# Møller Vertex Target Scan

Norman Graf (SLAC) October 31, 2017

## Determining Target Z Position

- The Møller invariant mass peak provides us not only a mass calibration point, it also allows us to determine the target z position.
- Using the vertex position of the Unconstrained Vertices
- Check by requiring the Target Constrained vertex mass to equal the Unconstrained vertex mass (constraint should only affect the resolution).

### 2015 Møller Vertex Z Position

#### z=0.585±0.015 Moller Vertex z 4,400 -Entries : 224571 4.200+ 0.31646 Mean: 4.7337 Rms : 4.000-OutOfRange : 2788 3.800 qauss 3.600 amplitude : 592.40 mean : -0.60247 3.400 sigma : 7.0116 3.200gauss\_1 3.000+ amplitude : 3623.1 0.58458 mean : 2.800 sigma : 3.7964 2.600+ sum 2.400 amplitude: 592.40±32.43 mean: -0.60247±0.05224 2.200 sigma : 7.0116±0.0880 2.000amplitude\_1:3623.1±30.3 mean\_1: 0.58458±0.0146 1,800sigma\_1: 3.7964±0.0220 1.600x²/ndof∶ 1.7927 1.400-1,200-1,000-800-600-400-200-0--5 10 0 5 -20 -15 -10 15

#### 2015 Møller Unconstrained Vertex Z Position

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## Target Position Consistency Check

- Plot Target Constrained mass for a number of target z positions.
- Compare to mass determined from the Unconstrained fit.
- Using only 6-hit tracks from Run 5772 reconstructed with the HPS-EngRun2015-Nominal-v6-0-fieldmap detector for this analysis.

### Unconstrained Mass

#### Run 5772 Møller Candidate 6-hit Tracks Unconstrained Ver...

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### Target Constrained Mass z = 0.0mm

#### Run 5772 Møller Candidate 6-hit Tracks Target z=0.0

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### Target Constrained Mass z = 0.5mm

#### Run 5772 Møller Candidate 6-hit Tracks Target z=0.5

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### Target Constrained Mass z = 1.0mm

#### Run 5772 Møller Candidate 6-hit Tracks Target z=1.0

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### Target Constrained Mass z = 1.5mm

#### Run 5772 Møller Candidate 6-hit Tracks Target z=1.5

#### Run 5772 Møller Candidate 6-hit Tracks Target z=1.5



## Target Constrained Mass vs Z Position



Fitted Gaussian Mean

## Conclusion

Both the explicit target z position determination from the unconstrained vertex analysis and the implicit target z position derived from requiring the unconstrained and target-constrained masses to be equal point to a target z position of

## Z = +0.5mm