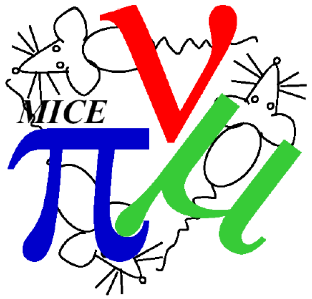
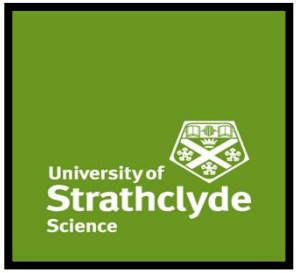




Field On Scattering

Alan Young

Department of Physics,
University of Strathclyde

13th March 2020

Introduction

- Data Selection
  - Moved selections from slow stage 1 to fast stage 2
  - Code to generate data selection histograms
  - Monte Carlo data currently in production

Rearrangement of data selections

Selection Cuts

- Stage 1 Cuts
  - Require exactly 1 TOF1 space point
  - Require exactly 1 TOF0 space point
  - Require exactly 1 track in Upstream Tracker
  - Upstream tracker Chi2/dof<10
  - Upstream tracker max radius < 150mm
  - Diffuser max radius < 100mm
  - TOF01 consistent with Muon Peak
  - Extrapolated TOF01 consistent with muon hypothesis
  - Successfully extrude track from Upstream tracker back to TOF0
- Stage 2 Cuts
  - Fiducial cut - require the track from the upstream tracker, when projected downstream to be within 140mm radius at station 5 of downstream tracker
  - Select narrow range of muon momentum to allow study of scattering as a function of momentum

Selection Cuts

- Stage 1 Cuts
  - Require exactly 1 track in Upstream Tracker
- Stage 2 Cuts
  - Require exactly 1 TOF1 space point
  - Require exactly 1 TOF0 space point
  - Upstream tracker Chi2/dof<10
  - Upstream tracker max radius < 150mm
  - Diffuser max radius < 90mm
  - 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 140mm radius at station 5 of downstream tracker
  - Select narrow range of muon momentum to allow study of scattering as a function of momentum

Field on data runs for analysis

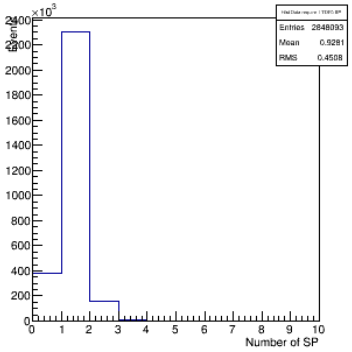
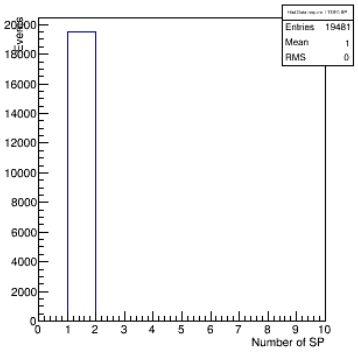
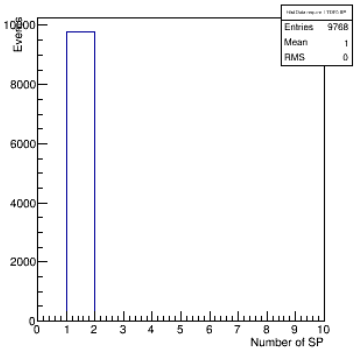
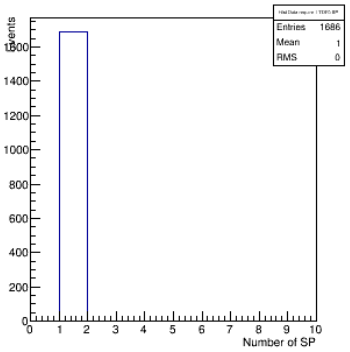
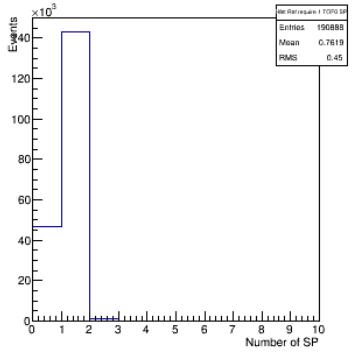
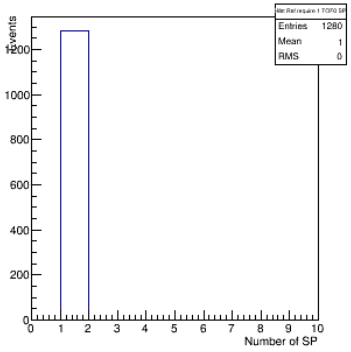
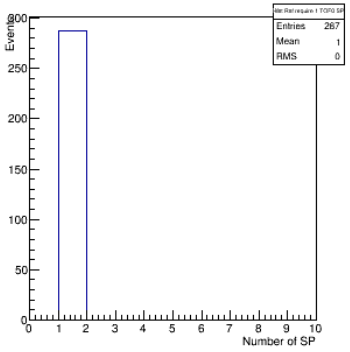
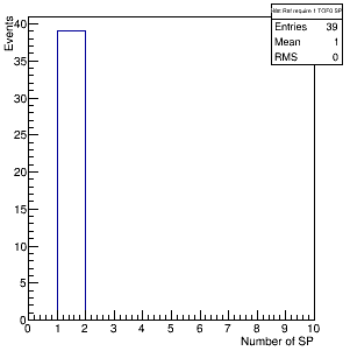
Data runs with LiH Absorber from Step 4 User Cycle 2016/03

140MeV/c	172MeV/c	200MeV/c	240MeV/c
8445	8448	8450	8451
8446	8449	8554	8456
8447	8453	8455	8460
8452	8458	8459	8461
8457	8464	8463	8462
8465	8469	8468	8467
8466			
8470			
8471			

Data runs no Absorber from Step 4 User Cycle 2016/03

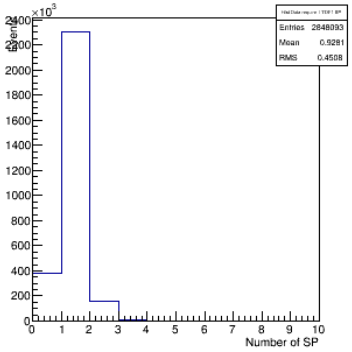
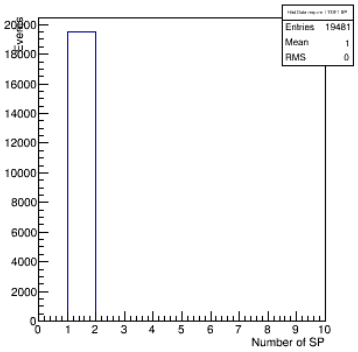
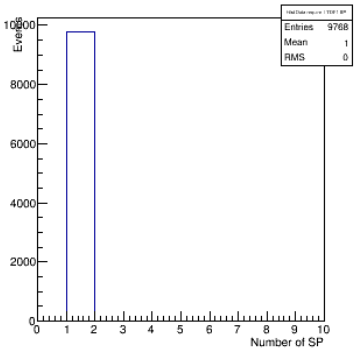
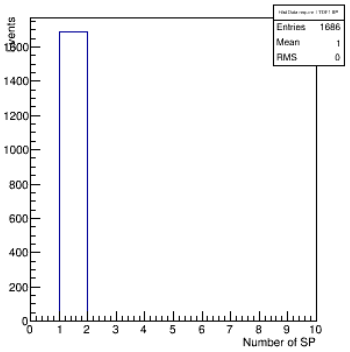
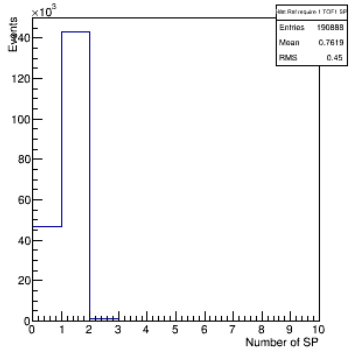
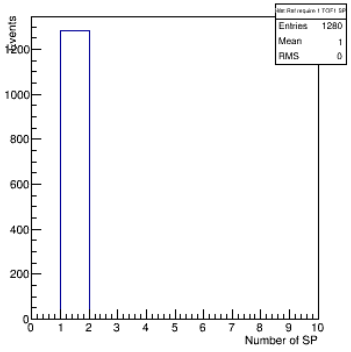
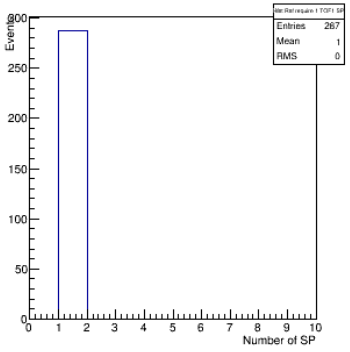
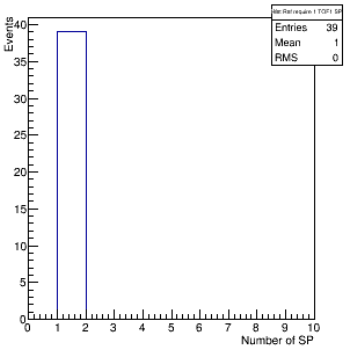
140MeV/c	172MeV/c	200MeV/c	240MeV/c
8363	8364	8366	8367
8372	8365	8368	8370
8378	8373	8369	8377
	8376	8374	
		8375	

TOF0 space points

	No Cuts	3-172	3-200	3-240
Absorber				
No Absorber				

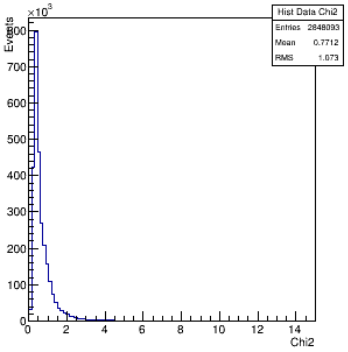
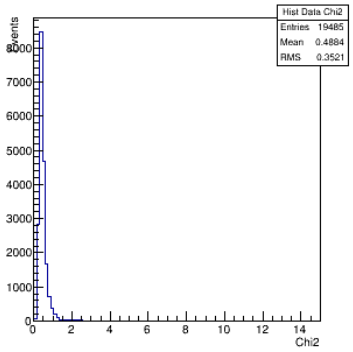
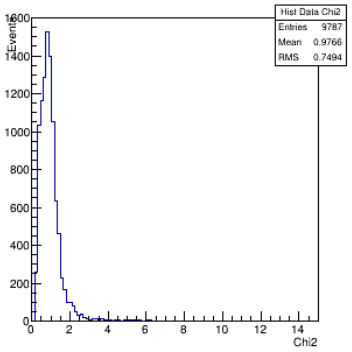
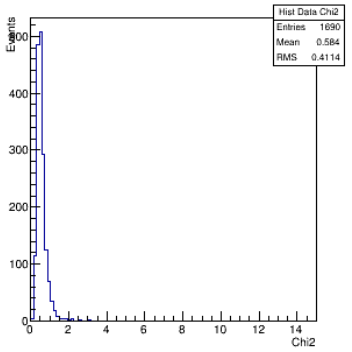
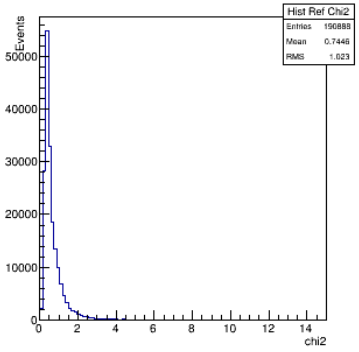
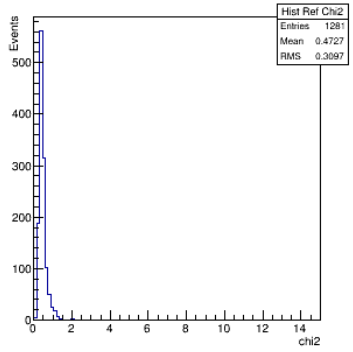
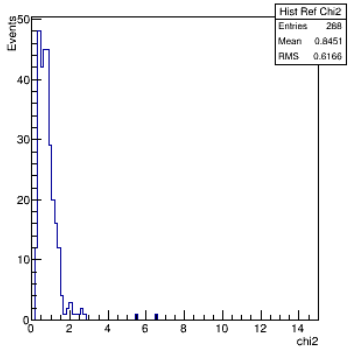
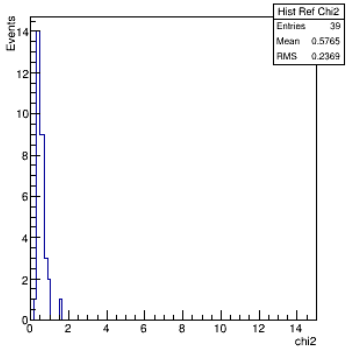
Criteria: Require 1 TOF0 space Point

TOF1 space points

	No Cuts	3-172	3-200	3-240
Absorber				
No Absorber				

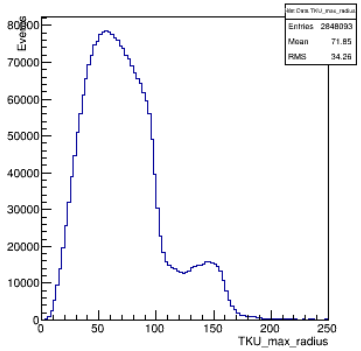
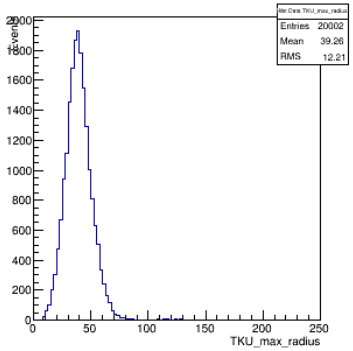
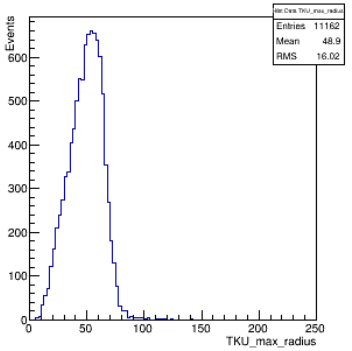
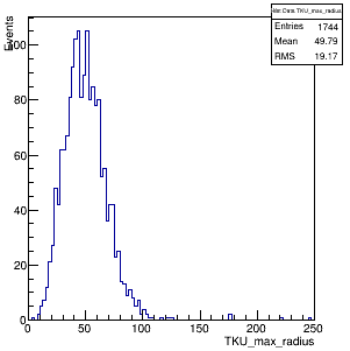
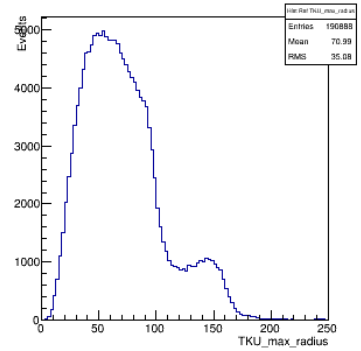
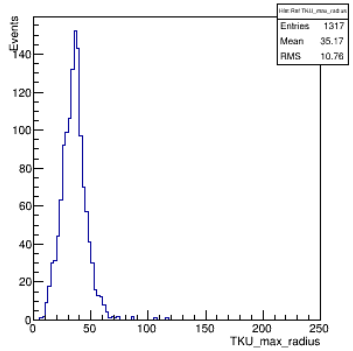
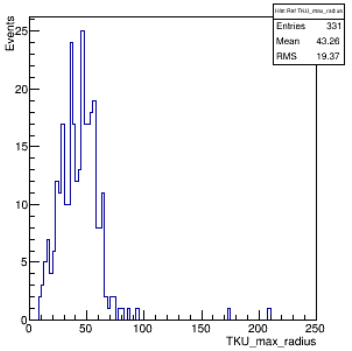
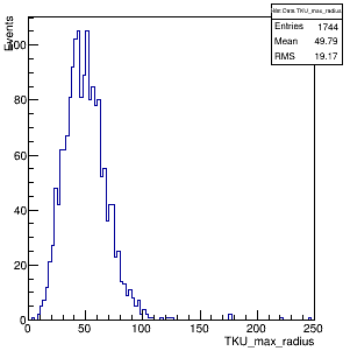
Criteria: Require 1 TOF1 space Point

Upstream tracker Chi^2/degrees of freedom

	No Cuts	3-172	3-200	3-240
Absorber				
No Absorber				

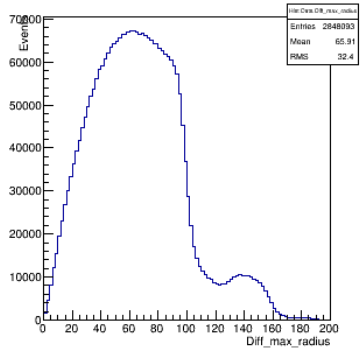
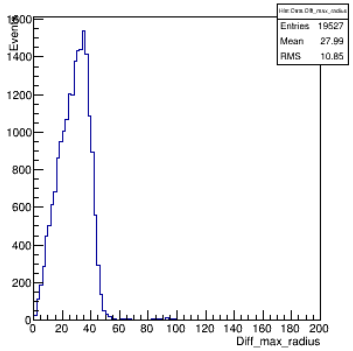
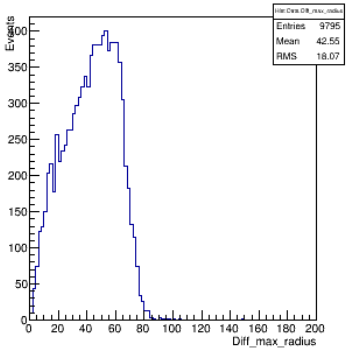
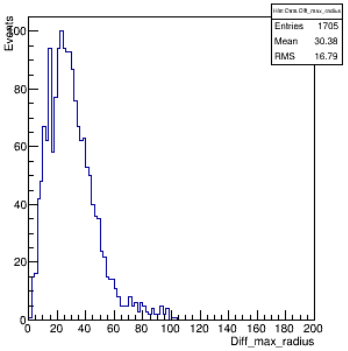
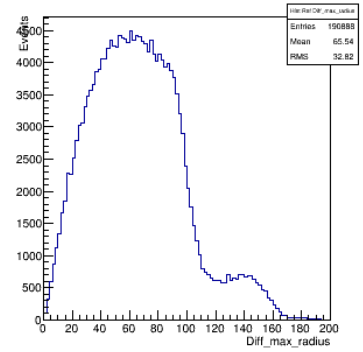
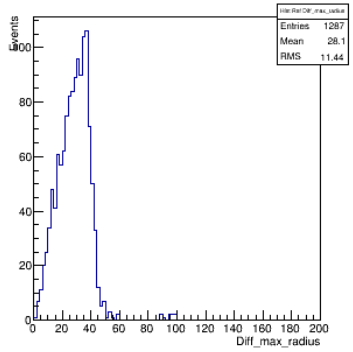
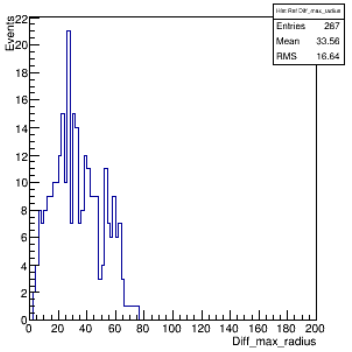
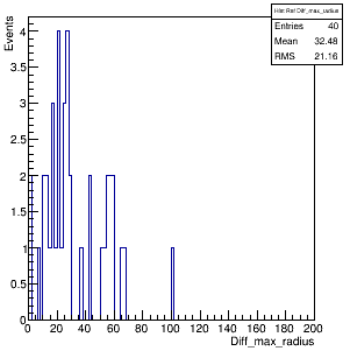
Criteria: Upstream tracker Chi^2/dof<10

Upstream tracker maximum radius

	No Cuts	3-172	3-200	3-240
Absorber				
No Absorber				

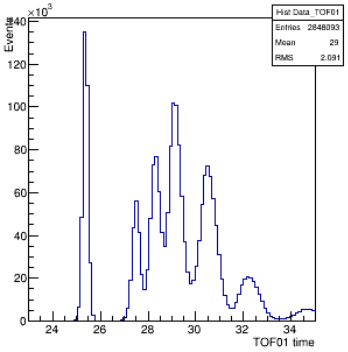
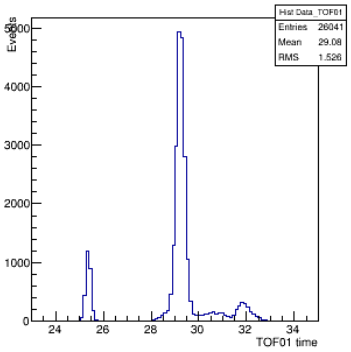
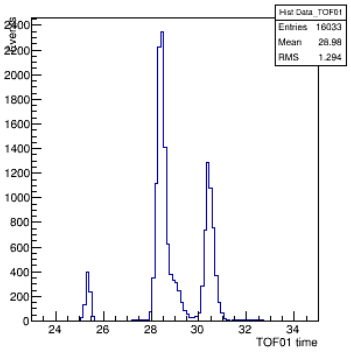
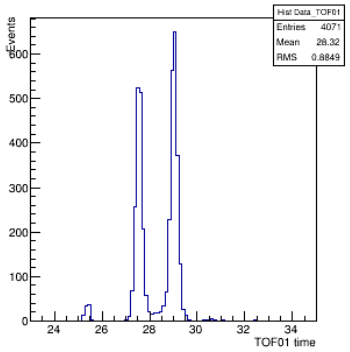
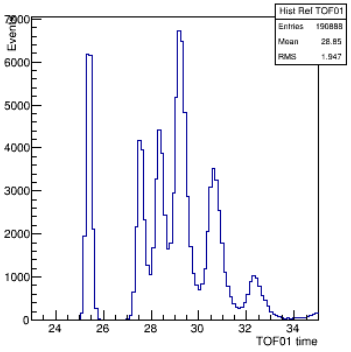
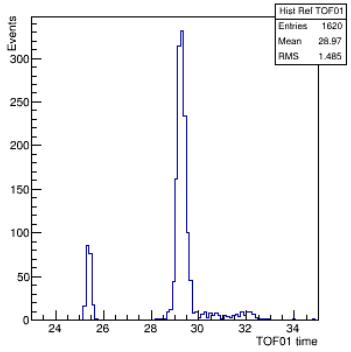
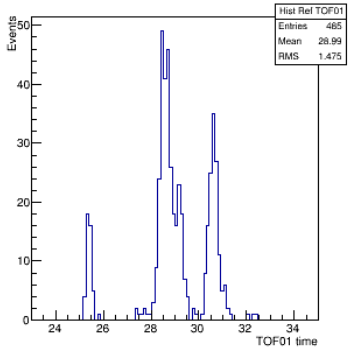
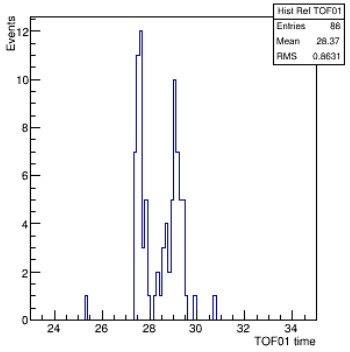
Criteria: Upstream tracker maximum radius<150mm

Diffuser maximum radius

	No Cuts	3-172	3-200	3-240
Absorber				
No Absorber				

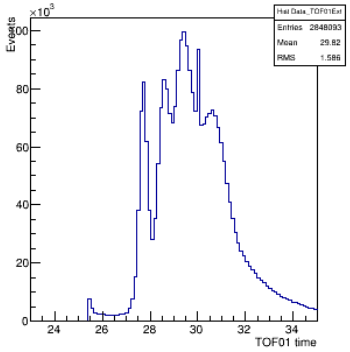
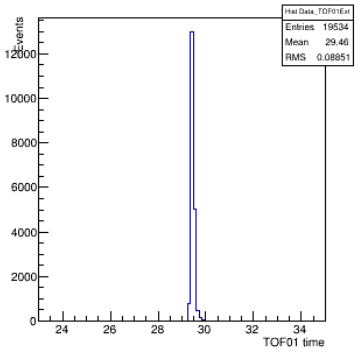
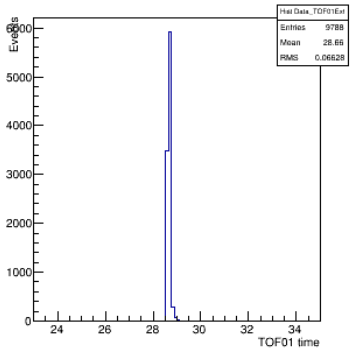
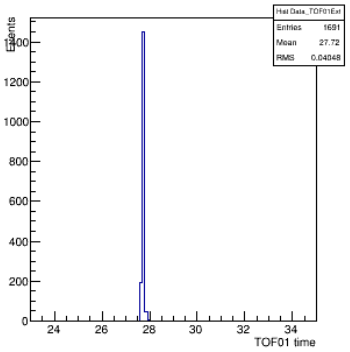
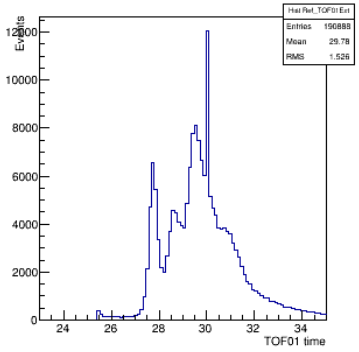
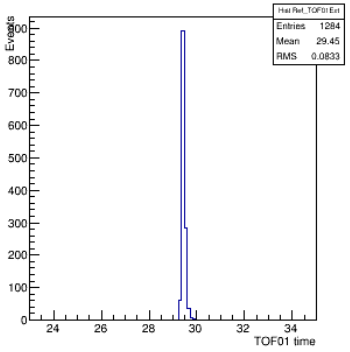
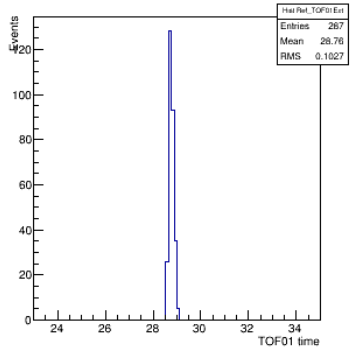
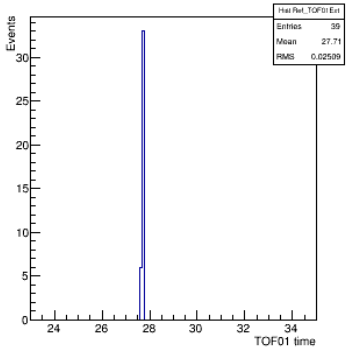
Criteria: Diffuser maximum radius<90mm

TOF01 time

	No Cuts	3-172	3-200	3-240
Absorber				
No Absorber				

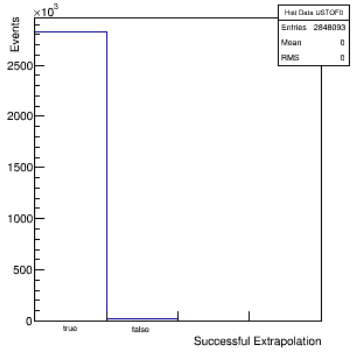
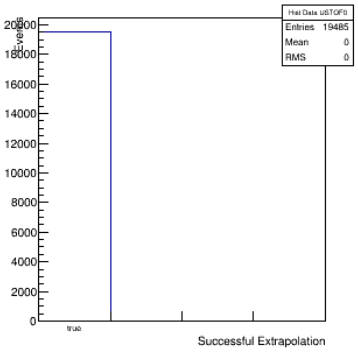
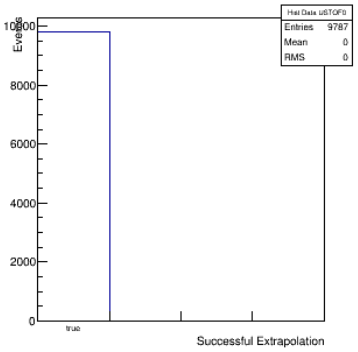
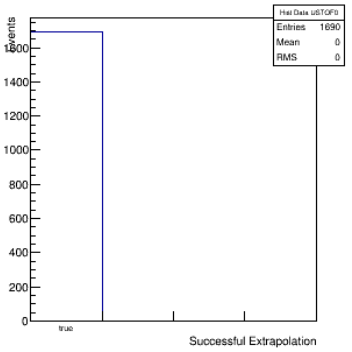
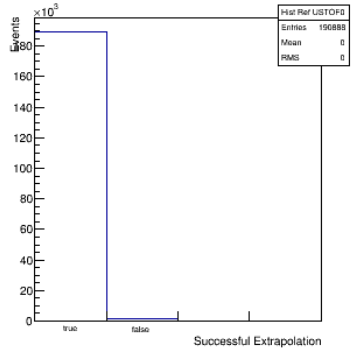
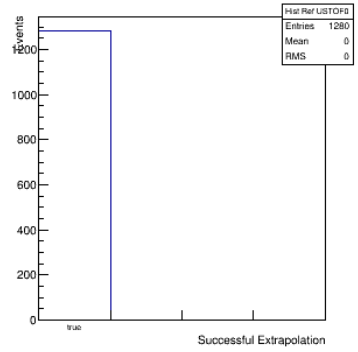
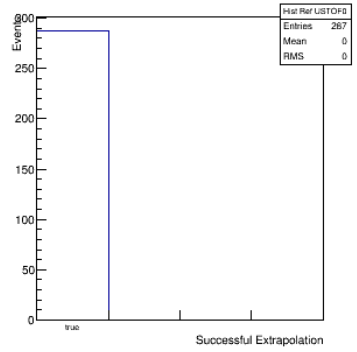
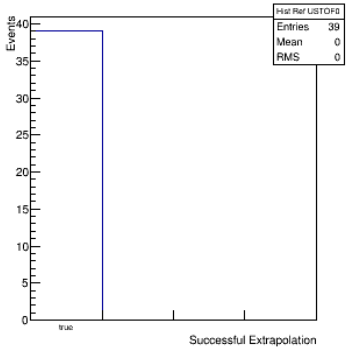
Criteria: TOF01 time consistent with Muon Peak

Extrapolated TOF01 time

	No Cuts	3-172	3-200	3-240
Absorber				
No Absorber				

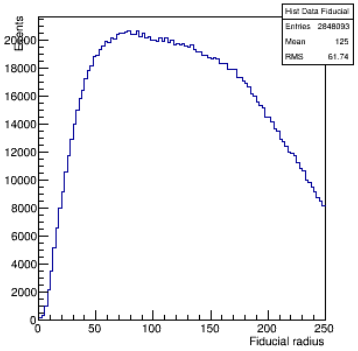
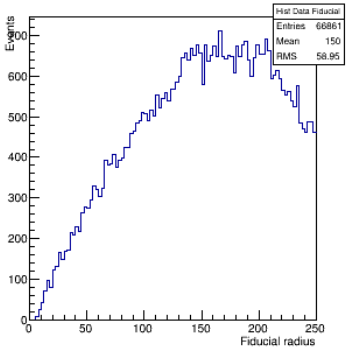
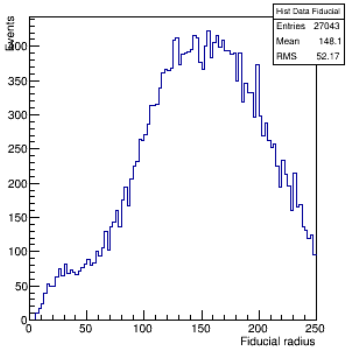
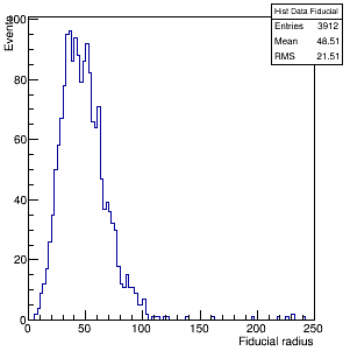
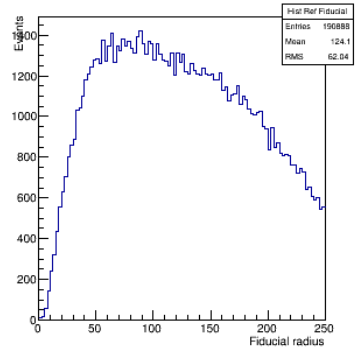
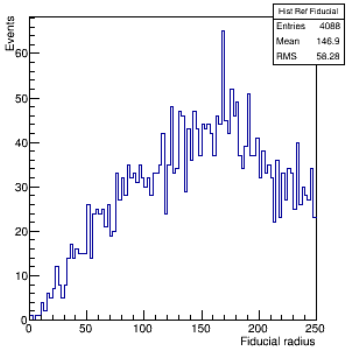
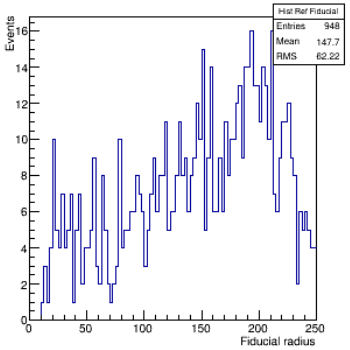
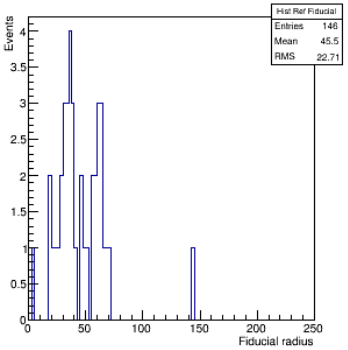
Criteria: Extrapolated TOF01 time consistent with Muon Peak

Extrapolate upstream track to TOF0

	No Cuts	3-172	3-200	3-240
Absorber				
No Absorber				

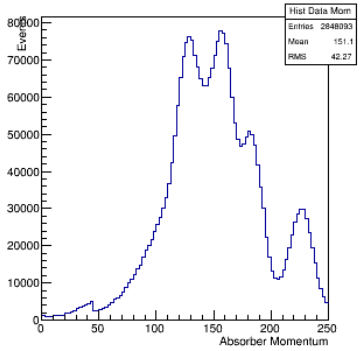
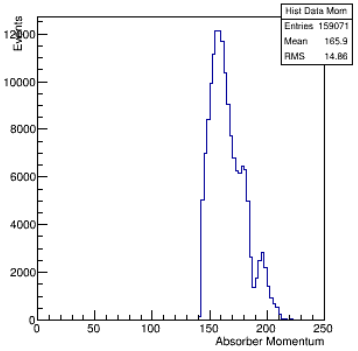
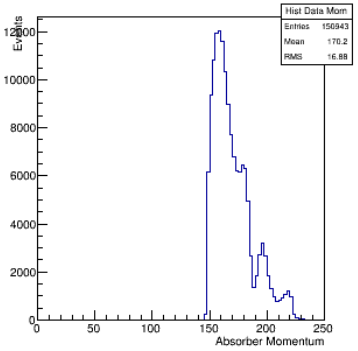
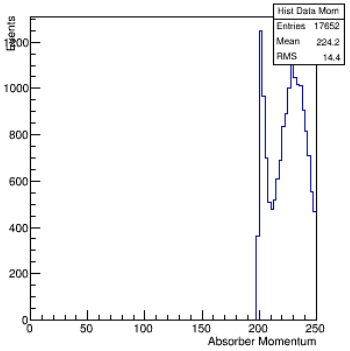
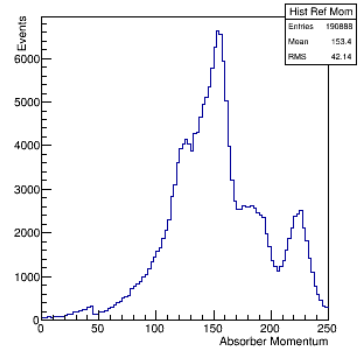
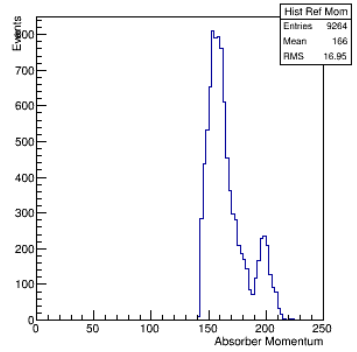
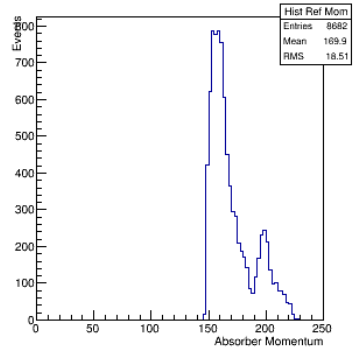
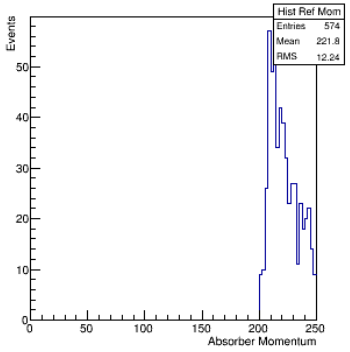
Criteria: Successfully Extrapolate upstream track to TOF0

Maximum fiducial radius

	No Cuts	3-172	3-200	3-240
Absorber				
No Absorber				

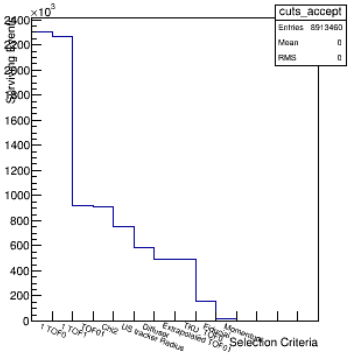
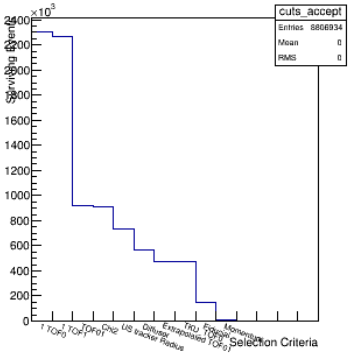
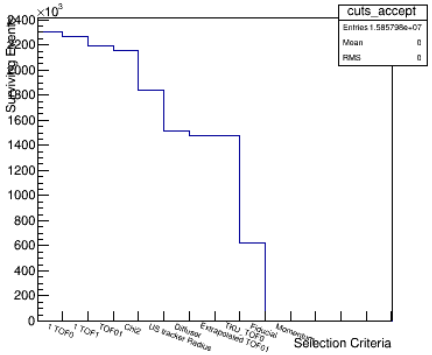
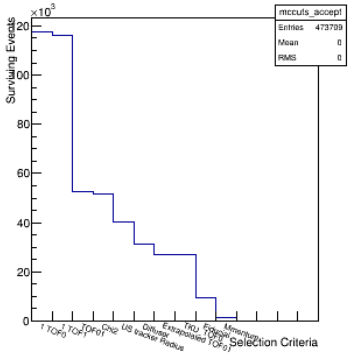
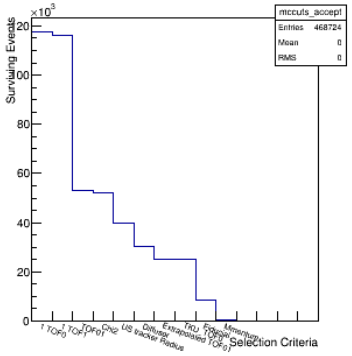
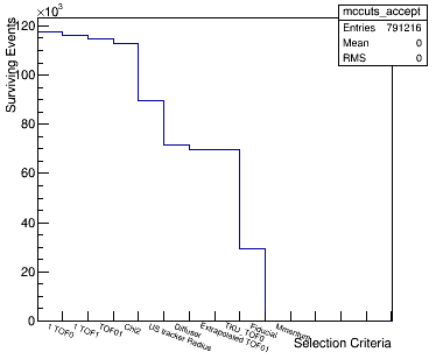
Criteria: Maximum fiducial radius < 140mm

Momentum at absorber

	No Cuts	3-172	3-200	3-240
Absorber				
No Absorber				

Criteria: Select 4MeV/c momentum window for scattering analysis

Rearrangement of data selections

	3-172	3-200	3-240
Absorber			
No Absorber			

Summary

- Monte Carlo in Production
- Very Low number of events for analysis, particularly at 240MeV/c with no absorber present
  - Look for further runs to add to those currently identified
  - Investigate if the 140MeV/c data is suitable for analysis