

## Muons in Hydrogen BC liquid DEG calc to check code

Z	A [g/mol]	$\rho$ [g/cm <sup>3</sup> ]	I [eV]	a	$k = m_s$	$x_0$	$x_1$	$\bar{C}$	$\delta_0$
1 (H)	1.00794 (7)	$6.000 \times 10^{-2}$	21.8	0.35807	3.0000	0.2000	2.0000	3.0093	0.00
T	p [MeV/c]	Ionization	Brems	Pair prod [MeV cm <sup>2</sup> /g]	Photonucl	Total	CSDA range [g/cm <sup>2</sup> ]		
10.0 MeV	$4.704 \times 10^1$	16.508				16.508	$3.316 \times 10^{-1}$		
14.0 MeV	$5.616 \times 10^1$	12.812				12.812	$6.097 \times 10^{-1}$		
20.0 MeV	$6.802 \times 10^1$	9.956				9.956	$1.147 \times 10^0$		
30.0 MeV	$8.509 \times 10^1$	7.684				7.684	$2.307 \times 10^0$		
40.0 MeV	$1.003 \times 10^2$	6.539				6.539	$3.727 \times 10^0$		
80.0 MeV	$1.527 \times 10^2$	4.870				4.870	$1.105 \times 10^1$		
100. MeV	$1.764 \times 10^2$	4.563				4.563	$1.530 \times 10^1$		
140. MeV	$2.218 \times 10^2$	4.236				4.236	$2.444 \times 10^1$		
200. MeV	$2.868 \times 10^2$	4.041			0.000	4.041	$3.900 \times 10^1$		
300. MeV	$3.917 \times 10^2$	3.955			0.000	3.955	$6.409 \times 10^1$		
348. MeV	$4.413 \times 10^2$	3.950			0.000	3.950	<i>Minimum ionization</i>		
400. MeV	$4.945 \times 10^2$	3.954			0.000	3.954	$8.940 \times 10^1$		
800. MeV	$8.995 \times 10^2$	4.069			0.000	4.070	$1.892 \times 10^2$		
1.00 GeV	$1.101 \times 10^3$	4.125			0.001	4.126	$2.380 \times 10^2$		
1.40 GeV	$1.502 \times 10^3$	4.218	0.000		0.001	4.219	$3.338 \times 10^2$		
2.00 GeV	$2.103 \times 10^3$	4.320	0.000		0.001	4.322	$4.742 \times 10^2$		
3.00 GeV	$3.104 \times 10^3$	4.437	0.000	0.000	0.002	4.439	$7.023 \times 10^2$		
4.00 GeV	$4.104 \times 10^3$	4.518	0.001	0.000	0.002	4.522	$9.254 \times 10^2$		
8.00 GeV	$8.105 \times 10^3$	4.706	0.001	0.001	0.005	4.713	$1.790 \times 10^3$		
10.0 GeV	$1.011 \times 10^4$	4.763	0.002	0.002	0.006	4.773	$2.211 \times 10^3$		
14.0 GeV	$1.411 \times 10^4$	4.848	0.003	0.003	0.008	4.862	$3.041 \times 10^3$		
20.0 GeV	$2.011 \times 10^4$	4.935	0.005	0.006	0.011	4.956	$4.263 \times 10^3$		
30.0 GeV	$3.011 \times 10^4$	5.030	0.008	0.010	0.015	5.064	$6.257 \times 10^3$		
40.0 GeV	$4.011 \times 10^4$	5.095	0.012	0.015	0.020	5.142	$8.217 \times 10^3$		
80.0 GeV	$8.011 \times 10^4$	5.244	0.028	0.038	0.038	5.349	$1.583 \times 10^4$		
100. GeV	$1.001 \times 10^5$	5.291	0.037	0.050	0.047	5.426	$1.954 \times 10^4$		
140. GeV	$1.401 \times 10^5$	5.361	0.055	0.076	0.066	5.558	$2.682 \times 10^4$		
200. GeV	$2.001 \times 10^5$	5.433	0.085	0.118	0.093	5.729	$3.745 \times 10^4$		
300. GeV	$3.001 \times 10^5$	5.516	0.137	0.191	0.139	5.983	$5.452 \times 10^4$		
400. GeV	$4.001 \times 10^5$	5.574	0.191	0.268	0.185	6.218	$7.092 \times 10^4$		
800. GeV	$8.001 \times 10^5$	5.716	0.423	0.592	0.373	7.104	$1.310 \times 10^5$		
1.00 TeV	$1.000 \times 10^6$	5.762	0.544	0.761	0.468	7.536	$1.583 \times 10^5$		
1.40 TeV	$1.400 \times 10^6$	5.833	0.791	1.101	0.663	8.389	$2.086 \times 10^5$		
2.00 TeV	$2.000 \times 10^6$	5.908	1.175	1.627	0.961	9.671	$2.752 \times 10^5$		
3.00 TeV	$3.000 \times 10^6$	5.995	1.827	2.504	1.474	11.800	$3.687 \times 10^5$		
3.10 TeV	$3.095 \times 10^6$	6.002	1.890	2.589	1.523	12.004	<i>Muon critical energy</i>		
4.00 TeV	$4.000 \times 10^6$	6.058	2.496	3.399	1.996	13.949	$4.465 \times 10^5$		
8.00 TeV	$8.000 \times 10^6$	6.212	5.240	7.012	4.180	22.644	$6.695 \times 10^5$		
10.0 TeV	$1.000 \times 10^7$	6.262	6.642	8.837	5.308	27.049	$7.502 \times 10^5$		
14.0 TeV	$1.400 \times 10^7$	6.339	9.452	12.466	7.642	35.899	$8.782 \times 10^5$		
20.0 TeV	$2.000 \times 10^7$	6.422	13.734	17.952	11.236	49.345	$1.020 \times 10^6$		
30.0 TeV	$3.000 \times 10^7$	6.519	20.884	27.062	17.498	71.963	$1.187 \times 10^6$		
40.0 TeV	$4.000 \times 10^7$	6.588	28.113	36.210	23.940	94.850	$1.308 \times 10^6$		
80.0 TeV	$8.000 \times 10^7$	6.759	57.248	72.833	51.135	187.975	$1.602 \times 10^6$		
100. TeV	$1.000 \times 10^8$	6.815	71.920	91.170	65.290	235.196	$1.697 \times 10^6$		