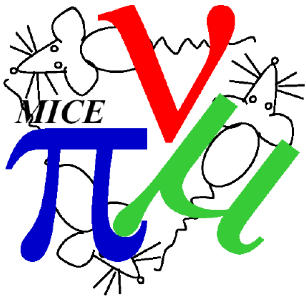


Field On Scattering

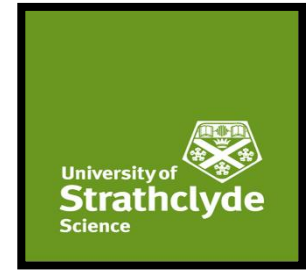
Alan Young

Department of Physics,
University of Strathclyde

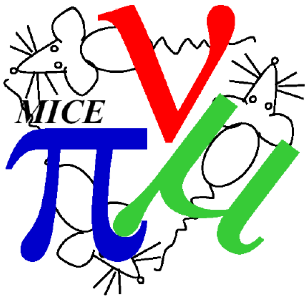
8th November 2018



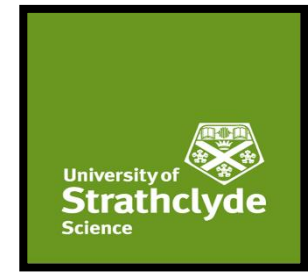
Code Status



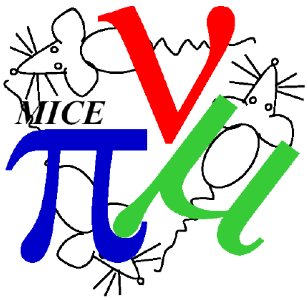
- Analysis carried out using Maus 3.1.0
- Field on analysis code based on Field off code developed by R Bayes and J Nugent.
- Globals implemented in data selection
- Additional cuts added to improve quality of data have been added
- Correction to downstream momentum has been added to compensate for misalignment



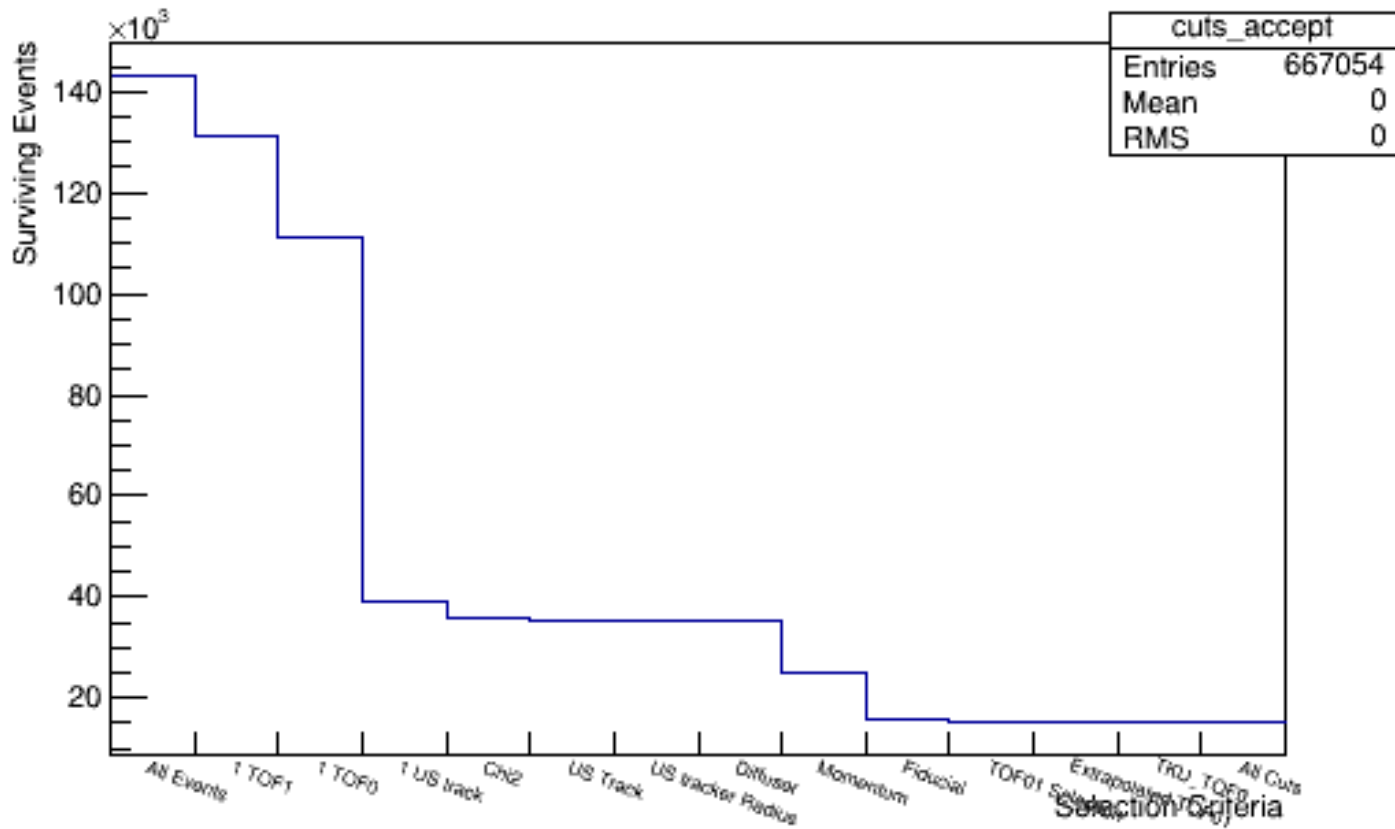
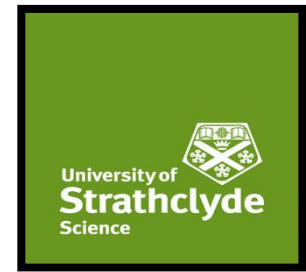
Data Selection

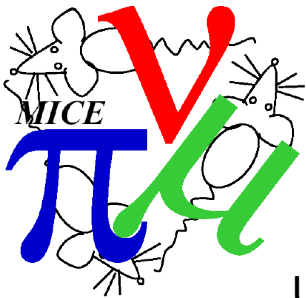


- Require exactly 1 TOF1 space point
- Require exactly 1 TOF0 space point
- Require exactly 1 track in Upstream Tracker
- Upstream tracker $\text{Chi}^2/\text{dof} < 5$
- Upstream tracker max radius $< 150\text{mm}$
- Diffuser max radius $< 100\text{mm}$
- TOF01 consistent with Muon Peak
- Extrapolated TOF01 consistent with muon hypothesis
- Successfully extrude track from Upstream tracker back to TOF0
- Fiducial cut - require the track from the upstream tracker, when projected downstream to be within a specific radius at a point downstream
- Select narrow range of muon momentum to allow study of scattering as a function of momentum

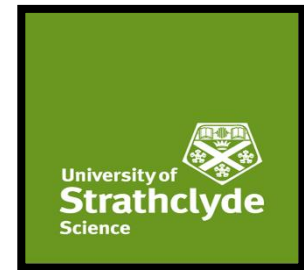


Data Selection



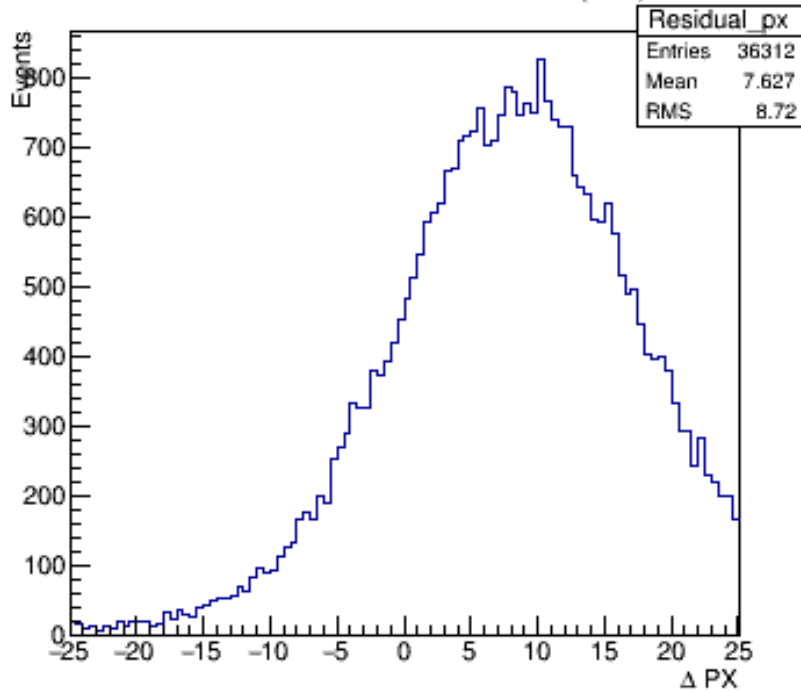


Correction of Analysis Misalignment



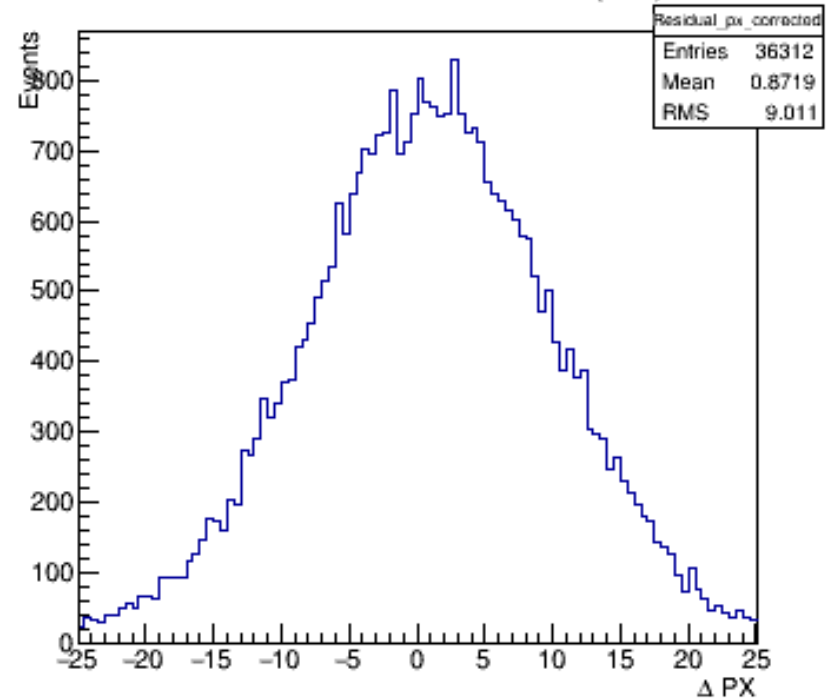
Uncorrected

Difference in Momentum (PX)

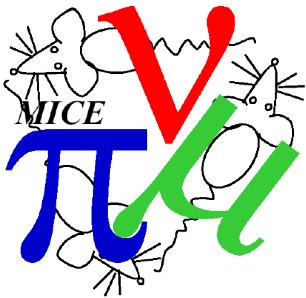


Corrected

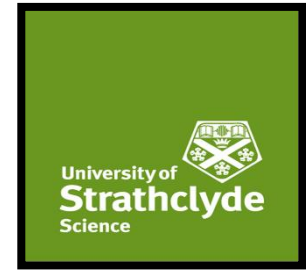
Difference in Momentum (PX)



- There is a significant offset between the upstream and downstream tracker data.
- As the scattering is not expected to have a preferential direction a compensating factor has been added to the momentum at the absorber as predicted by the downstream tracker.



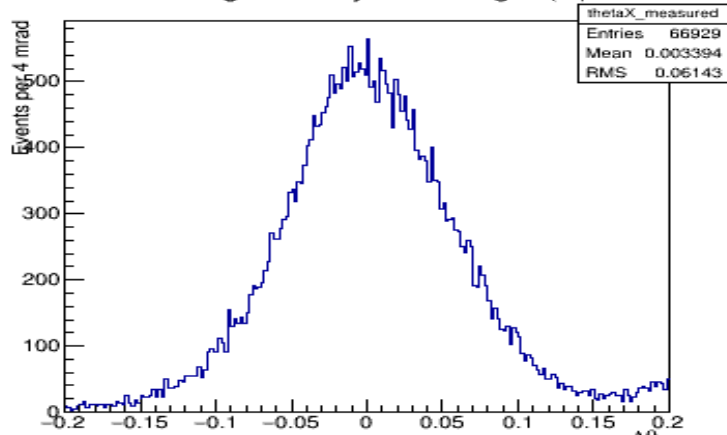
Measured Scattering Angles



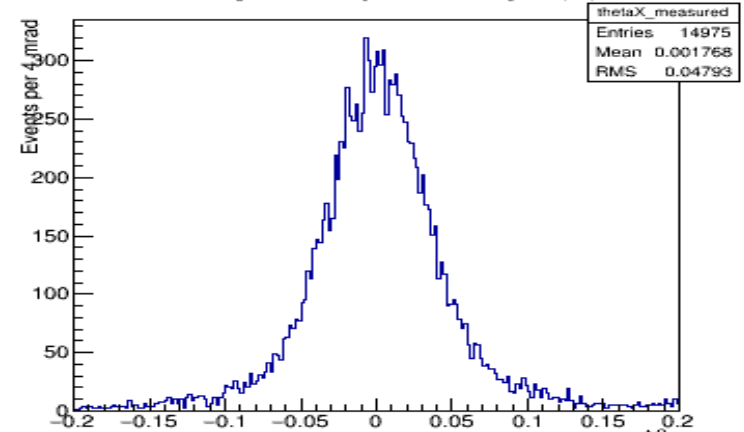
170MeV/c

200MeV/c

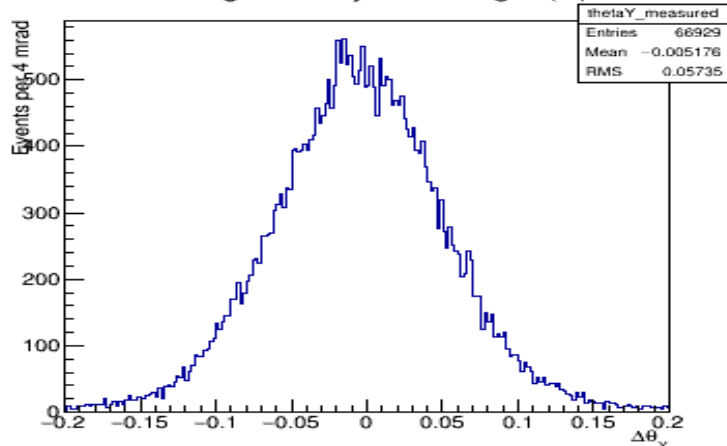
Change in Projected Angle (X)



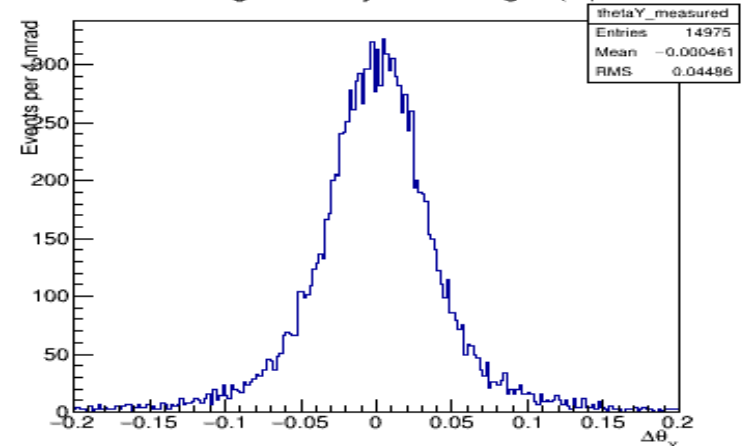
Change in Projected Angle (X)



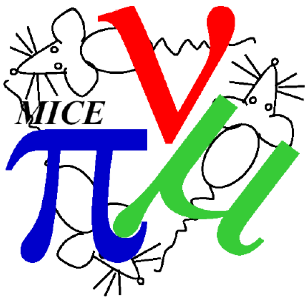
Change in Projected Angle (Y)



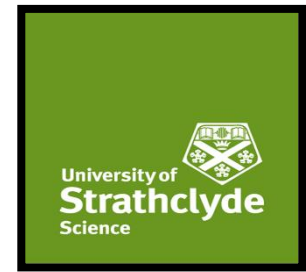
Change in Projected Angle (Y)



Each momentum slice taking 2 ½ days to analyse!



Summary



- Seeing an unexpected asymmetry in the projected scattering angle
 - Introduced a correction factor to compensate
- Starting to run analysis code over full data set, but it is slow.
 - Most of the time is taken in preparing the data for analysis, which includes data selection.
 - Looking to introduce a 2-stage process, where most computational intensive part of data preparation process is run separately from momentum selection and analysis
 - Pursuing gaining access to grid computing resources.