

Low Level Calibration With Standard Candles in SPINE

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Low Level Calibration With Standard Candles

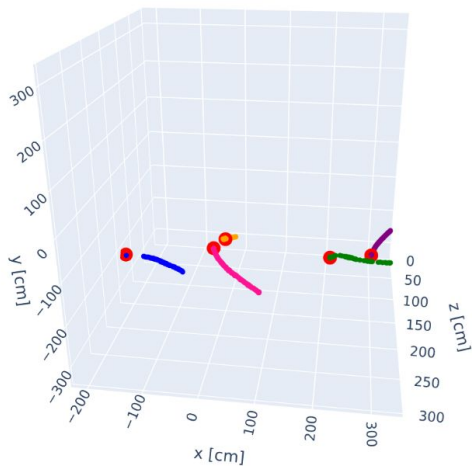
- stopping muons
 - select stopping muons that decay to Michels
- michel electrons

PDVD cosmic sim files

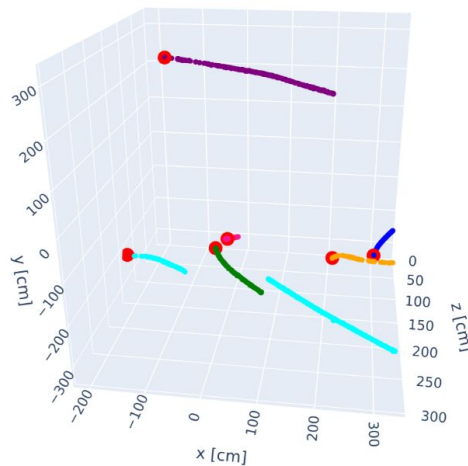
Stopping cosmic muons

Selected stopping-muon candidates: reco vs truth

Reco selected stopping muons



Truth selected stopping muons



an example iteration

- one muon track more at the truth particles
- truth tracks might appear segmented

- reco 0 | ID 19
- reco 0 Michel point
- reco 1 | ID 43
- reco 1 Michel point
- reco 2 | ID 50
- reco 2 Michel point
- reco 3 | ID 52
- reco 3 Michel point
- reco 4 | ID 54
- reco 4 Michel point
- truth 0 | ID 2
- truth 0 Michel point
- truth 1 | ID 6
- truth 1 Michel point
- truth 2 | ID 12
- truth 2 Michel point
- truth 3 | ID 13
- truth 3 Michel point
- truth 4 | ID 17
- truth 4 Michel point
- truth 5 | ID 20
- truth 5 Michel point

Muon direction with PCA

Number of selected muons: 5

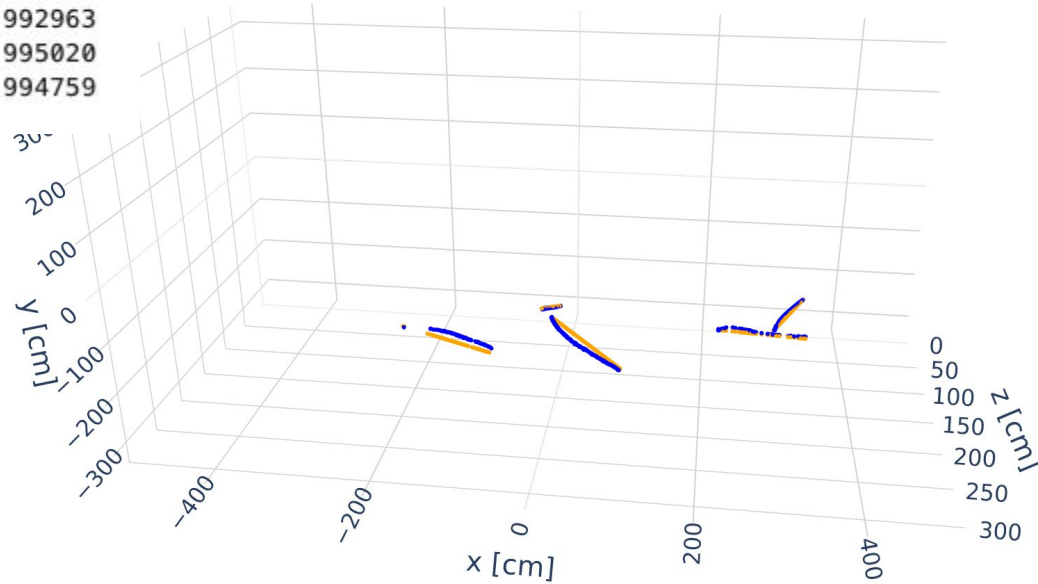
Track 0: explained variance = 0.996127

Track 1: explained variance = 0.997819

Track 2: explained variance = 0.992963

Track 3: explained variance = 0.995020

Track 4: explained variance = 0.994759

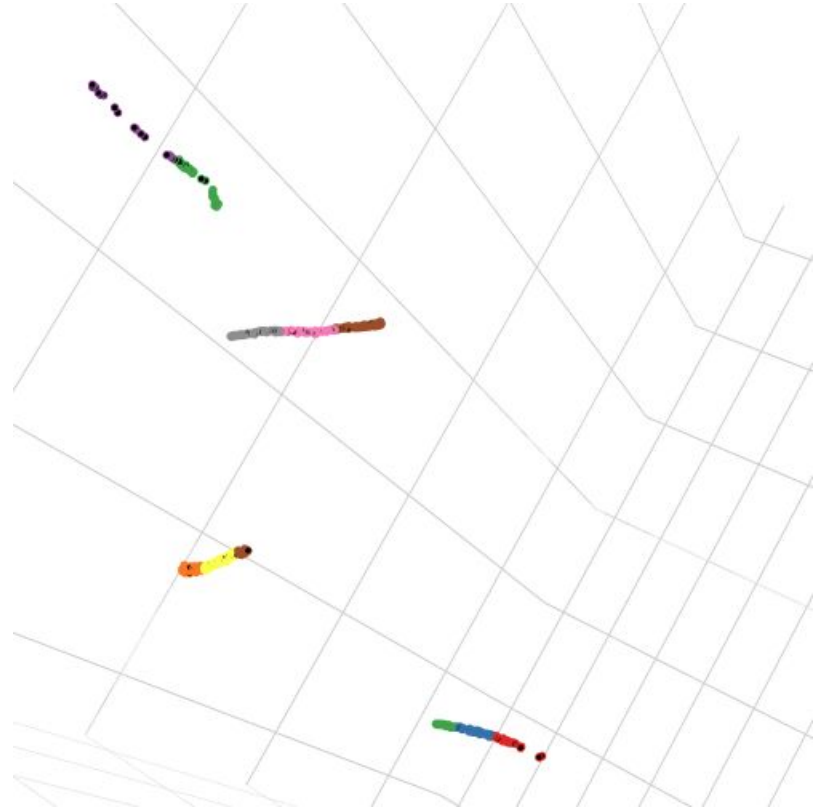


Legend

- selected muon 0
- PCA direction 0
- selected muon 1
- PCA direction 1
- selected muon 2
- PCA direction 2
- selected muon 3
- PCA direction 3
- selected muon 4
- PCA direction 4

Local dQ/dx estimation

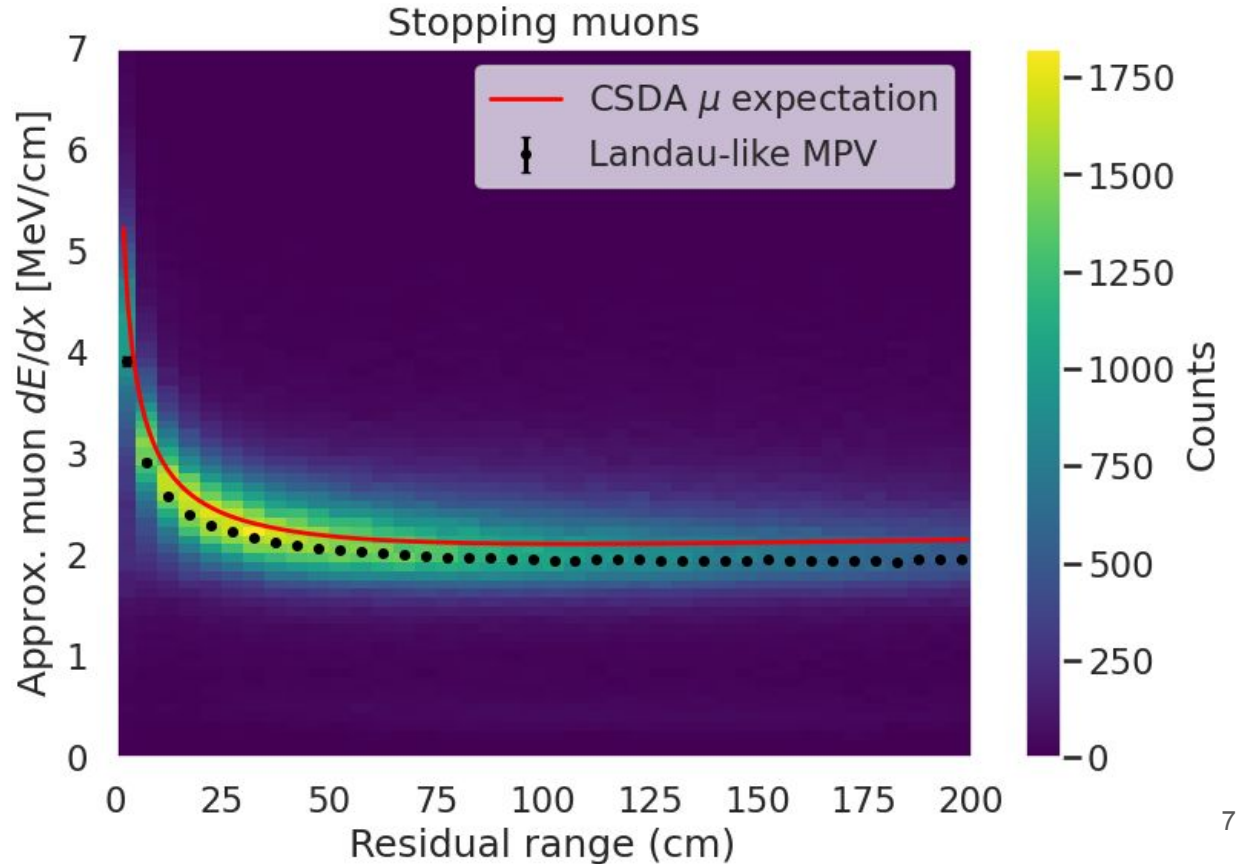
	dQ	dx	residual_range
0	67.900406	2.294993	2.5
1	0.270924	0.765015	37.5
2	2.456656	3.059998	47.5
3	2.458188	2.419131	52.5
4	11.216229	3.857270	57.5
...
71	6.305493	4.383214	87.5
72	12.252764	4.457695	92.5
73	11.402743	4.880415	97.5
74	10.852370	3.900266	102.5
75	2.565476	1.081887	107.5



Repeating with higher statistics

Muon CSV files: 446
PCA CSV files: 446
Total dQ/dx segments: 752762
Total selected muons: 26599

selected_muon_id	dQ	dx	residual_range	explained_variance_1	
0	0	67.900406	2.294993	2.5	0.996127
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Repeating with higher statistics

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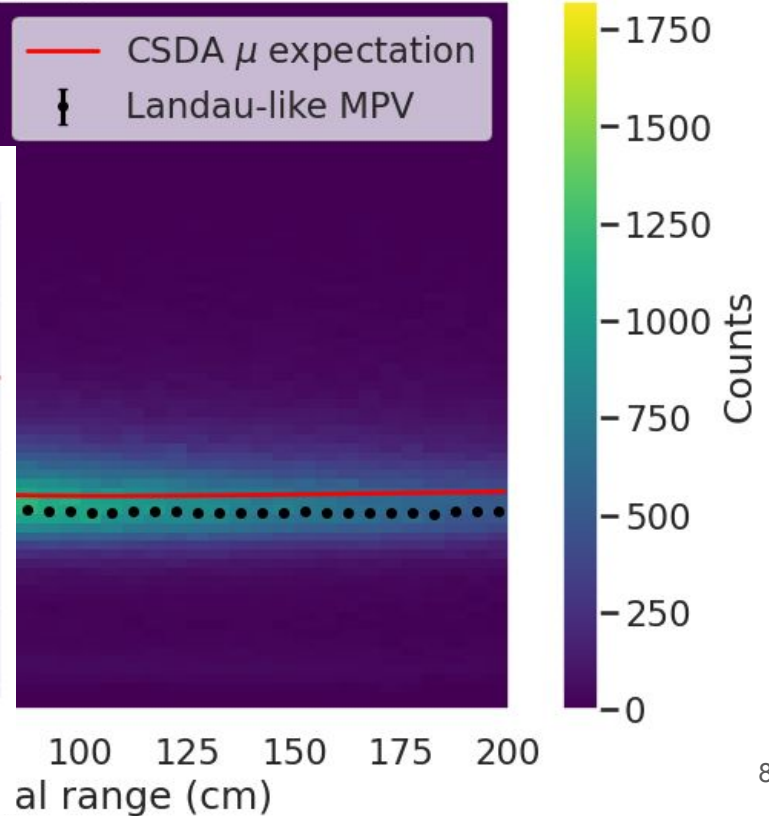
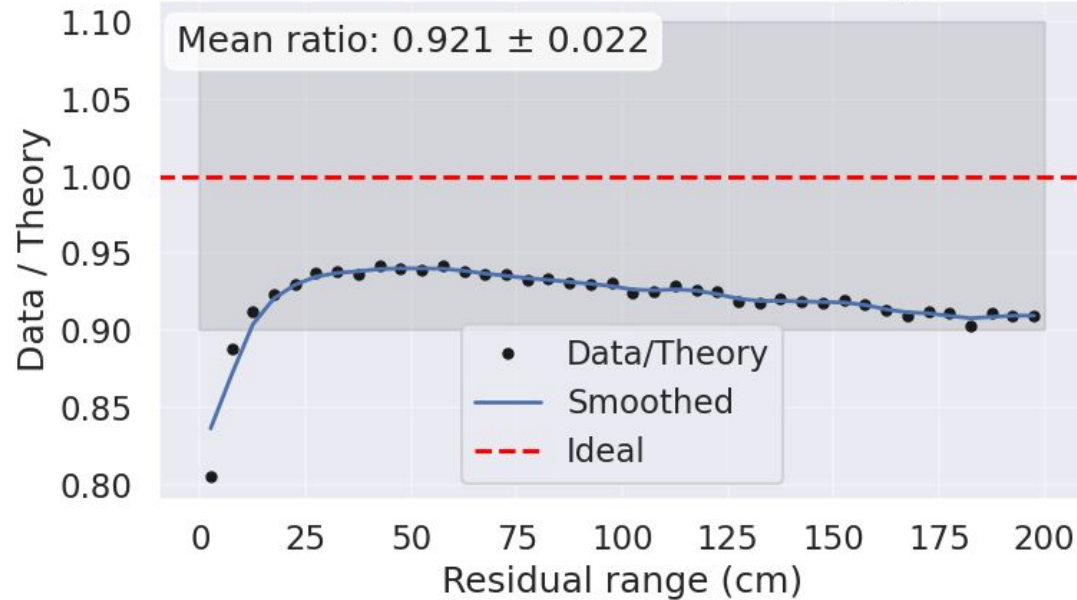
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7
6
/cm]

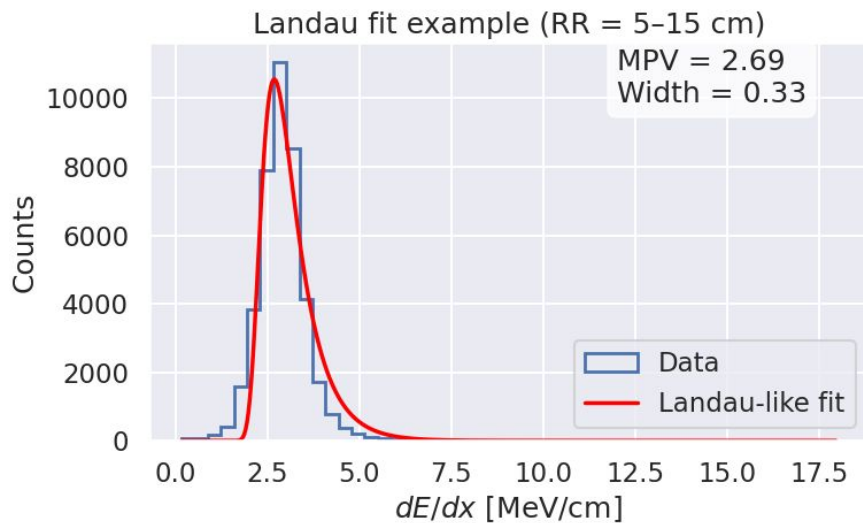
Stopping muons

— CSDA μ expectation
| Landau-like MPV

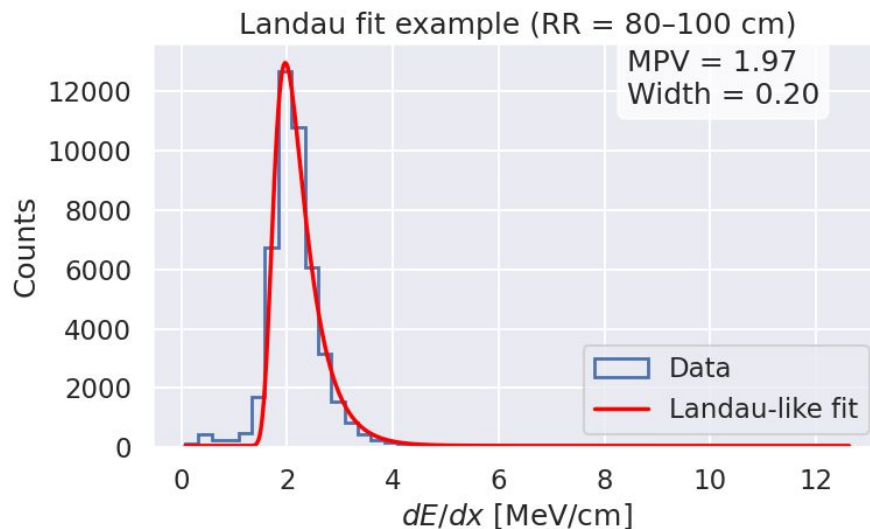
Calibration check (MPV vs theory)



Landau fit



Bragg peak



MIP