Field On Scattering
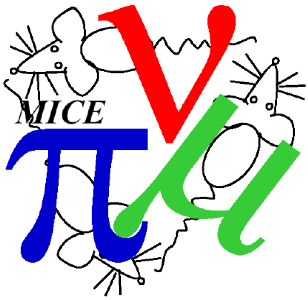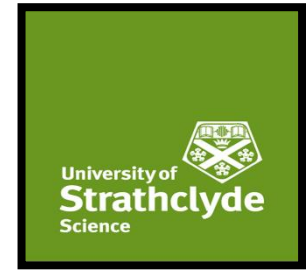
Alan Young

Department of Physics,
University of Strathclyde

22nd October 2020

Data Selection

- Require exactly 1 TOF1 space point
- Require exactly 1 TOF0 space point
- Require exactly 1 track in Upstream Tracker
- Upstream tracker χ^2/dof<10
- Upstream tracker max radius < 150mm
- Diffuser max radius < 90mm
- TOF01 consistent with Muon Peak
- Successfully Extrapolated track from Upstream tracker back to TOF0
- Extrapolated TOF01 consistent with muon hypothesis
- Fiducial Cut - Require the track from the upstream tracker, when projected downstream to be within a specific radius along the length of the Down Stream Tracker
- Select narrow range of Muon momentum to allow study of scattering as a function of momentum
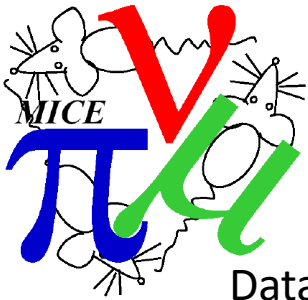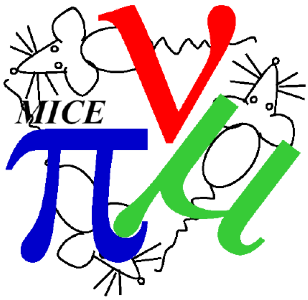
Field on data runs for analysis
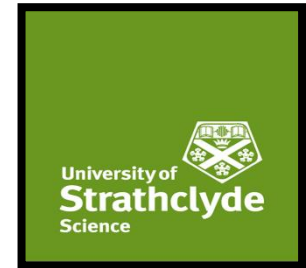
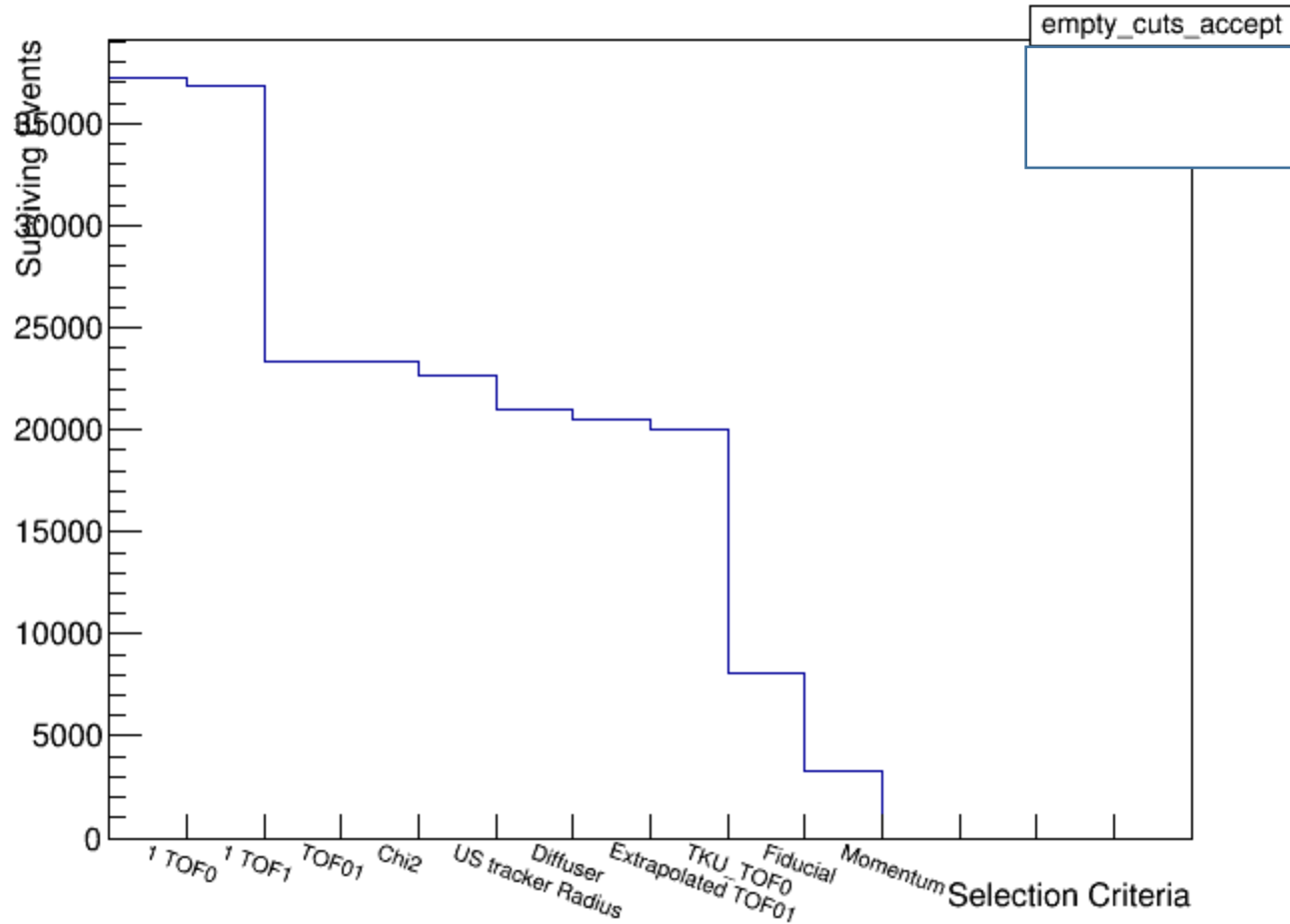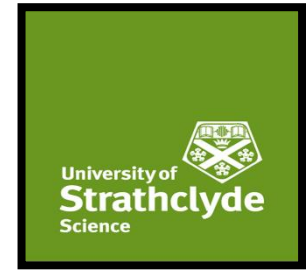## Data runs with LiH Absorber from Step 4 User Cycle 2016/03

140MeV/c	170MeV/c	200MeV/c	240MeV/c
8445	8448	8450	8451
8446	8449	8454	8456
8447	8453	8455	8460
8452	8458	8459	8461
8457	8464	8463	8462
8465	8469	8468	8467
8466			
8470			
8471			
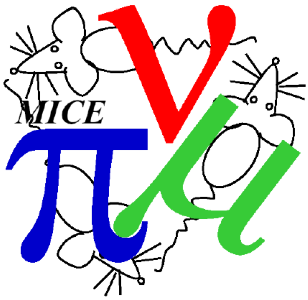
Data runs with no Absorber from Step 4 User Cycle 2016/03

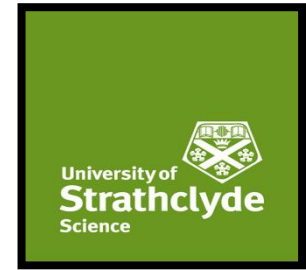| 140MeV/c	170MeV/c	200MeV/c	240MeV/c
8363	8364	8366	8367
8372	8365	8368	8370
8378	8373	8369	8377
	8376	8374	
		8375	

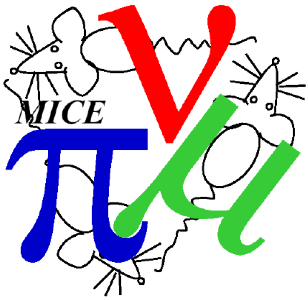# Cuts passed for empty channel
Data - 170MeV/c

TOF01 – LiH 170MeV/c
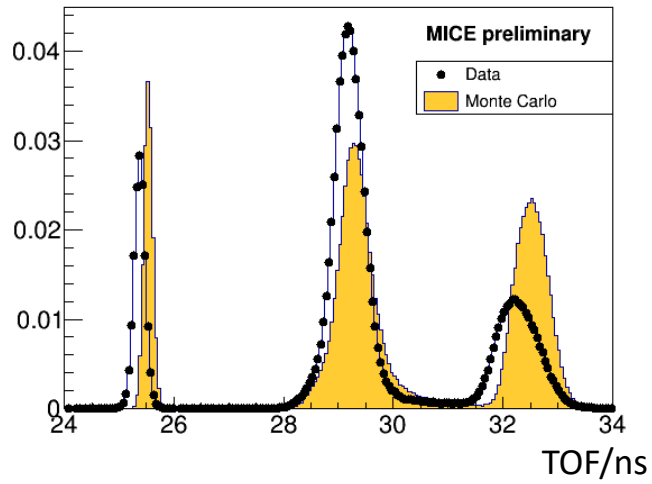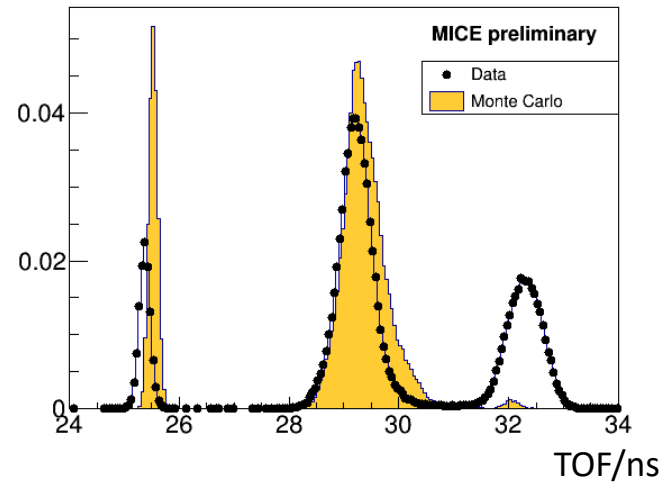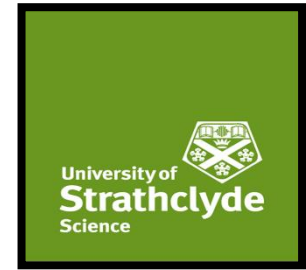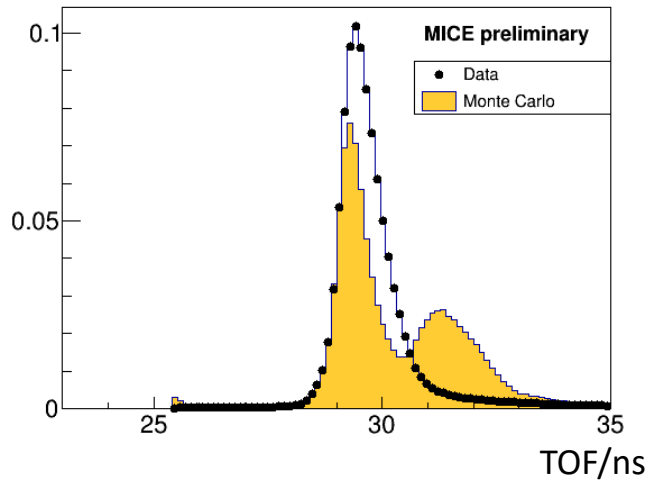
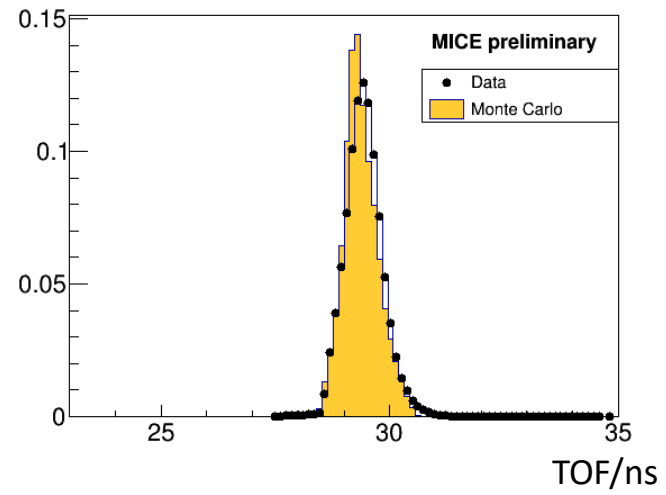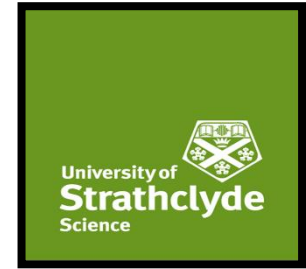# Extrapolated TOF01 – LiH 170MeV/c

Extrapolated TOF01 - No Cuts

MICE preliminary
- Data
- Monte Carlo

TOF/ns

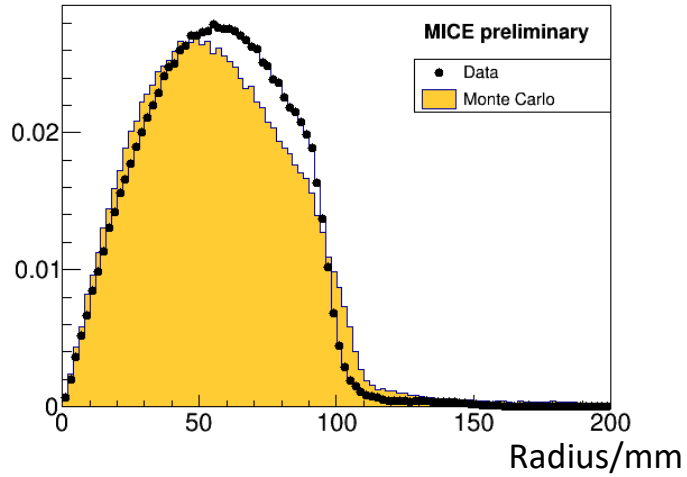Extrapolated TOF01

MICE preliminary
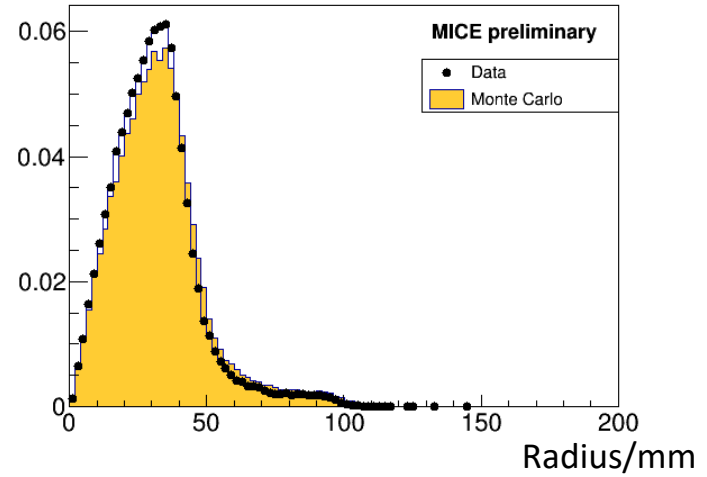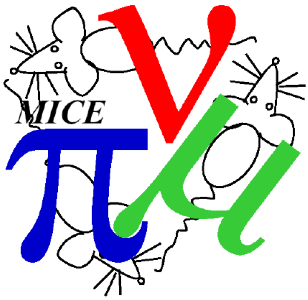- Data
- Monte Carlo

TOF/ns
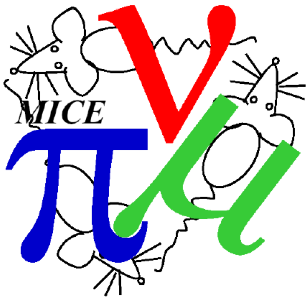
Maximum Radius Diffuser – LiH 170MeV/c
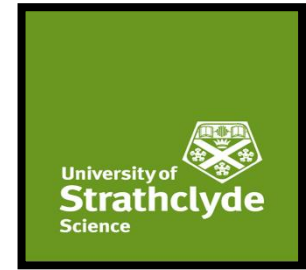

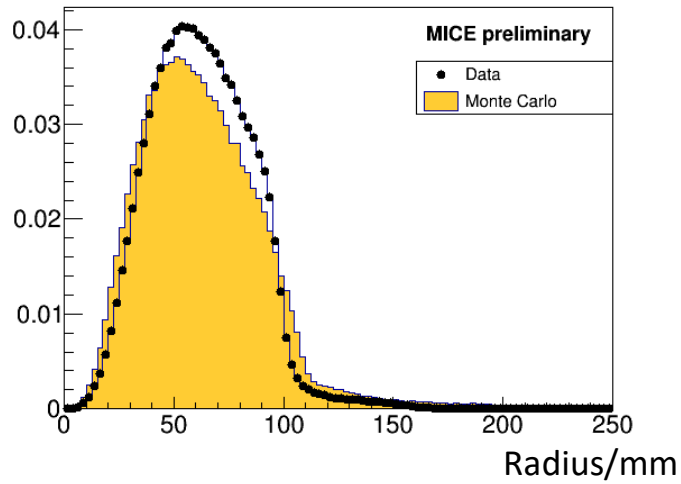
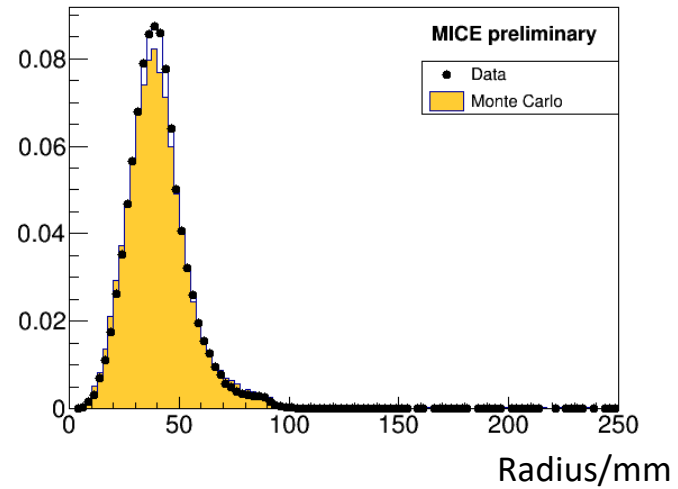Diffuser Max. Radius - No Cuts

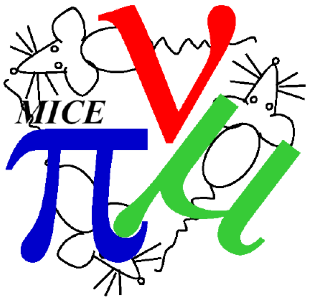Diffuser Max. Radius

Upstream Tracker Max Radius – LiH 170MeV/c

Upstream Tracker Max. Radius - No Cuts

MICE preliminary
- Data
- Monte Carlo

Radius/mm

Upstream Tracker Max. Radius

MICE preliminary
- Data
- Monte Carlo
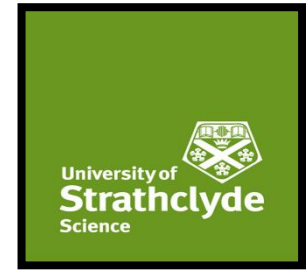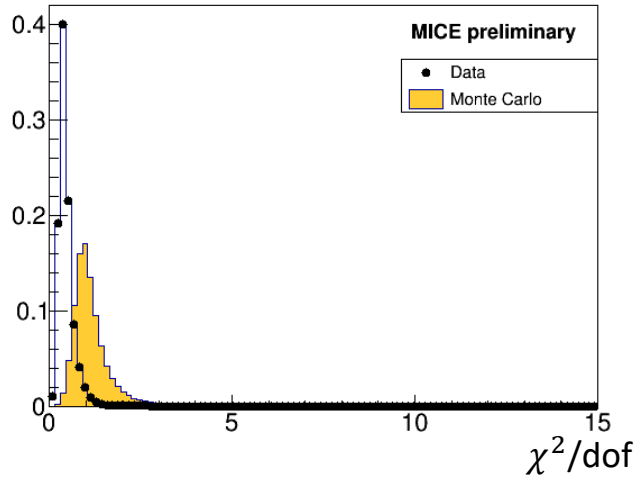
Radius/mm

χ^2/dof – LiH 170MeV/c
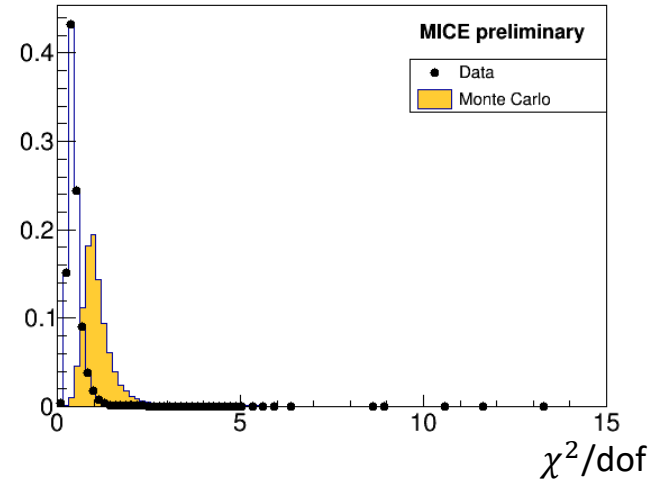
Momentum at centre of absorber – LiH 170MeV/c

Momentum at Centre of Absorber - No Cuts

MICE preliminary
- Data
- Monte Carlo

Momentum/(MeV/c)

Momentum at Centre of Absorber

MICE preliminary
- Data
- Monte Carlo

Momentum/(MeV/c)

Fiducial Radius – LiH 170MeV/c
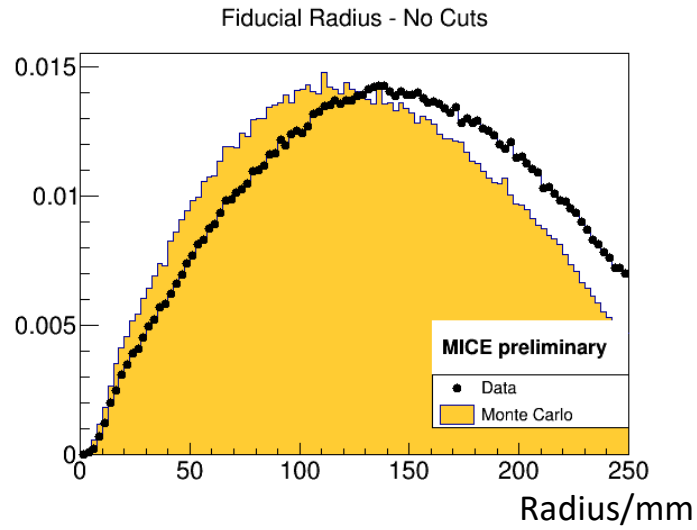
Comparison of Fiducial cut with tracks in DST
LiH 170MeV/c

No Other Cuts

All Cuts

Measured

No Other Cuts
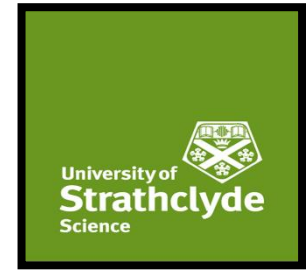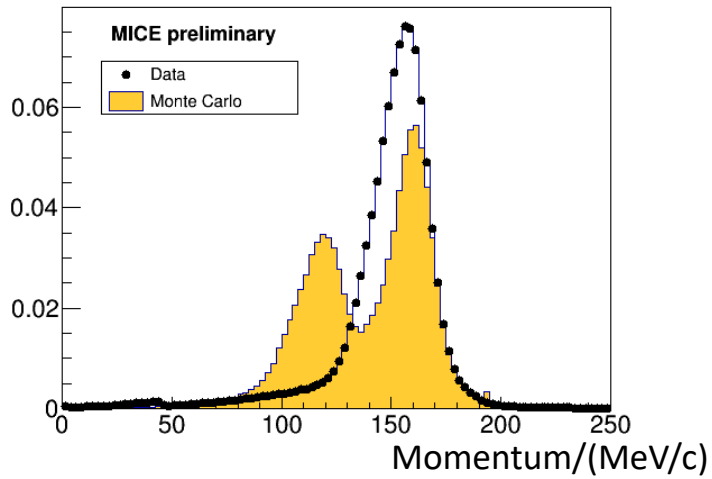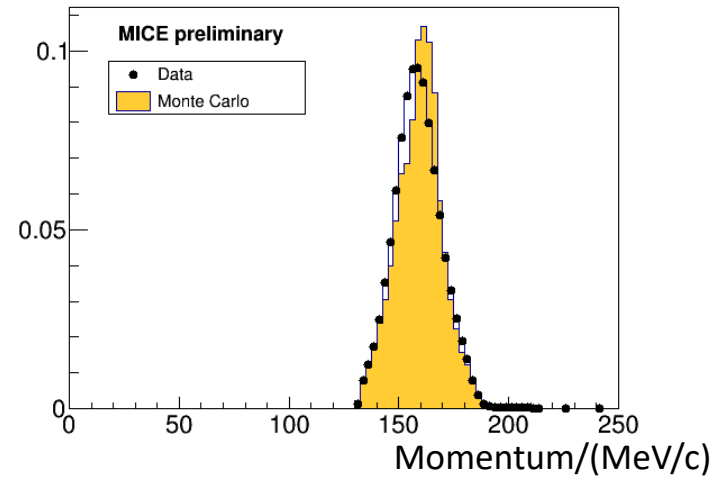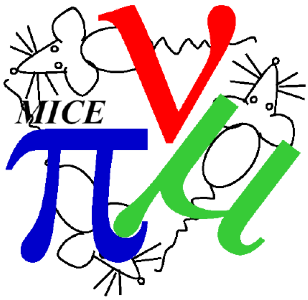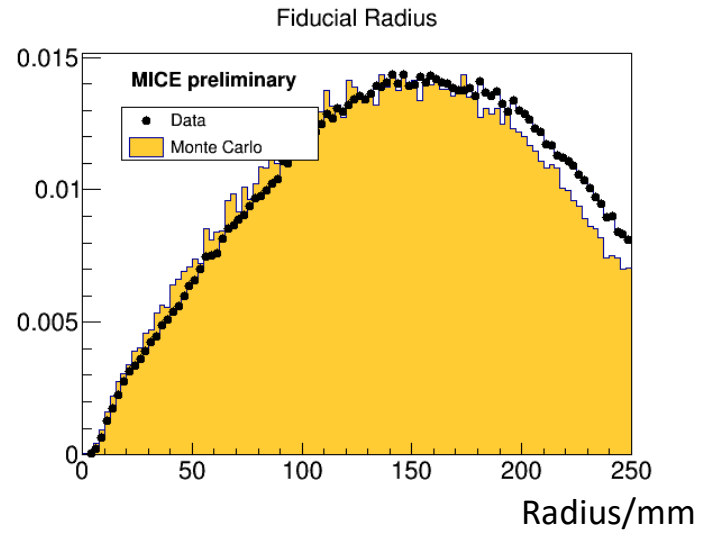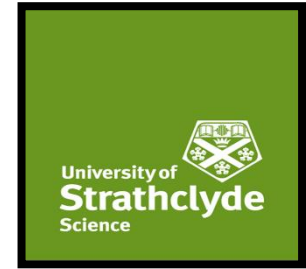
	Track in DST	No Track in DST
Pass Fiducial Cut	211192	87597
Fail Fiducial Cut	88282	465597

All Cuts

	Track in DST	No Track in DST
Pass Fiducial Cut	42384	6554
Fail Fiducial Cut	18797	98727

Monte Carlo

No Other Cuts

	Track in DST	No Track in DST
Pass Fiducial Cut	161333	60980
Fail Fiducial Cut	93270	214401

All Cuts

	Track in DST	No Track in DST
Pass Fiducial Cut	26006	1110
Fail Fiducial Cut	14806	33110

Comparison of Fiducial cut with tracks in DST
Empty 170MeV/c

No Other Cuts

All Cuts

Measured

	Track in DST	No Track in DST
Pass Fiducial Cut	23216	5543
Fail Fiducial Cut	9251	32939

	Track in DST	No Track in DST
Pass Fiducial Cut	3031	262
Fail Fiducial Cut	1454	4924

Monte Carlo

	Track in DST	No Track in DST
Pass Fiducial Cut	165988	67536
Fail Fiducial Cut	87554	212179

	Track in DST	No Track in DST
Pass Fiducial Cut	15958	2283
Fail Fiducial Cut	10255	32269

Summary
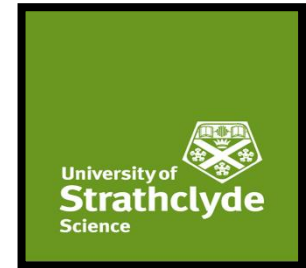
- Currently working on improving data selection
- Focussing on 170MeV/c as more data available for empty channel
- Offset in TOF01 time between Monte Carlo and data
- After TOF01 cut, Fiducial cut responsible for the removal of the most events
- Investigating Fiducial cut as high proportion of events fail fiducial cut, but still create a track in DST