

# Simulation straw detector with parameterization at reconstruction

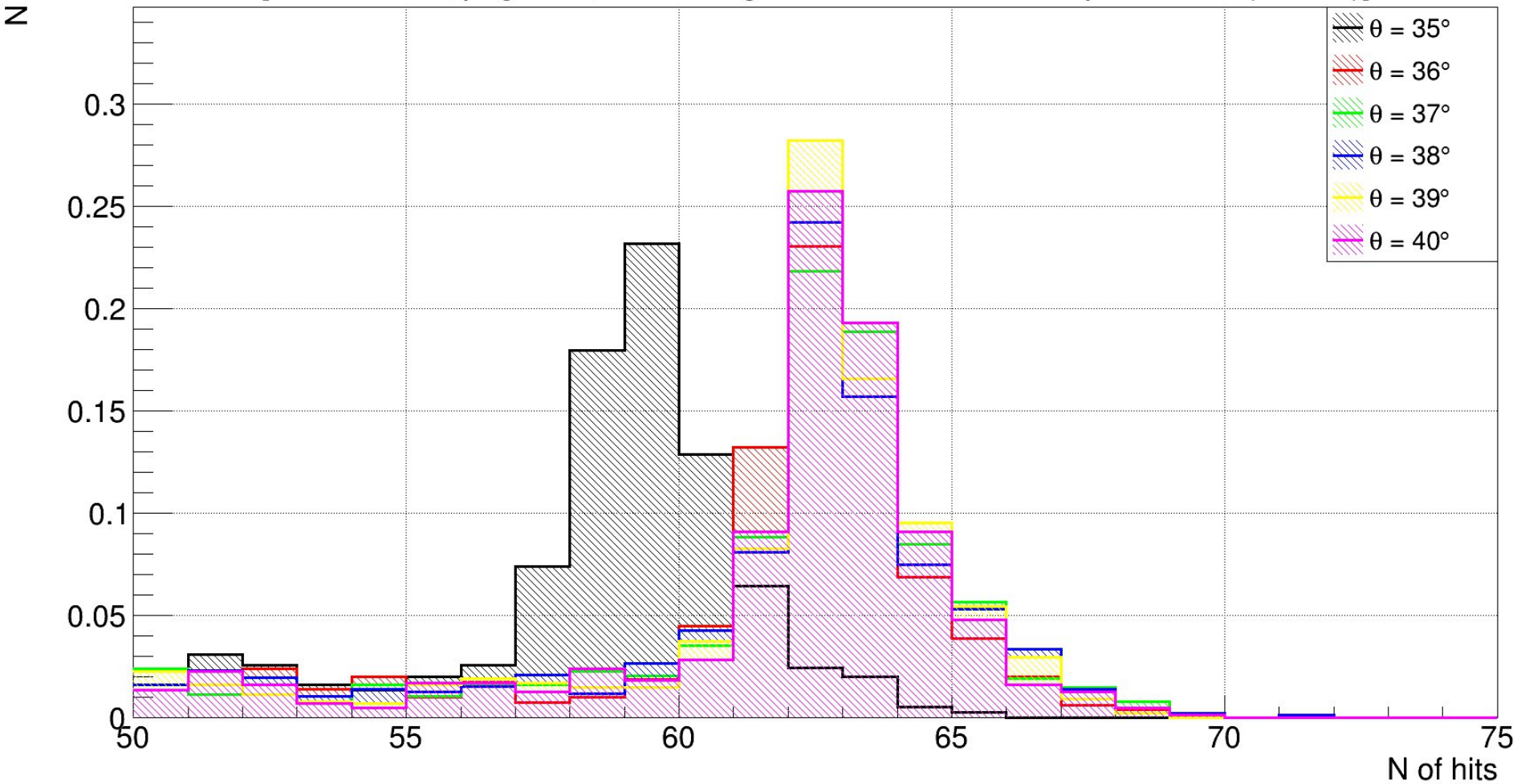
2024-04-30

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# Boundary angle between Z-axis and Beam-axis is $36^\circ$

N hits in Barrel for range of theta (angle between Z-axis and beam)

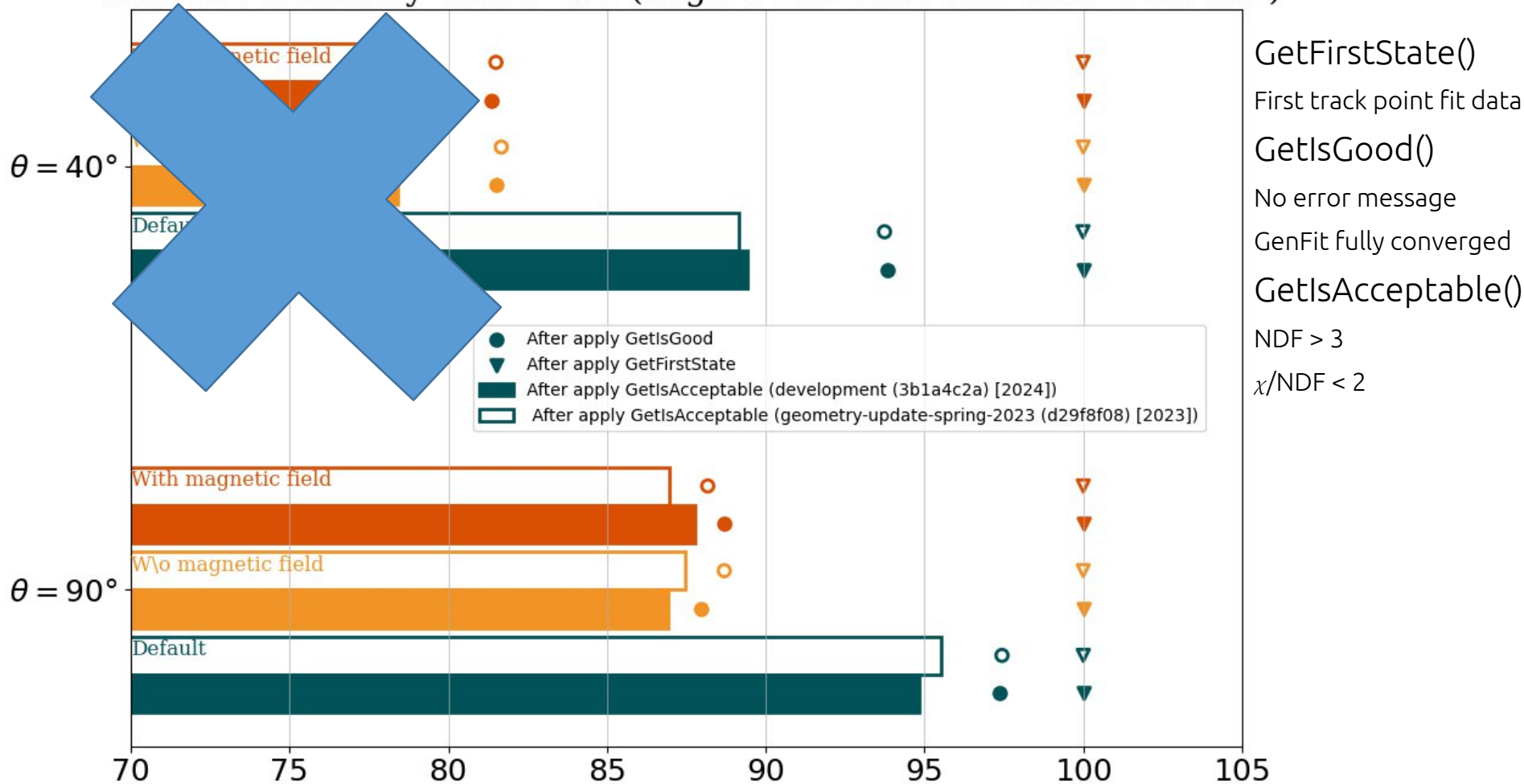
[P = 1.0 GeV, pdg = 13, stereo-angle between straw sublayers =  $3.0^\circ$  (default)]



# Parameterization reduces the efficiency of track reconstruction

Reconstruction efficiency for parametrization with and w\o a magnetic field.  
Comparison with the default version.

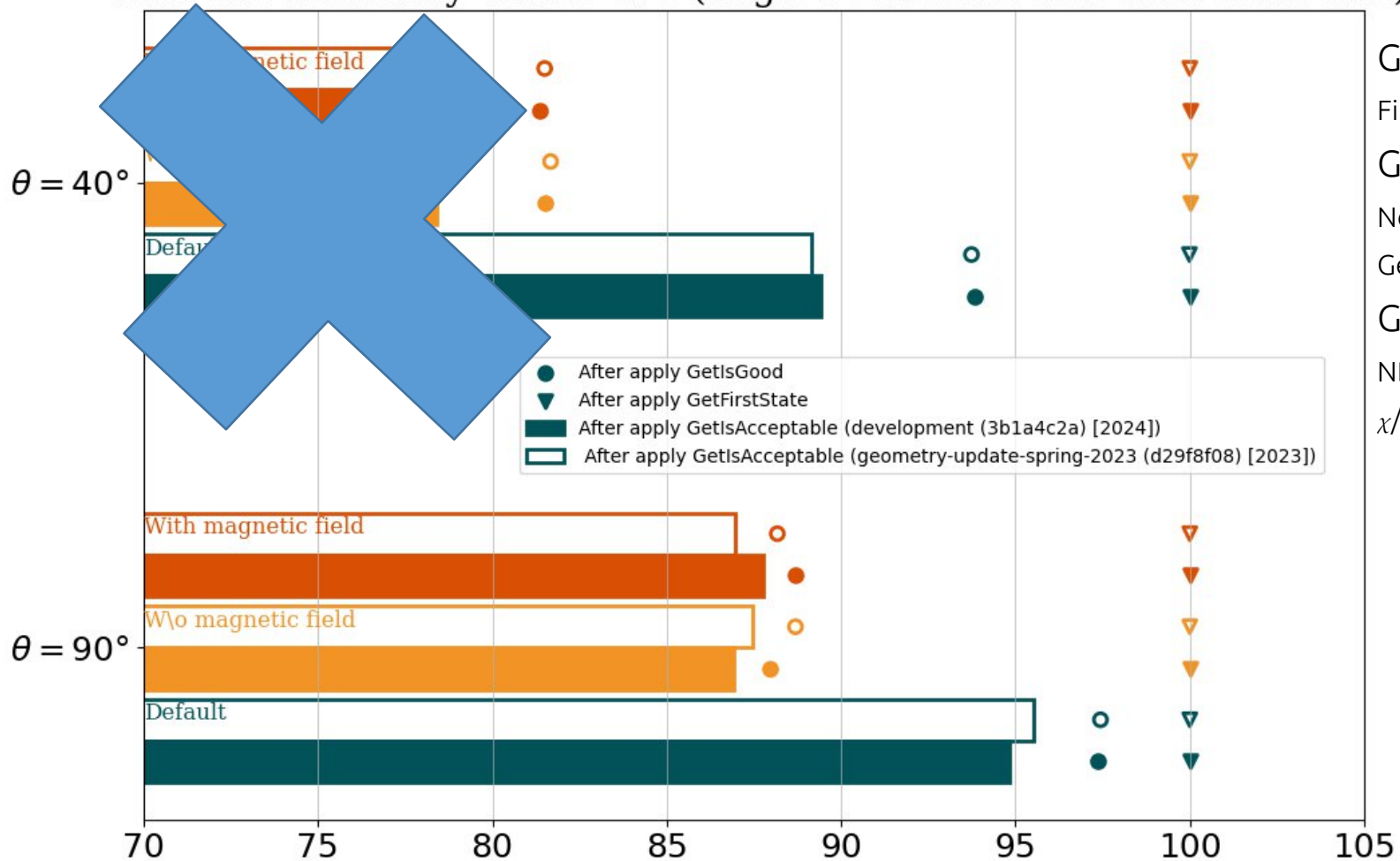
Presented for two versions of SPDRROOT (dev[fill] and geom[empty])  
with two boundary values of  $\theta$  (angle between Z-axis and Beam-axis)



# The difference between parameterization with and w/o magnetic field is within 2%

Reconstruction efficiency for parameterization with and w/o a magnetic field.  
Comparison with the default version.

Presented for two versions of SPDR00T (dev[fill] and geom[empty])  
with two boundary values of  $\theta$  (angle between Z-axis and Beam-axis)



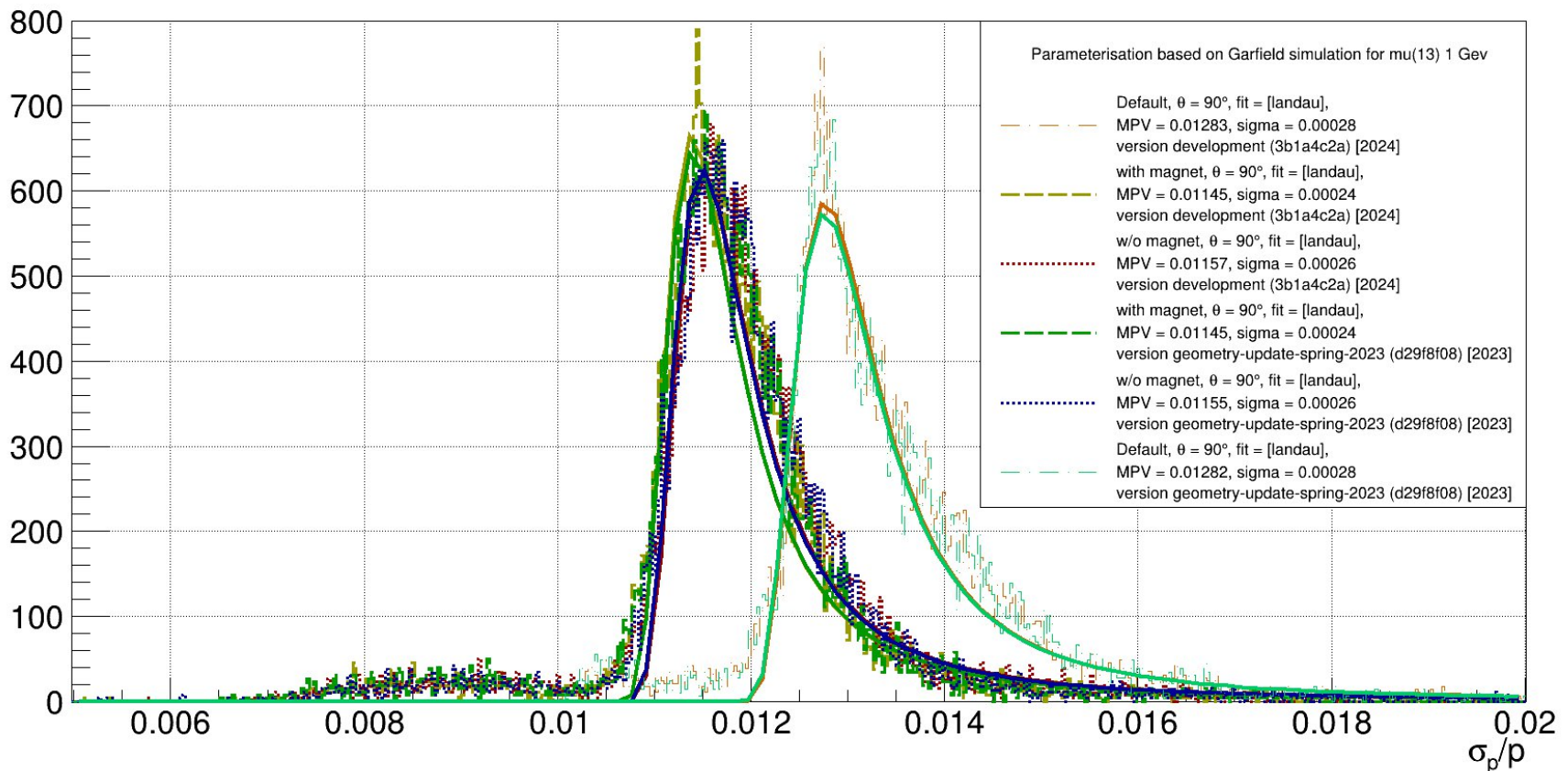
- GetFirstState()
- First track point fit data
- GetIsGood()
- No error message
- GenFit fully converged
- GetIsAcceptable()
- NDF > 3
- $\chi/NDF < 2$

Momentum resolution (**full**) is better with parameterization.  
The difference is more than 10%

The difference between parameterization with and without a magnetic field is less than 1 %

$\sigma_p/p$  for  $\theta=90^\circ$  (angle between Z-axis and beam)

[P = 1.0 GeV, pdg = 13, stereo-angle between straw sublayers = 3.0° (default)]





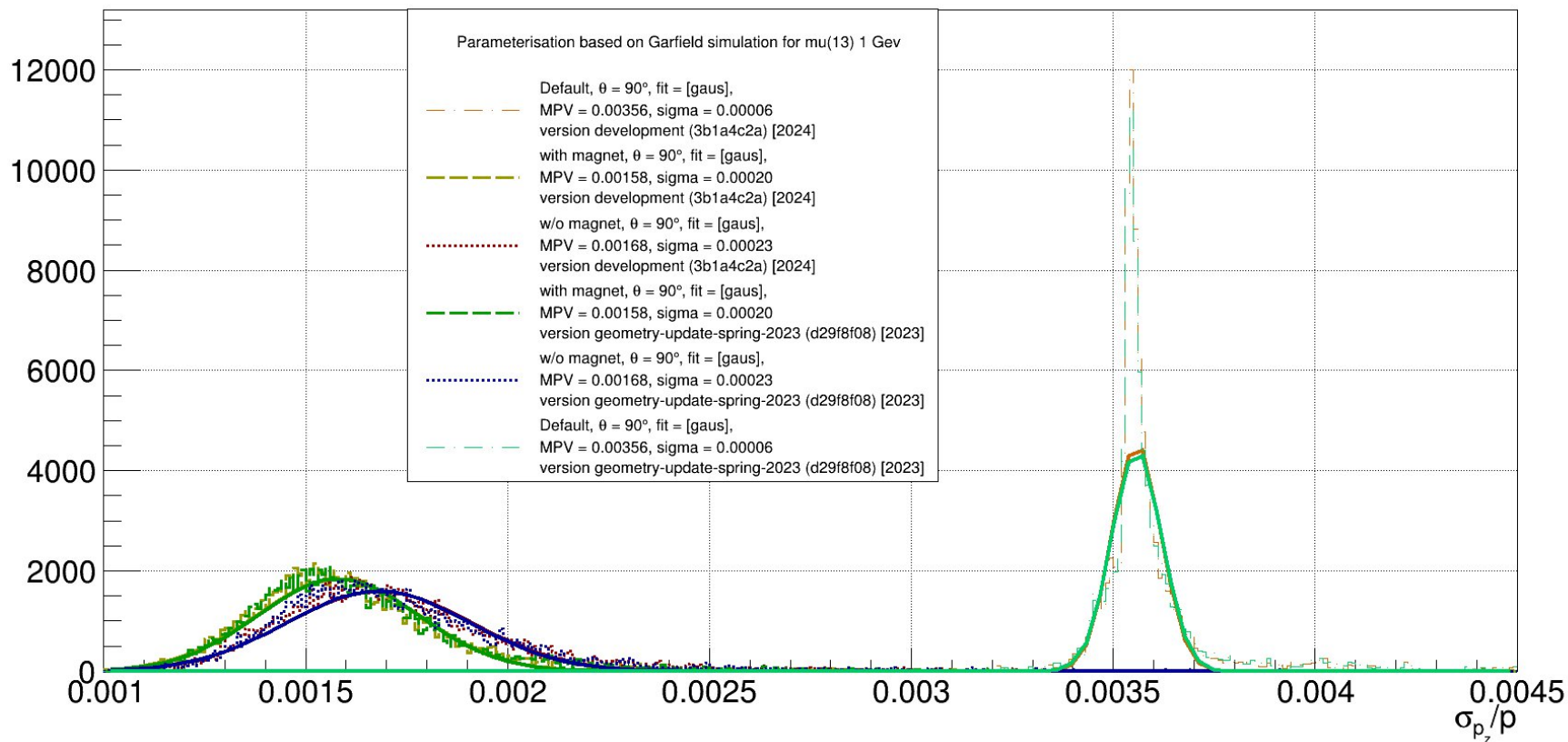
Momentum resolution ( $Z$ ) is better with parameterization.

The difference is more than 50%

The difference between parameterization with and without a magnetic field is less than 7 %

$\sigma_{p_z}/p_z$  for  $\theta=90^\circ$  (angle between Z-axis and beam)

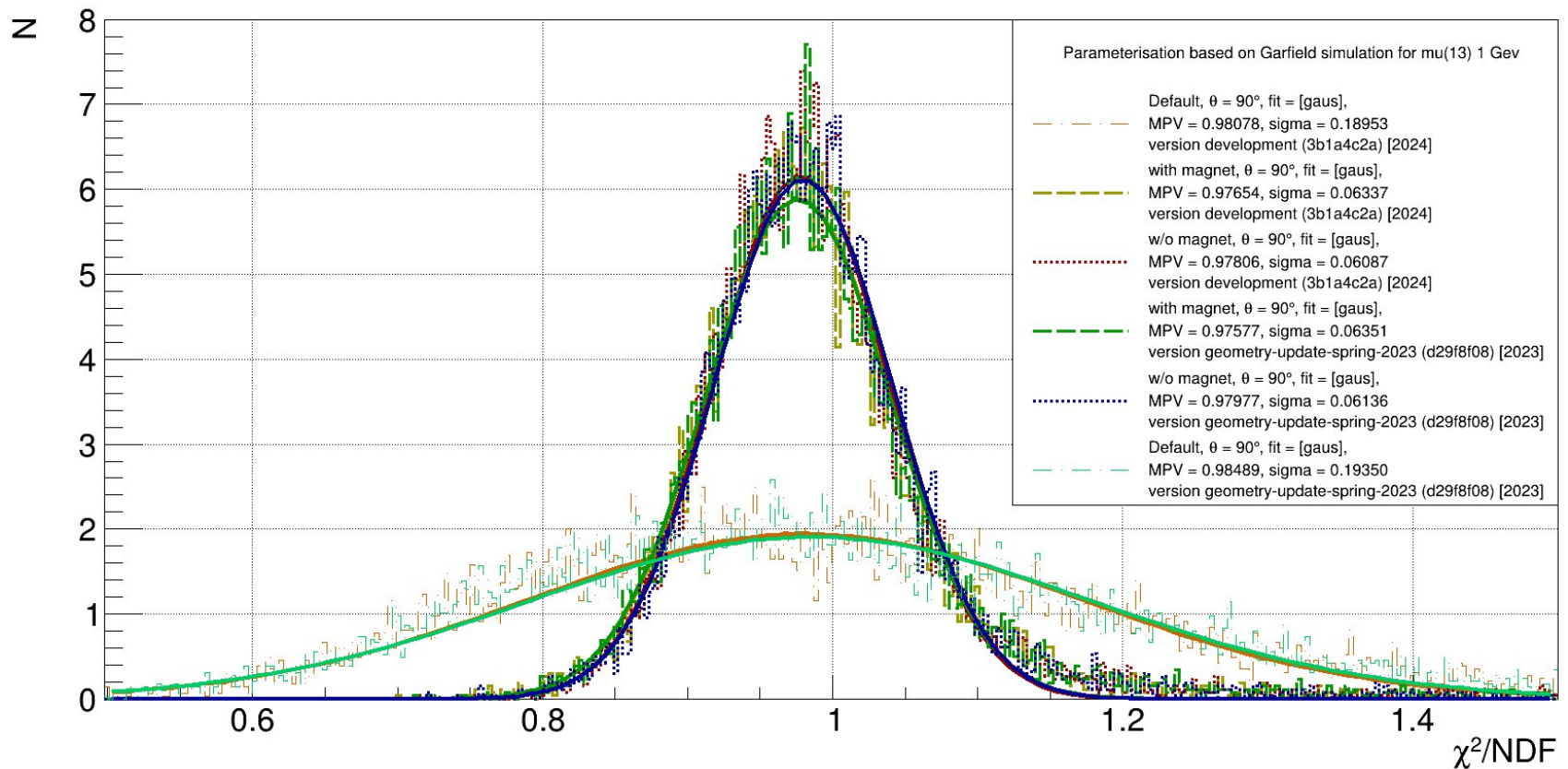
[P = 1.0 GeV, pdg = 13, stereo-angle between straw sublayers = 3.0° (default)]



# $\chi^2/\text{ndf}$ there is no difference

$\chi^2/\text{ndf}$  for  $\theta=90^\circ$  (angle between Z-axis and beam)

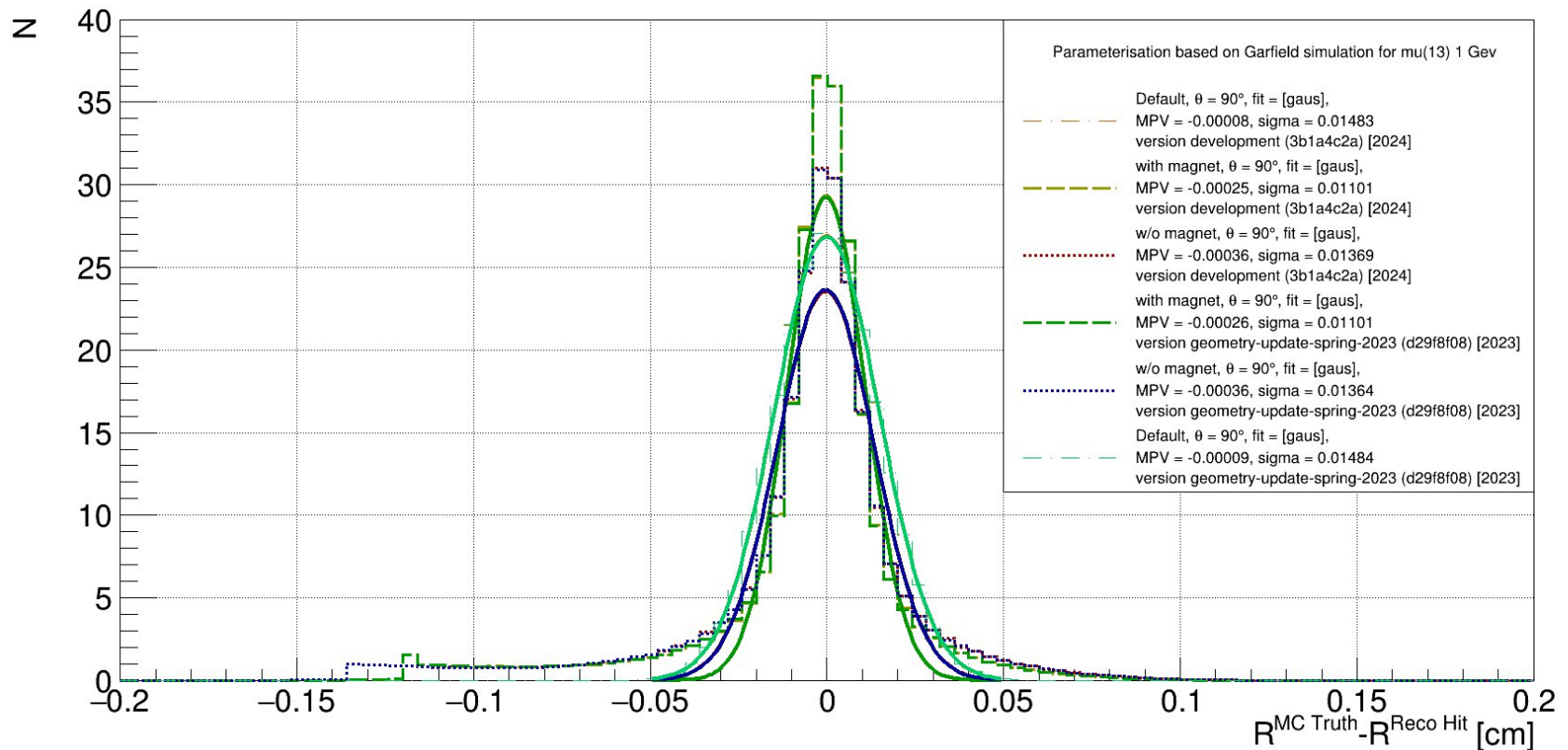
[P = 1.0 GeV, pdg = 13, stereo-angle between straw sublayers =  $3.0^\circ$  (default)]



# The residual distribution is wider for the default version

Residual for  $\theta=90^\circ$  (angle between Z-axis and beam)

[P = 1.0 GeV, pdg = 13, stereo-angle between straw sublayers =  $3.0^\circ$  (default)]

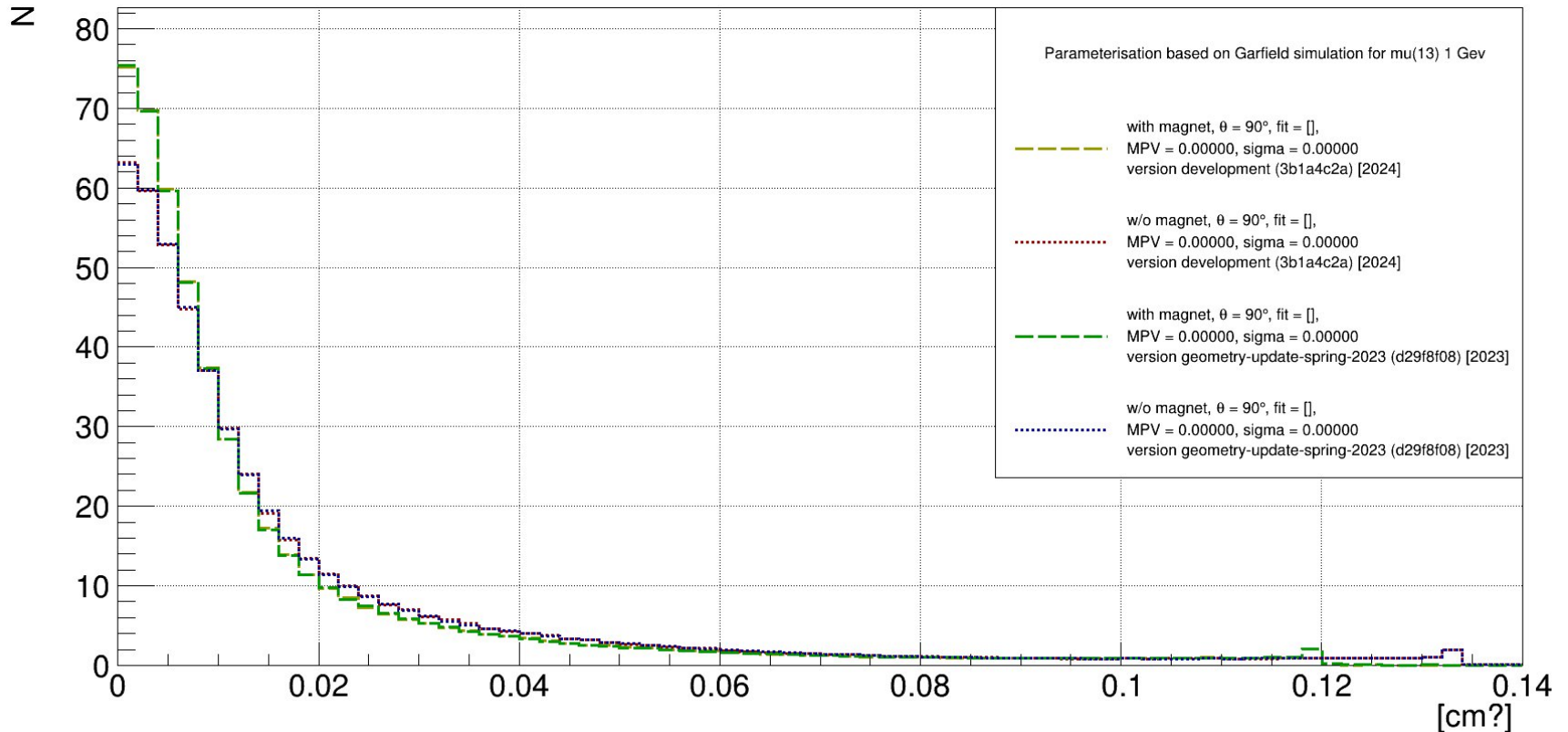




# Resolution distribution when comparing parameterization with and without a magnetic field. Parameterization without magnetic field gives a wider distribution

Resolution for  $\theta=90^\circ$  (angle between Z-axis and beam)

[P = 1.0 GeV, pdg = 13, stereo-angle between straw sublayers =  $3.0^\circ$  (default)]





Resolution for  $\theta=90^\circ$  (angle between Z-axis and beam)

[P = 1.0 GeV, pdg = 13, stereo-angle between straw sublayers =  $3.0^\circ$  (default)]

