Multiple Coulomb Scattering in the MICE LH2 Absorber

- Optics tag Test1/Test2 difference
- Materials traversed TOF01- Absorber
  - (+) Path length in absorber calculation
- Monte Carlo PID estimate in selection used
- MAUS v-3.2.0 installs on SL, not on CENTOS

Data used

Data Used
User cycles 2017 – 09 -10 - 11

Optics : 3-170+M3-Test1, 3-240+M3-Test1 3-200+M3-Test2/Test1

Empty

Test 1	Test 2	Test 1	
170	**200**	**240**	
10092	10093	10159	10189
10153	10156	10161	10190
10154	10157	10162	10199
10155	10158	10169	**10200**
10165	10164	10175	10201
10167	10168	10176	10208
10173	**10182**	10177	10209
10186	10183	10178	10210
10202	10203	10180	10211
	10207	10181	10159
	10093	10185	

Full

Test 1	Test 1
170	**200**	**240**
09772	09773	09935
09774	09776	09936
09775	09779	09937
09777	09855	09938
09778	09856	09939
09854	09857	09940
09859	**09858**	09941
09861	09860	09942
09772	09773	09943
		09944
		09935

- 200-Test 1 has 5A less than 200-Test 2 in D1

All Test 2 except run 09856

*run numbers in bold requested for MC

Materials TOF01 -> Absorber

Traversed material

Material	z(cm)
Helium (Tracker)	113
Aluminium (Tracker)	0.016
Air	897.16
SciFi	0.525
TOF1	?
LH2	->
HE (Absorber)	->
Aluminium (Absorber)	->

Vessel shape for LH2/He path length calculation

$$r = 5.009^{-6}x^5 - 0.0007x^4 + 0.034x^3 - 0.815x^2 + 10.867x.$$ [1]

Al vessel window thickness

$$h(r) = \begin{cases} \sqrt{142.45^2 - r^2} - 2.27 - \sqrt{140^2 - r^2} & r \leq 87.2 \\ \sqrt{102.08^2 - (r-150)^2} - \sqrt{100.8^2 - (r-149)^2} & r > 87.2 \end{cases}$$ [2]

Al safety window thickness

$$h(r) = \begin{cases} \sqrt{151.95^2 - r^2} - 2.41 - \sqrt{149.33^2 - r^2} & r \leq 92.3 \\ \sqrt{107.52^2 - (r-158.93)^2} - \sqrt{108.88^2 - (r-160)^2} & r > 92.3 \end{cases}$$ [2]

[1] J.C. Nugent (2016) *"Multiple Coulomb Scattering in the MICE Experiment"*
[2] R. Connors et. Al. (2014) "The Thickness Measurement of MICE Absorber Aluminum window at LBNL"

TOF01 Distributions