

## Muons in water as calc from steam to check code

$\langle Z/A \rangle$	$\rho$ [g/cm <sup>3</sup> ]	$I$ [eV]	$a$	$k = m_s$	$x_0$	$x_1$	$\bar{C}$	$\delta_0$
0.55509	1.000	71.6	0.44251	3.0000	0.2000	2.0000	3.5017	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	$4.704 \times 10^1$	8.013				8.013	$6.894 \times 10^{-1}$
14.0 MeV	$5.616 \times 10^1$	6.249				6.249	$1.261 \times 10^0$
20.0 MeV	$6.802 \times 10^1$	4.879				4.879	$2.360 \times 10^0$
30.0 MeV	$8.509 \times 10^1$	3.784				3.784	$4.720 \times 10^0$
40.0 MeV	$1.003 \times 10^2$	3.231				3.231	$7.598 \times 10^0$
80.0 MeV	$1.527 \times 10^2$	2.425				2.425	$2.234 \times 10^1$
100. MeV	$1.764 \times 10^2$	2.280				2.280	$3.087 \times 10^1$
140. MeV	$2.218 \times 10^2$	2.131				2.131	$4.910 \times 10^1$
200. MeV	$2.868 \times 10^2$	2.047				2.047	$7.793 \times 10^1$
300. MeV	$3.917 \times 10^2$	2.018			0.000	2.018	$1.273 \times 10^2$
308. MeV	$4.000 \times 10^2$	2.018			0.000	2.018	<i>Minimum ionization</i>
400. MeV	$4.945 \times 10^2$	2.027			0.000	2.027	$1.768 \times 10^2$
800. MeV	$8.995 \times 10^2$	2.105	0.000		0.000	2.105	$3.704 \times 10^2$
1.00 GeV	$1.101 \times 10^3$	2.139	0.000		0.000	2.140	$4.646 \times 10^2$
1.40 GeV	$1.502 \times 10^3$	2.194	0.000		0.001	2.195	$6.491 \times 10^2$
2.00 GeV	$2.103 \times 10^3$	2.254	0.001	0.000	0.001	2.256	$9.185 \times 10^2$
3.00 GeV	$3.104 \times 10^3$	2.321	0.001	0.001	0.001	2.324	$1.355 \times 10^3$
4.00 GeV	$4.104 \times 10^3$	2.367	0.001	0.001	0.002	2.371	$1.781 \times 10^3$
8.00 GeV	$8.105 \times 10^3$	2.472	0.004	0.003	0.004	2.483	$3.424 \times 10^3$
10.0 GeV	$1.011 \times 10^4$	2.504	0.005	0.005	0.005	2.519	$4.224 \times 10^3$
14.0 GeV	$1.411 \times 10^4$	2.552	0.007	0.008	0.007	2.574	$5.794 \times 10^3$
20.0 GeV	$2.011 \times 10^4$	2.600	0.011	0.013	0.009	2.634	$8.097 \times 10^3$
30.0 GeV	$3.011 \times 10^4$	2.653	0.019	0.023	0.013	2.709	$1.184 \times 10^4$
40.0 GeV	$4.011 \times 10^4$	2.690	0.027	0.034	0.018	2.768	$1.549 \times 10^4$
80.0 GeV	$8.011 \times 10^4$	2.774	0.060	0.081	0.034	2.950	$2.946 \times 10^4$
100. GeV	$1.001 \times 10^5$	2.800	0.078	0.107	0.042	3.028	$3.616 \times 10^4$
140. GeV	$1.401 \times 10^5$	2.838	0.116	0.161	0.059	3.174	$4.906 \times 10^4$
200. GeV	$2.001 \times 10^5$	2.879	0.174	0.246	0.084	3.383	$6.736 \times 10^4$
300. GeV	$3.001 \times 10^5$	2.925	0.275	0.391	0.125	3.717	$9.554 \times 10^4$
400. GeV	$4.001 \times 10^5$	2.958	0.379	0.542	0.167	4.046	$1.213 \times 10^5$
800. GeV	$8.001 \times 10^5$	3.037	0.814	1.171	0.337	5.359	$2.069 \times 10^5$
1.00 TeV	$1.000 \times 10^6$	3.063	1.038	1.496	0.423	6.021	$2.421 \times 10^5$
1.03 TeV	$1.035 \times 10^6$	3.067	1.077	1.551	0.439	6.135	<i>Muon critical energy</i>
1.40 TeV	$1.400 \times 10^6$	3.103	1.491	2.142	0.601	7.336	$3.022 \times 10^5$
2.00 TeV	$2.000 \times 10^6$	3.145	2.186	3.132	0.870	9.333	$3.746 \times 10^5$
3.00 TeV	$3.000 \times 10^6$	3.193	3.352	4.781	1.332	12.658	$4.663 \times 10^5$
4.00 TeV	$4.000 \times 10^6$	3.228	4.537	6.452	1.803	16.021	$5.363 \times 10^5$
8.00 TeV	$8.000 \times 10^6$	3.315	9.338	13.185	3.763	29.601	$7.172 \times 10^5$
10.0 TeV	$1.000 \times 10^7$	3.343	11.766	16.575	4.773	36.458	$7.780 \times 10^5$
14.0 TeV	$1.400 \times 10^7$	3.386	16.613	23.331	6.854	50.184	$8.711 \times 10^5$
20.0 TeV	$2.000 \times 10^7$	3.433	23.944	33.521	10.051	70.948	$9.712 \times 10^5$
30.0 TeV	$3.000 \times 10^7$	3.486	36.151	50.475	15.600	105.713	$1.086 \times 10^6$
40.0 TeV	$4.000 \times 10^7$	3.525	48.424	67.484	21.296	140.730	$1.168 \times 10^6$
80.0 TeV	$8.000 \times 10^7$	3.621	97.657	135.575	45.199	282.053	$1.365 \times 10^6$
100. TeV	$1.000 \times 10^8$	3.652	122.347	169.661	57.590	353.250	$1.428 \times 10^6$