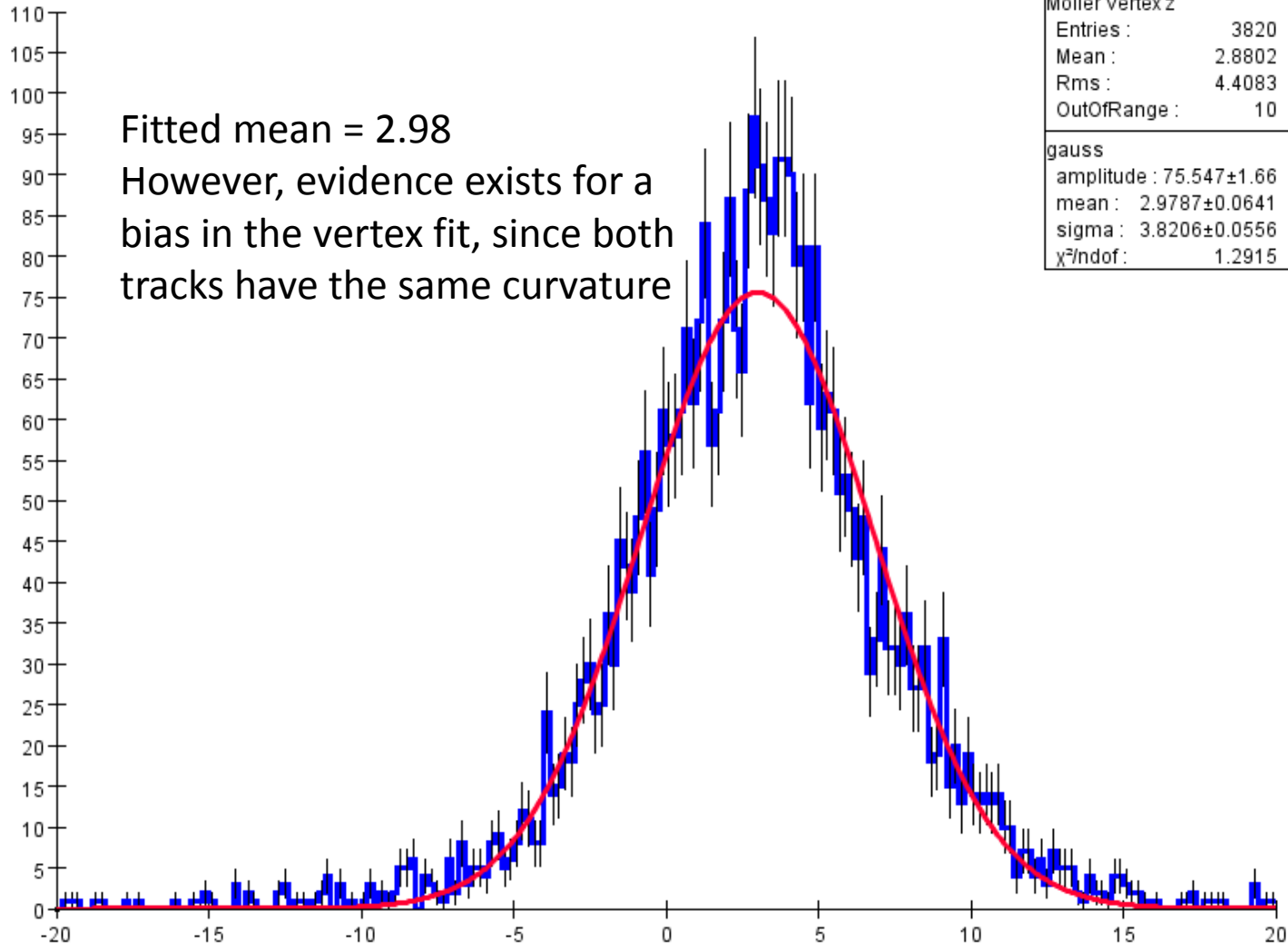
# FEE Y Intercept as function of Z Fits

2016 Run 7996 FEE Y Intercept as function of Target z



# Target Unconstrained Møller Vertex z

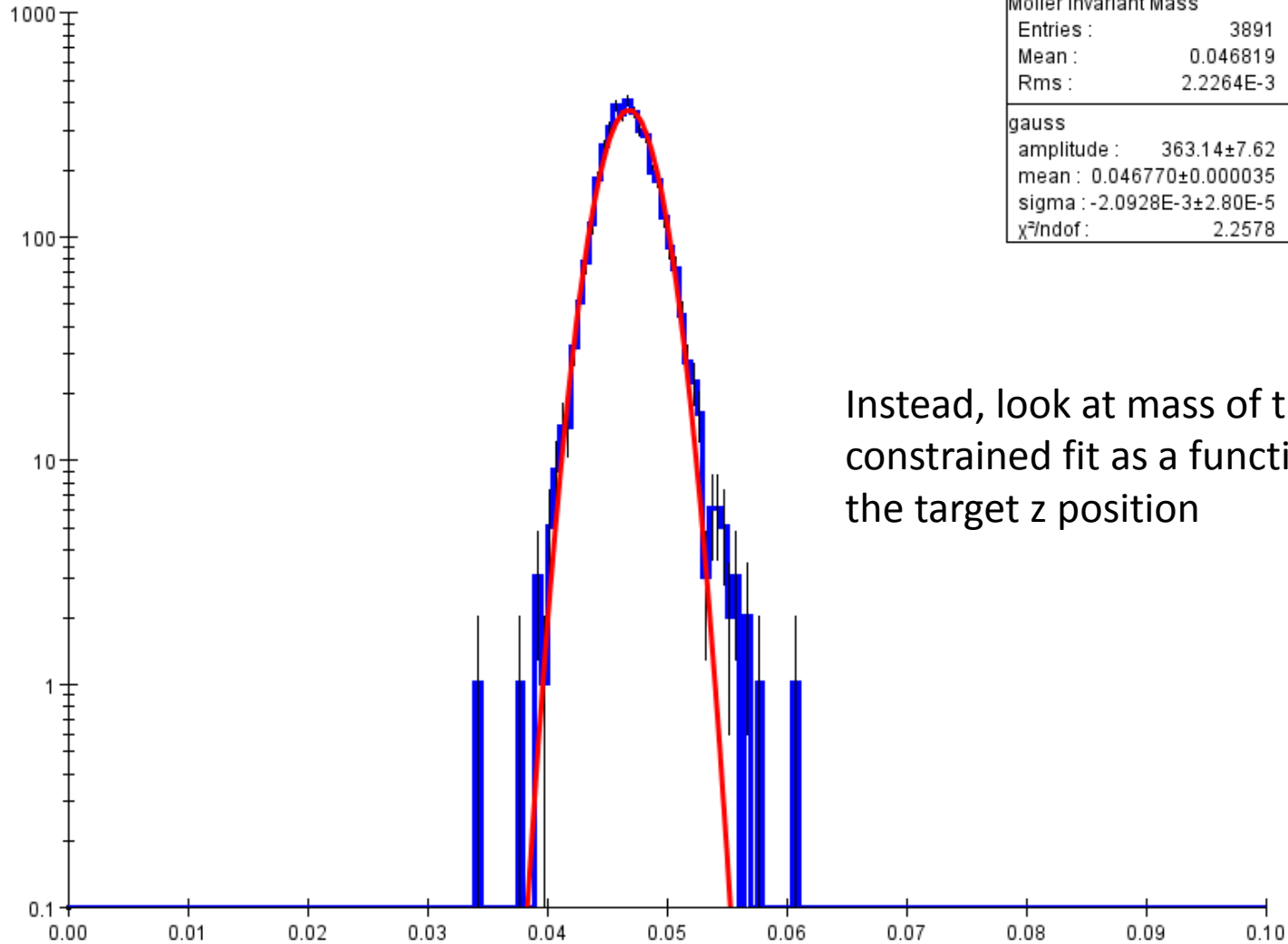
2016 Run 7796 Møller Unconstrained Vertex Z





# Target Constrained Møller Invariant Mass, $z=-5$

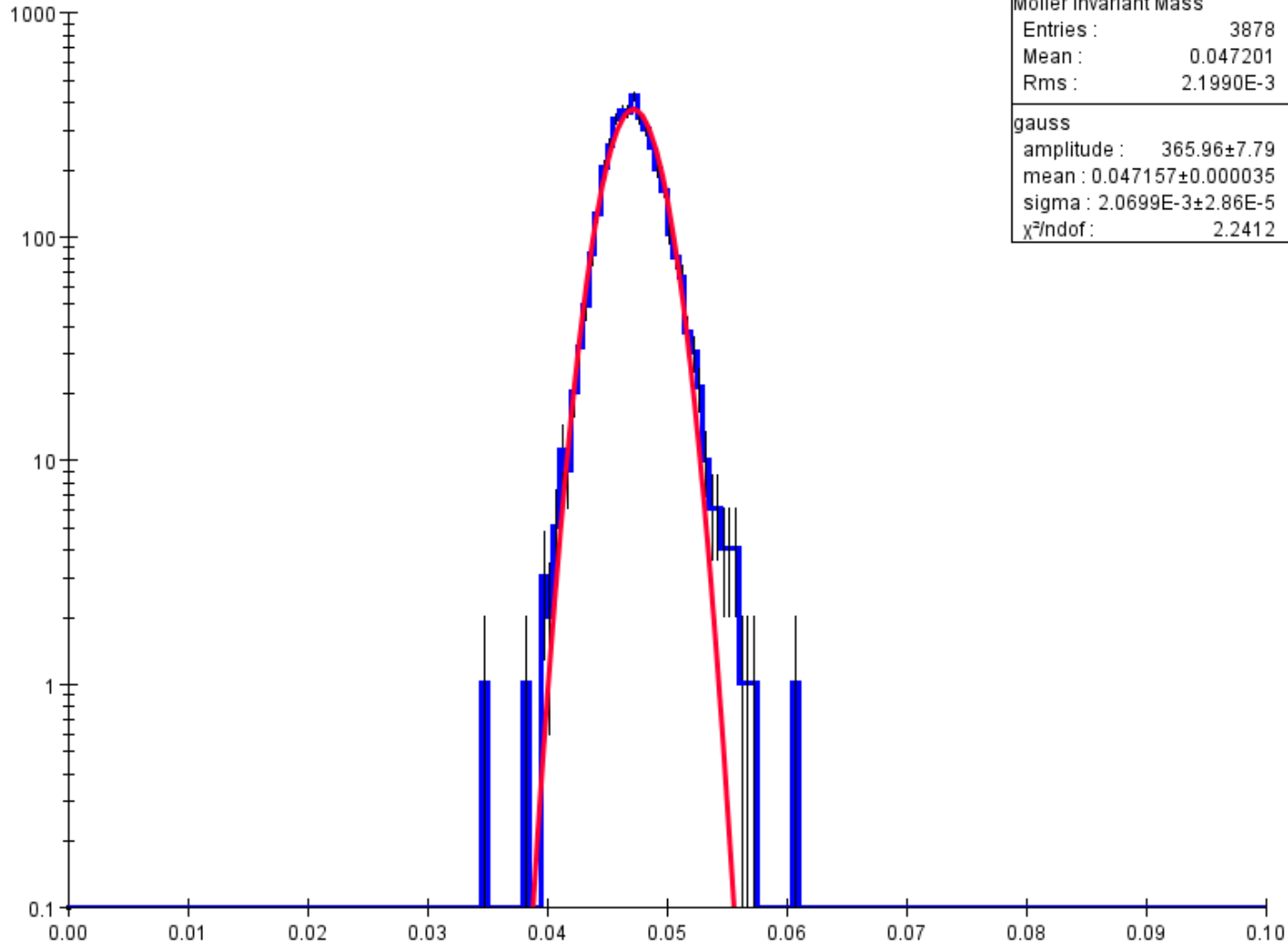
2016 Run 7796 Møller Target Constrained Mass  $z=-5$



Instead, look at mass of the target  
constrained fit as a function of  
the target  $z$  position

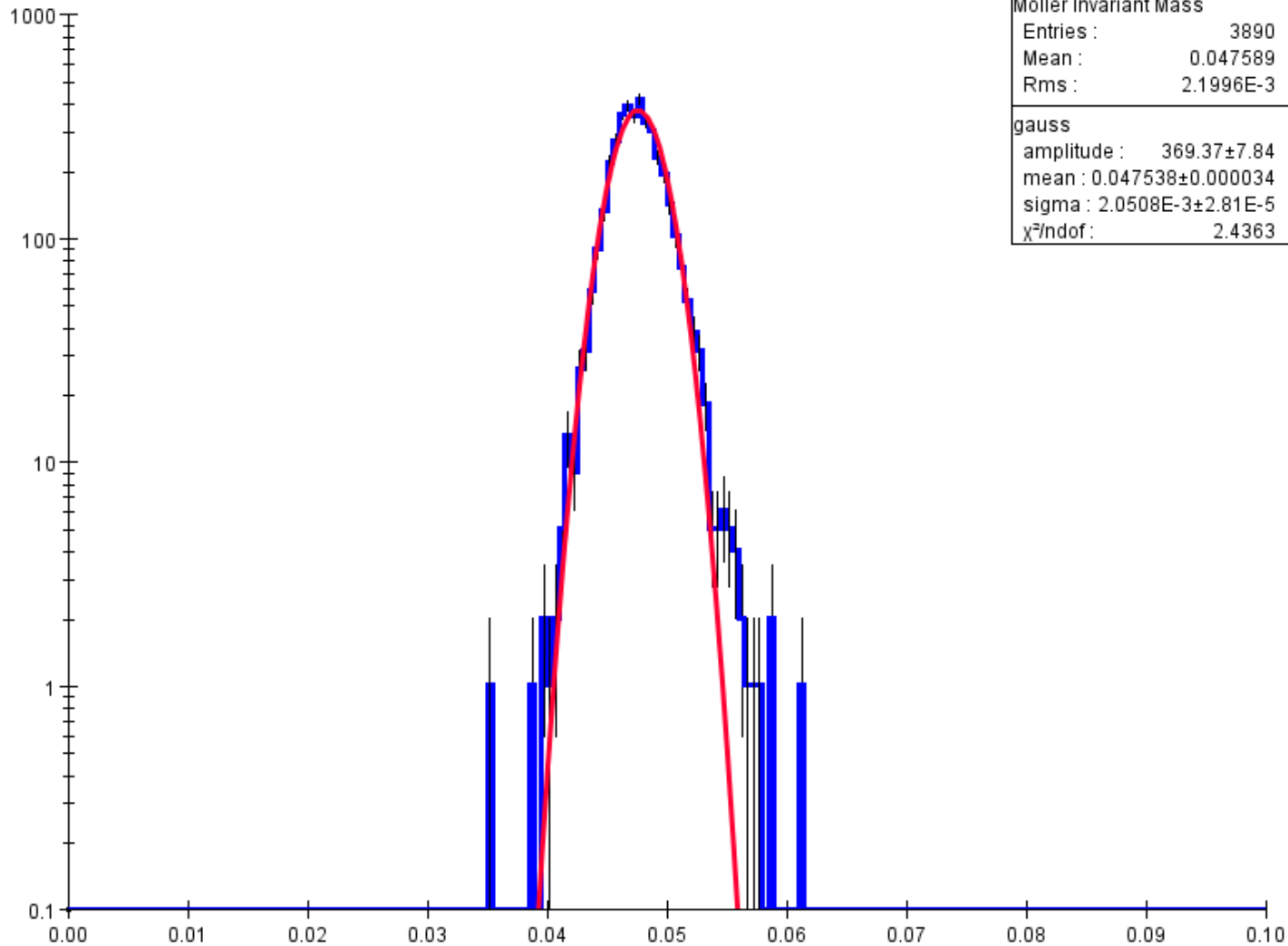
# Target Constrained Møller Invariant Mass, $z=-4$

2016 Run 7796 Møller Target Constrained Mass  $z=-4$



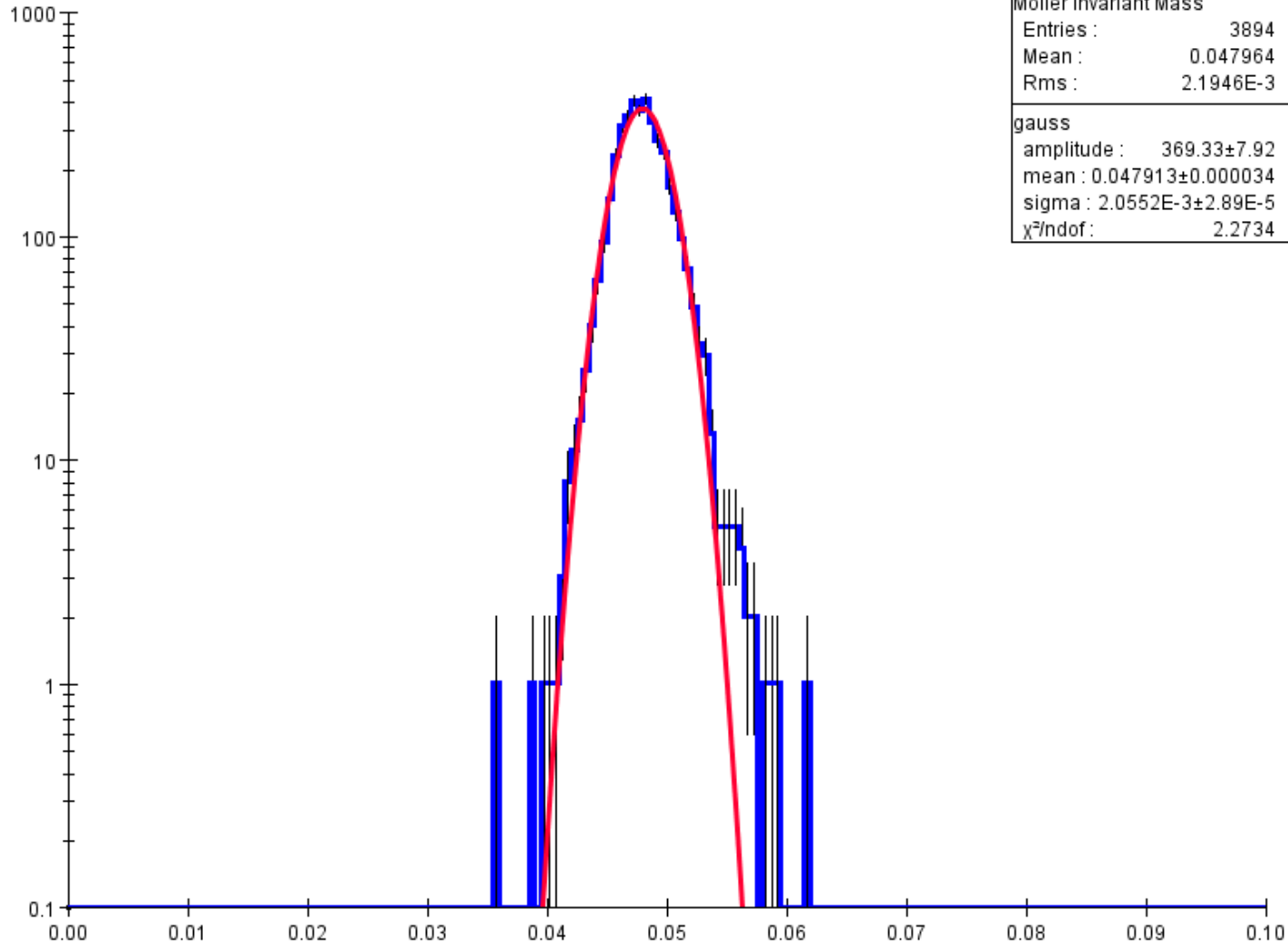
# Target Constrained Møller Invariant Mass, $z=-3$

2016 Run 7796 Møller Target Constrained Mass  $z=-3$



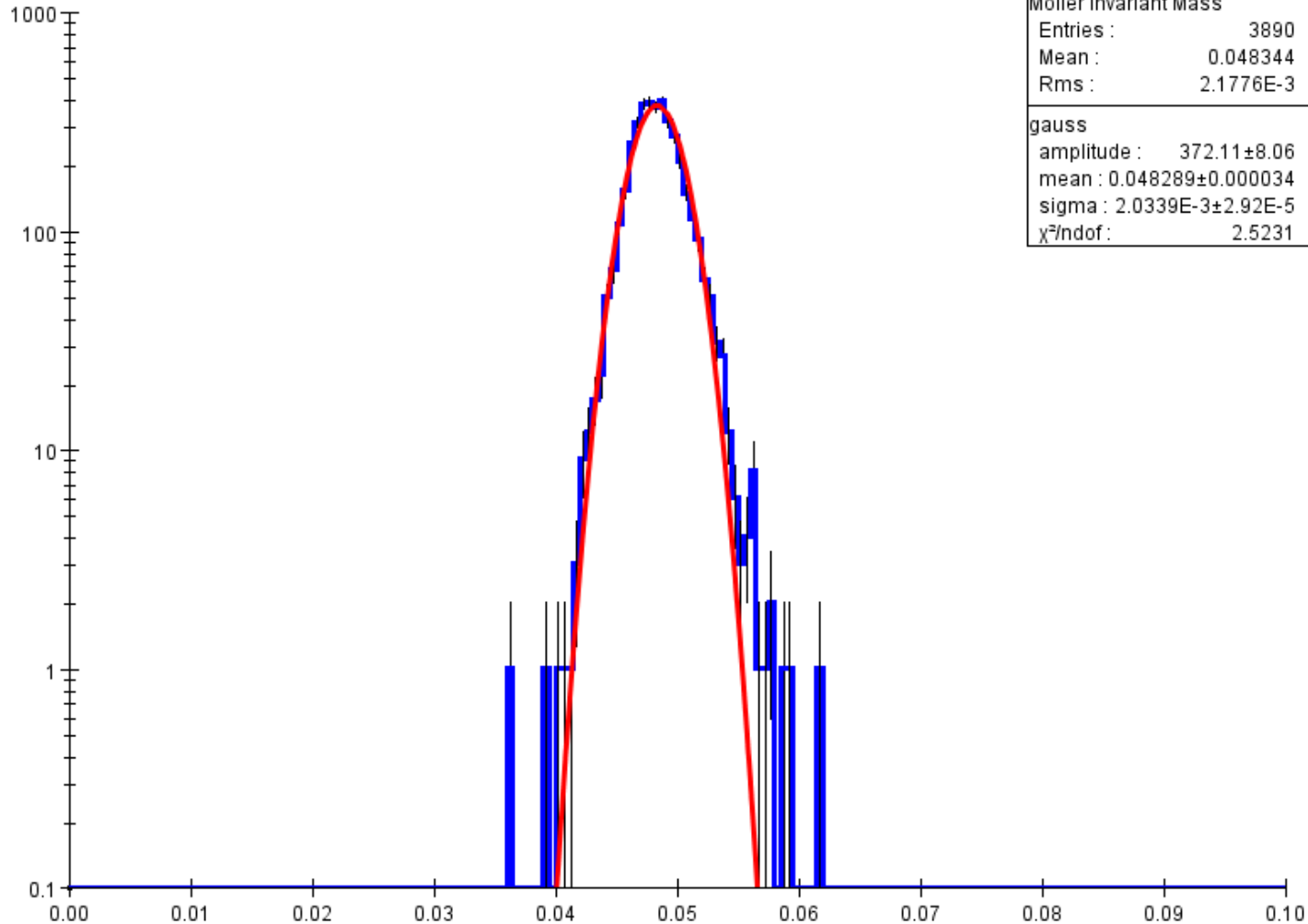
# Target Constrained Møller Invariant Mass, $z=-2$

2016 Run 7796 Møller Target Constrained Mass  $z=-2$



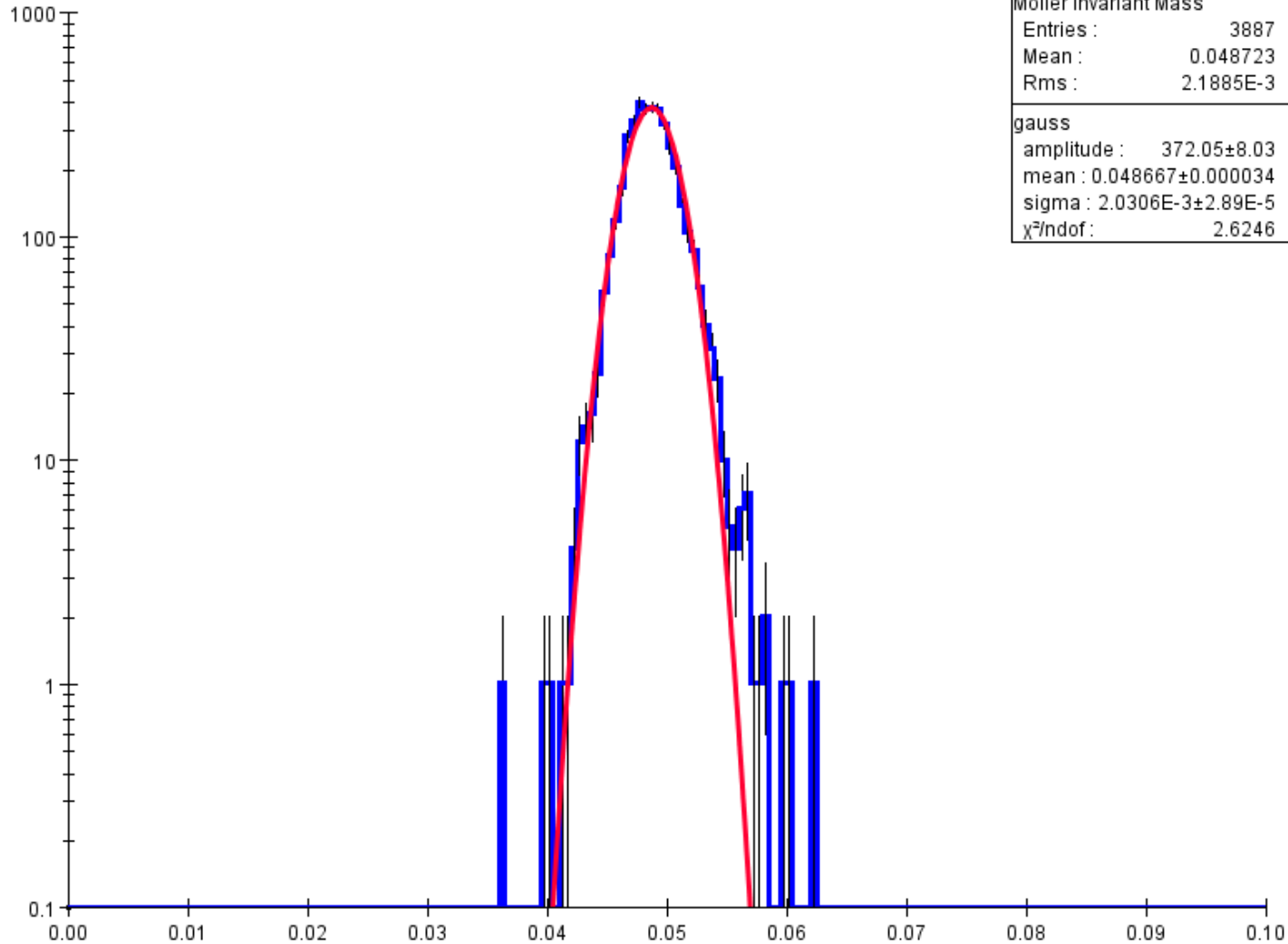
# Target Constrained Møller Invariant Mass, $z=-1$

2016 Run 7796 Møller Target Constrained Mass  $z=-1$



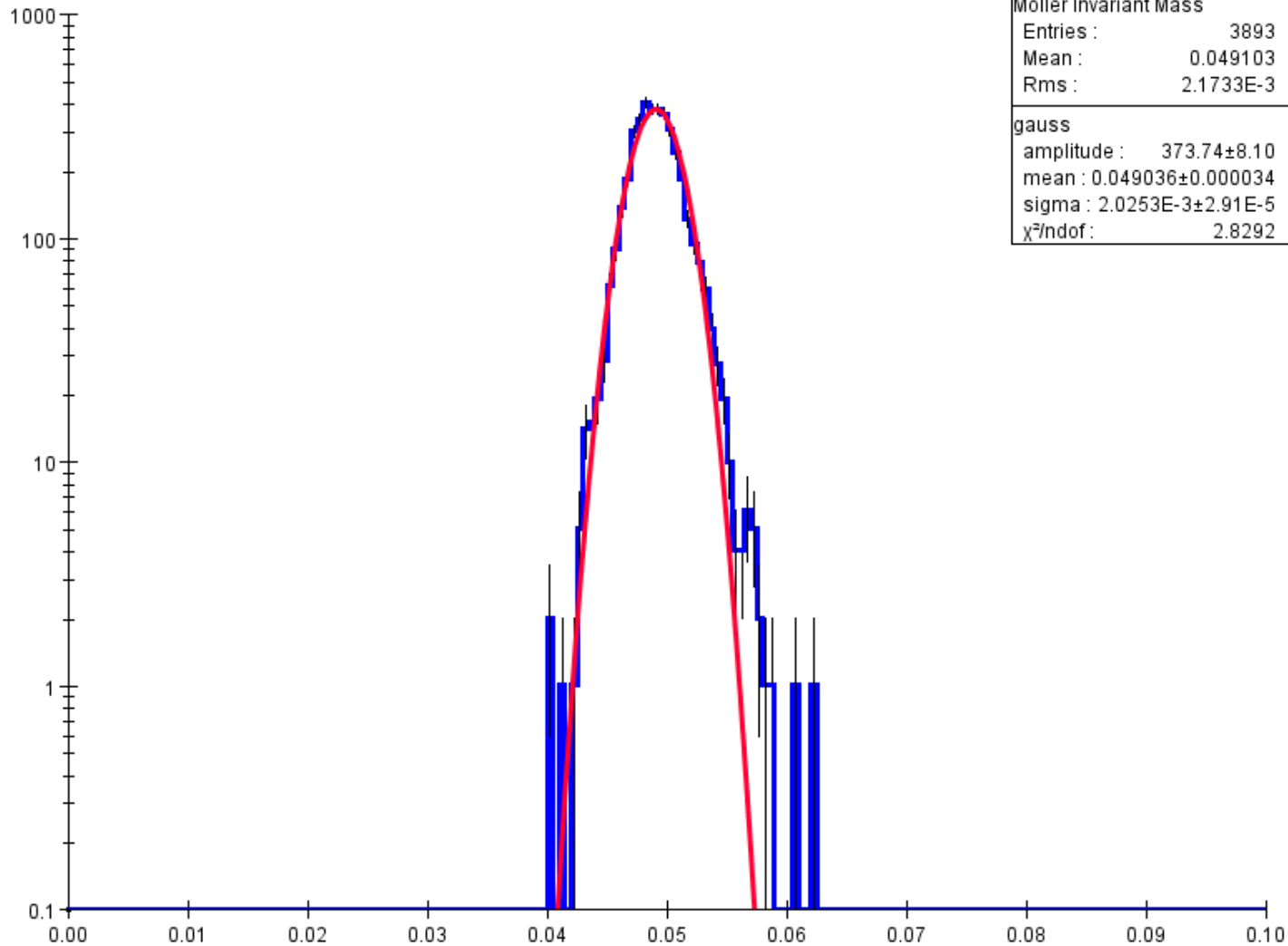
# Target Constrained Møller Invariant Mass, $z=0$

2016 Run 7796 Møller Target Constrained Mass  $z=0$



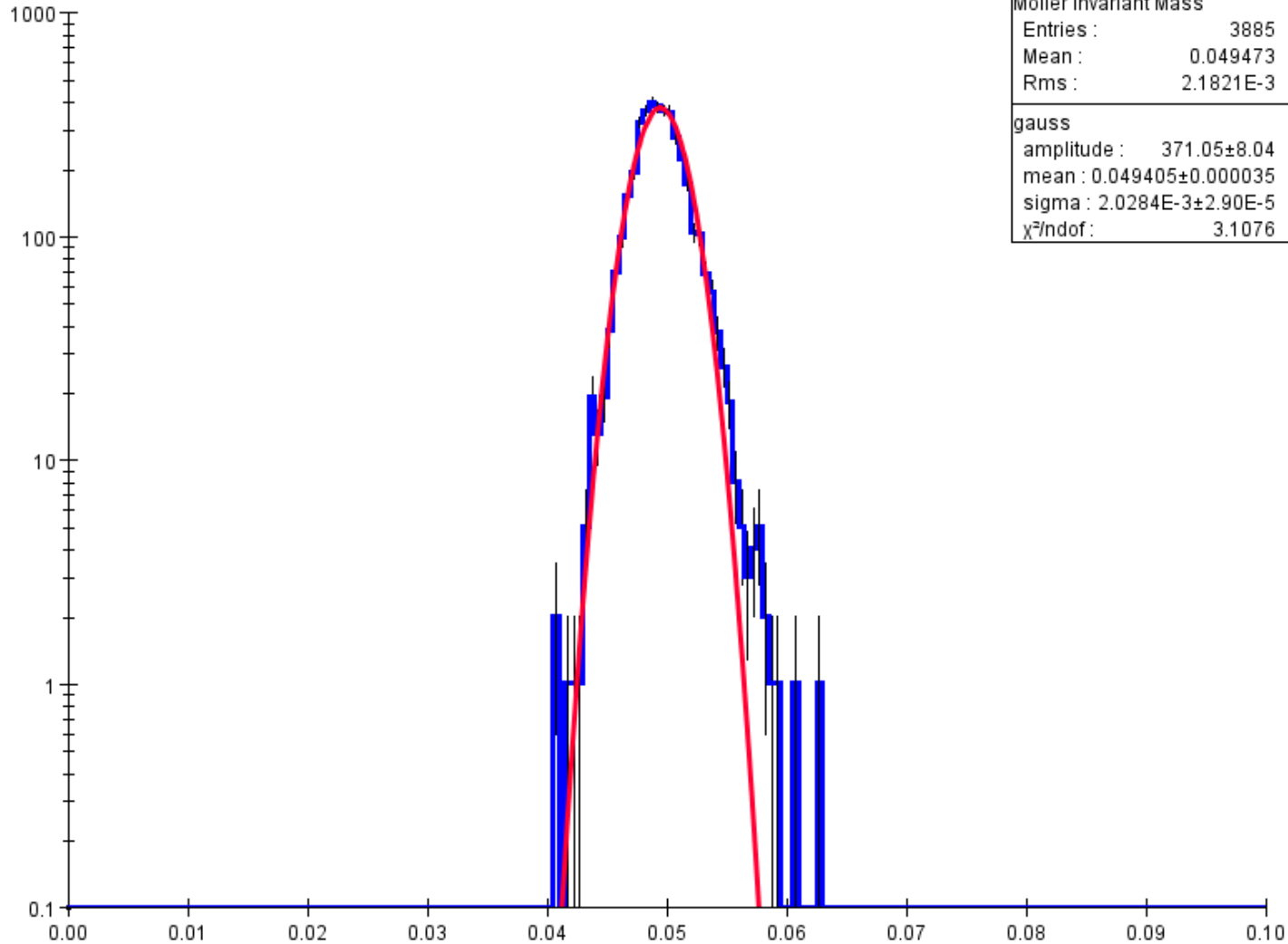
# Target Constrained Møller Invariant Mass, $z=1$

2016 Run 7796 Møller Target Constrained Mass  $z=1$



# Target Constrained Møller Invariant Mass, $z=2$

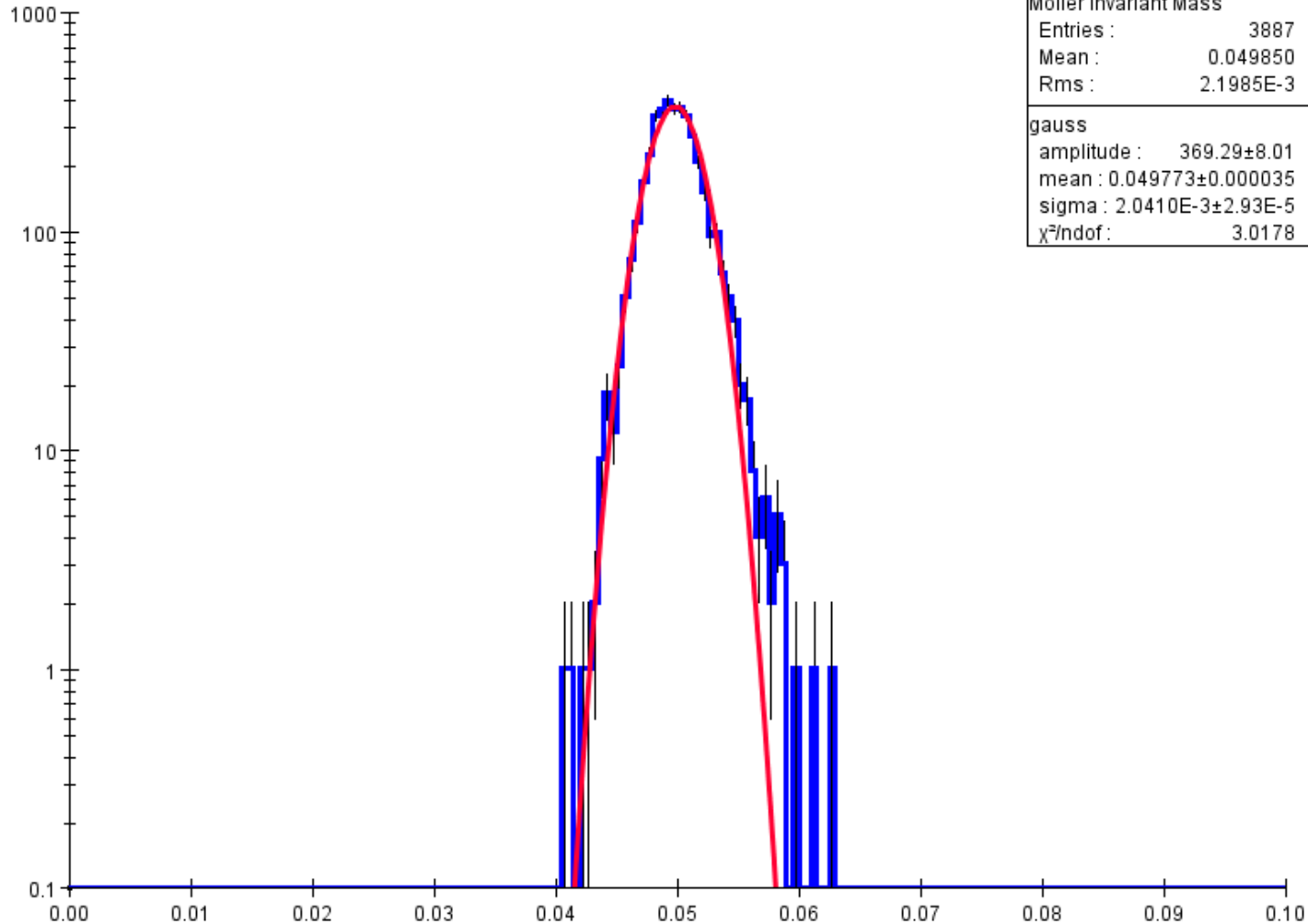
2016 Run 7796 Møller Target Constrained Mass  $z=2$





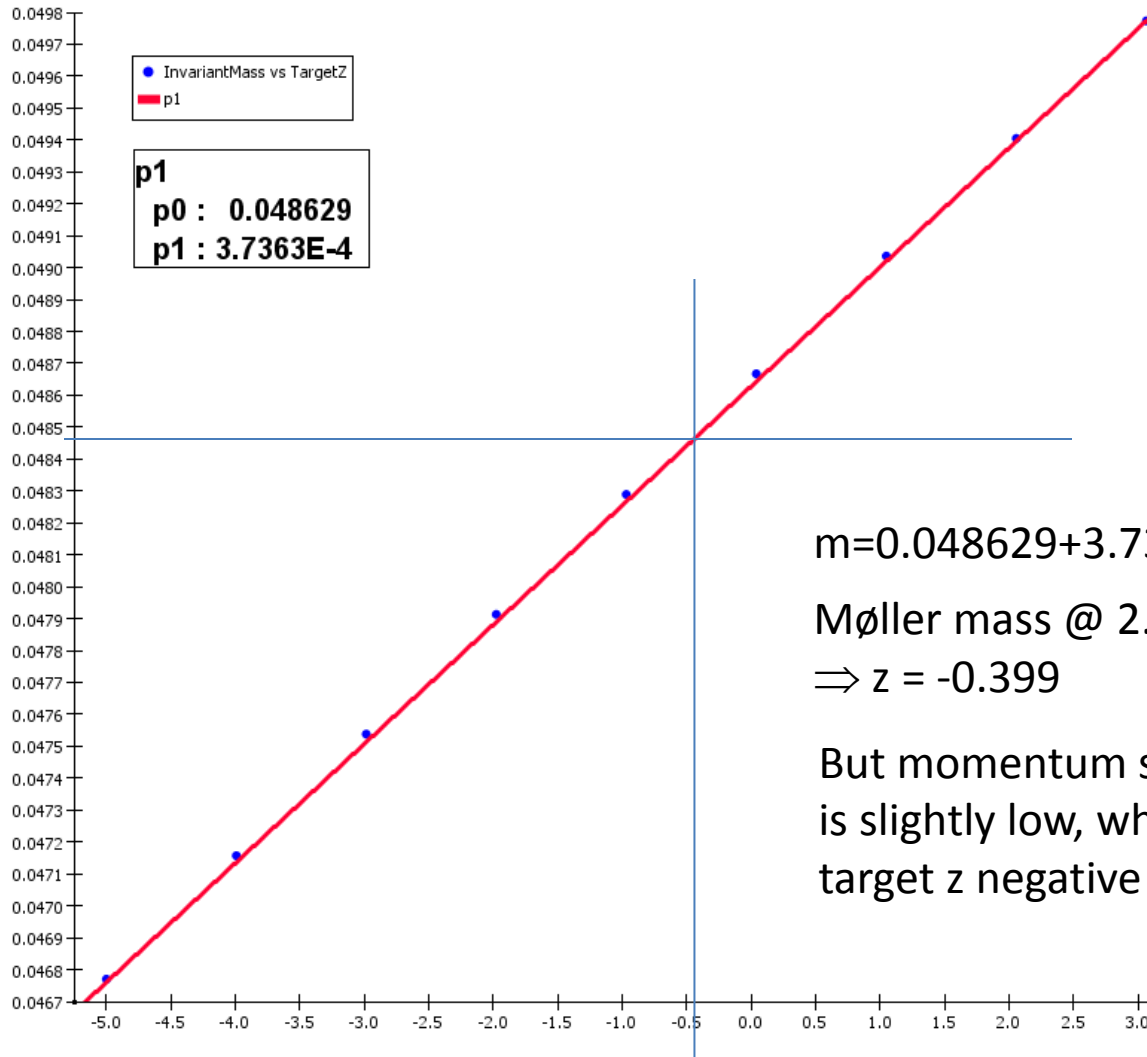
# Target Constrained Møller Invariant Mass, $z=3$

2016 Run 7796 Møller Target Constrained Mass  $z=3$



# Target Constrained Møller Mass Fitted Mean vs z

2016 Run 7796 Møller Invariant Mass Target Constrained vs Target z Position



$$m = 0.048629 + 3.7363E-4z$$

Møller mass @ 2.3 GeV = .04848

$$\Rightarrow z = -0.399$$

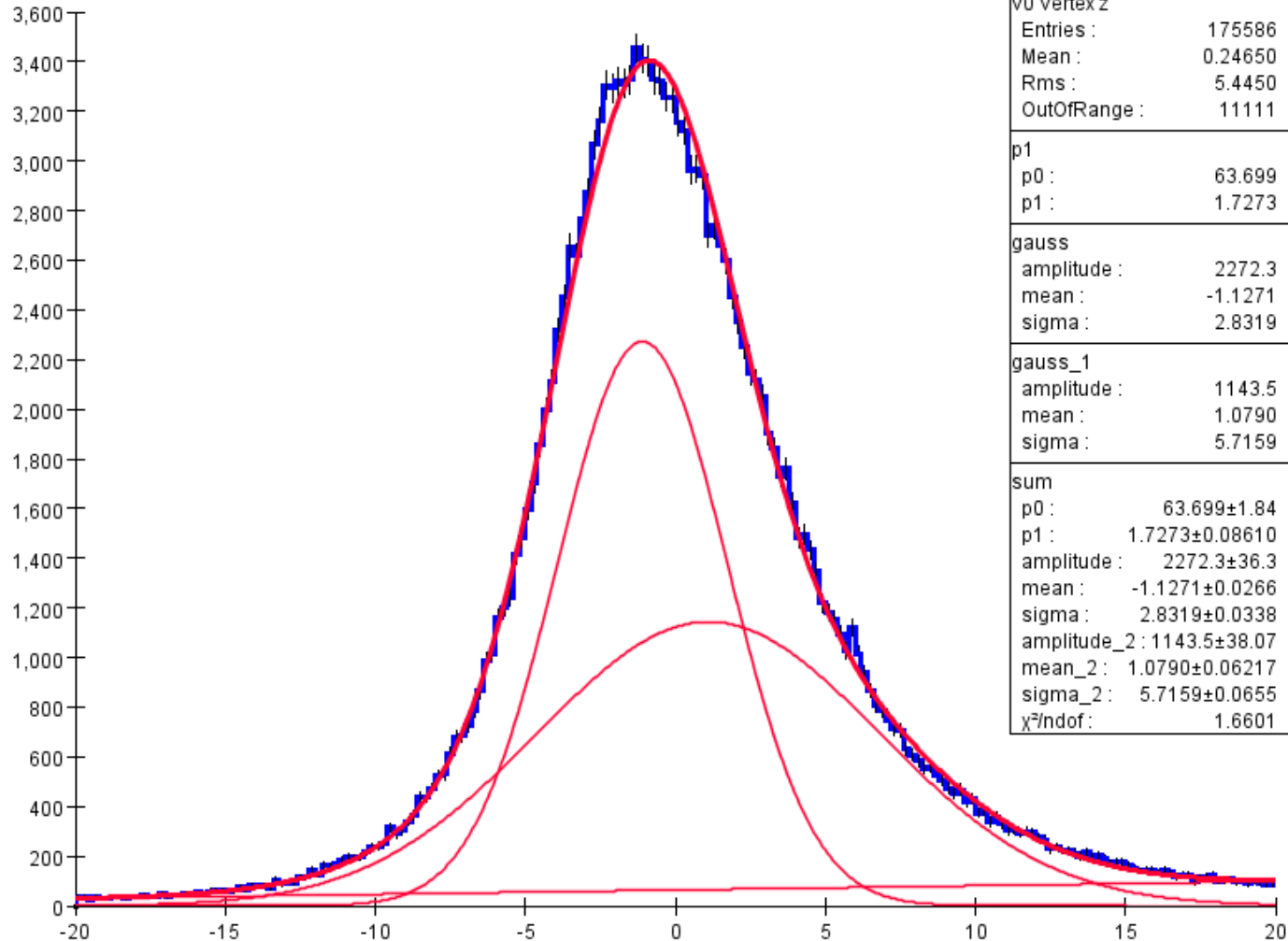
But momentum scale for FEE  
is slightly low, which would push  
target z negative

# Unconstrained V0 vertex z

Hokey assemblage of functions

“Core” Gaussian mean= -1.13

2016 Run 7796 V0 Unconstrained Vertex Z



# Where's the target?

- I'd be happy with -1mm
- but could also leave it at 0 and correct later after we get more statistics and cleaner calibration samples.