

## Muons in tissue-equivalent gas (Propane based)

$\langle Z/A \rangle$	$\rho$ [g/cm <sup>3</sup> ]	$I$ [eV]	$a$	$k = m_s$	$x_0$	$x_1$	$\bar{C}$	$\delta_0$
0.55027	$1.826 \times 10^{-3}$	59.5	0.09802	3.5159	1.5139	3.9916	9.3529	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	$4.704 \times 10^1$	8.132				8.132	$6.782 \times 10^{-1}$	
14.0 MeV	$5.616 \times 10^1$	6.337				6.337	$1.241 \times 10^0$	
20.0 MeV	$6.802 \times 10^1$	4.943				4.944	$2.326 \times 10^0$	
30.0 MeV	$8.509 \times 10^1$	3.831				3.831	$4.656 \times 10^0$	
40.0 MeV	$1.003 \times 10^2$	3.269				3.269	$7.500 \times 10^0$	
80.0 MeV	$1.527 \times 10^2$	2.450				2.450	$2.209 \times 10^1$	
100. MeV	$1.764 \times 10^2$	2.303				2.303	$3.053 \times 10^1$	
140. MeV	$2.218 \times 10^2$	2.158				2.158	$4.855 \times 10^1$	
200. MeV	$2.868 \times 10^2$	2.084				2.084	$7.695 \times 10^1$	
263. MeV	$3.527 \times 10^2$	2.068			0.000	2.069	<i>Minimum ionization</i>	
300. MeV	$3.917 \times 10^2$	2.071			0.000	2.072	$1.252 \times 10^2$	
400. MeV	$4.945 \times 10^2$	2.097			0.000	2.097	$1.732 \times 10^2$	
800. MeV	$8.995 \times 10^2$	2.232	0.000		0.000	2.232	$3.580 \times 10^2$	
1.00 GeV	$1.101 \times 10^3$	2.289	0.000		0.000	2.290	$4.464 \times 10^2$	
1.40 GeV	$1.502 \times 10^3$	2.383	0.000		0.001	2.384	$6.175 \times 10^2$	
2.00 GeV	$2.103 \times 10^3$	2.488	0.001	0.000	0.001	2.490	$8.635 \times 10^2$	
3.00 GeV	$3.104 \times 10^3$	2.613	0.001	0.001	0.001	2.616	$1.255 \times 10^3$	
4.00 GeV	$4.104 \times 10^3$	2.694	0.001	0.001	0.002	2.698	$1.630 \times 10^3$	
8.00 GeV	$8.105 \times 10^3$	2.863	0.003	0.003	0.004	2.873	$3.061 \times 10^3$	
10.0 GeV	$1.011 \times 10^4$	2.912	0.004	0.004	0.005	2.925	$3.751 \times 10^3$	
14.0 GeV	$1.411 \times 10^4$	2.981	0.006	0.007	0.007	3.001	$5.100 \times 10^3$	
20.0 GeV	$2.011 \times 10^4$	3.049	0.010	0.011	0.009	3.079	$7.072 \times 10^3$	
30.0 GeV	$3.011 \times 10^4$	3.119	0.016	0.020	0.014	3.168	$1.027 \times 10^4$	
40.0 GeV	$4.011 \times 10^4$	3.164	0.023	0.029	0.018	3.234	$1.339 \times 10^4$	
80.0 GeV	$8.011 \times 10^4$	3.263	0.052	0.071	0.034	3.421	$2.540 \times 10^4$	
100. GeV	$1.001 \times 10^5$	3.292	0.068	0.093	0.043	3.496	$3.118 \times 10^4$	
140. GeV	$1.401 \times 10^5$	3.334	0.101	0.140	0.059	3.634	$4.239 \times 10^4$	
200. GeV	$2.001 \times 10^5$	3.377	0.152	0.214	0.084	3.828	$5.848 \times 10^4$	
300. GeV	$3.001 \times 10^5$	3.425	0.239	0.341	0.126	4.131	$8.361 \times 10^4$	
400. GeV	$4.001 \times 10^5$	3.458	0.331	0.473	0.168	4.429	$1.070 \times 10^5$	
800. GeV	$8.001 \times 10^5$	3.537	0.711	1.023	0.340	5.610	$1.870 \times 10^5$	
1.00 TeV	$1.000 \times 10^6$	3.562	0.908	1.307	0.427	6.204	$2.209 \times 10^5$	
1.34 TeV	$1.335 \times 10^6$	3.596	1.239	1.781	0.576	7.192	<i>Muon critical energy</i>	
1.40 TeV	$1.400 \times 10^6$	3.601	1.304	1.873	0.605	7.384	$2.800 \times 10^5$	
2.00 TeV	$2.000 \times 10^6$	3.643	1.913	2.742	0.876	9.175	$3.527 \times 10^5$	
3.00 TeV	$3.000 \times 10^6$	3.691	2.935	4.188	1.343	12.157	$4.471 \times 10^5$	
4.00 TeV	$4.000 \times 10^6$	3.726	3.975	5.654	1.818	15.173	$5.206 \times 10^5$	
8.00 TeV	$8.000 \times 10^6$	3.811	8.188	11.563	3.795	27.358	$7.142 \times 10^5$	
10.0 TeV	$1.000 \times 10^7$	3.839	10.320	14.540	4.814	33.514	$7.802 \times 10^5$	
14.0 TeV	$1.400 \times 10^7$	3.882	14.575	20.470	6.914	45.841	$8.818 \times 10^5$	
20.0 TeV	$2.000 \times 10^7$	3.928	21.013	29.416	10.141	64.498	$9.916 \times 10^5$	
30.0 TeV	$3.000 \times 10^7$	3.982	31.735	44.299	15.744	95.759	$1.118 \times 10^6$	
40.0 TeV	$4.000 \times 10^7$	4.020	42.516	59.231	21.495	127.263	$1.208 \times 10^6$	
80.0 TeV	$8.000 \times 10^7$	4.115	85.747	119.011	45.644	254.518	$1.426 \times 10^6$	
100. TeV	$1.000 \times 10^8$	4.146	107.420	148.937	58.166	318.670	$1.497 \times 10^6$	