

## Muons in butane (C<sub>4</sub>H<sub>10</sub>)

	$\langle Z/A \rangle$	$\rho$ [g/cm <sup>3</sup> ]	$I$ [eV]	$a$	$k = m_s$	$x_0$	$x_1$	$\bar{C}$	$\delta_0$
	0.59497	$2.489 \times 10^{-3}$	48.3	0.10852	3.4884	1.3792	3.7528	8.5651	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	$4.704 \times 10^1$	9.023				9.023	$6.102 \times 10^{-1}$		
14.0 MeV	$5.616 \times 10^1$	7.024				7.024	$1.118 \times 10^0$		
20.0 MeV	$6.802 \times 10^1$	5.475				5.475	$2.097 \times 10^0$		
30.0 MeV	$8.509 \times 10^1$	4.239				4.239	$4.202 \times 10^0$		
40.0 MeV	$1.003 \times 10^2$	3.615				3.615	$6.773 \times 10^0$		
80.0 MeV	$1.527 \times 10^2$	2.705				2.706	$1.998 \times 10^1$		
100. MeV	$1.764 \times 10^2$	2.542				2.542	$2.762 \times 10^1$		
140. MeV	$2.218 \times 10^2$	2.380				2.381	$4.396 \times 10^1$		
200. MeV	$2.868 \times 10^2$	2.296				2.296	$6.972 \times 10^1$		
266. MeV	$3.567 \times 10^2$	2.278			0.000	2.278	<i>Minimum ionization</i>		
300. MeV	$3.917 \times 10^2$	2.281			0.000	2.281	$1.135 \times 10^2$		
400. MeV	$4.945 \times 10^2$	2.307			0.000	2.307	$1.572 \times 10^2$		
800. MeV	$8.995 \times 10^2$	2.451	0.000		0.000	2.452	$3.252 \times 10^2$		
1.00 GeV	$1.101 \times 10^3$	2.513	0.000		0.000	2.514	$4.058 \times 10^2$		
1.40 GeV	$1.502 \times 10^3$	2.614	0.000		0.001	2.616	$5.616 \times 10^2$		
2.00 GeV	$2.103 \times 10^3$	2.729	0.000	0.000	0.001	2.730	$7.859 \times 10^2$		
3.00 GeV	$3.104 \times 10^3$	2.851	0.001	0.000	0.001	2.854	$1.143 \times 10^3$		
4.00 GeV	$4.104 \times 10^3$	2.928	0.001	0.001	0.002	2.932	$1.489 \times 10^3$		
8.00 GeV	$8.105 \times 10^3$	3.097	0.003	0.003	0.004	3.106	$2.809 \times 10^3$		
10.0 GeV	$1.011 \times 10^4$	3.146	0.004	0.004	0.005	3.158	$3.447 \times 10^3$		
14.0 GeV	$1.411 \times 10^4$	3.215	0.006	0.006	0.007	3.234	$4.698 \times 10^3$		
20.0 GeV	$2.011 \times 10^4$	3.283	0.009	0.010	0.009	3.312	$6.530 \times 10^3$		
30.0 GeV	$3.011 \times 10^4$	3.354	0.014	0.017	0.014	3.400	$9.508 \times 10^3$		
40.0 GeV	$4.011 \times 10^4$	3.400	0.020	0.026	0.018	3.464	$1.242 \times 10^4$		
80.0 GeV	$8.011 \times 10^4$	3.501	0.047	0.062	0.035	3.645	$2.366 \times 10^4$		
100. GeV	$1.001 \times 10^5$	3.531	0.061	0.083	0.043	3.718	$2.909 \times 10^4$		
140. GeV	$1.401 \times 10^5$	3.575	0.089	0.124	0.060	3.849	$3.966 \times 10^4$		
200. GeV	$2.001 \times 10^5$	3.620	0.135	0.190	0.085	4.031	$5.489 \times 10^4$		
300. GeV	$3.001 \times 10^5$	3.670	0.213	0.303	0.128	4.314	$7.886 \times 10^4$		
400. GeV	$4.001 \times 10^5$	3.705	0.295	0.421	0.170	4.592	$1.013 \times 10^5$		
800. GeV	$8.001 \times 10^5$	3.790	0.636	0.913	0.344	5.683	$1.795 \times 10^5$		
1.00 TeV	$1.000 \times 10^6$	3.818	0.813	1.169	0.432	6.231	$2.131 \times 10^5$		
1.40 TeV	$1.400 \times 10^6$	3.860	1.169	1.676	0.612	7.317	$2.722 \times 10^5$		
1.56 TeV	$1.557 \times 10^6$	3.873	1.311	1.879	0.684	7.747	<i>Muon critical energy</i>		
2.00 TeV	$2.000 \times 10^6$	3.905	1.716	2.456	0.887	8.965	$3.462 \times 10^5$		
3.00 TeV	$3.000 \times 10^6$	3.957	2.636	3.754	1.359	11.707	$4.436 \times 10^5$		
4.00 TeV	$4.000 \times 10^6$	3.995	3.573	5.071	1.840	14.480	$5.202 \times 10^5$		
8.00 TeV	$8.000 \times 10^6$	4.087	7.373	10.381	3.843	25.685	$7.249 \times 10^5$		
10.0 TeV	$1.000 \times 10^7$	4.118	9.298	13.057	4.876	31.348	$7.953 \times 10^5$		
14.0 TeV	$1.400 \times 10^7$	4.164	13.140	18.386	7.005	42.695	$9.042 \times 10^5$		
20.0 TeV	$2.000 \times 10^7$	4.214	18.956	26.428	10.277	59.875	$1.022 \times 10^6$		
30.0 TeV	$3.000 \times 10^7$	4.271	28.645	39.804	15.962	88.683	$1.159 \times 10^6$		
40.0 TeV	$4.000 \times 10^7$	4.313	38.392	53.226	21.799	117.731	$1.256 \times 10^6$		
80.0 TeV	$8.000 \times 10^7$	4.416	77.477	106.962	46.325	235.180	$1.492 \times 10^6$		
100. TeV	$1.000 \times 10^8$	4.449	97.073	133.863	59.049	294.436	$1.568 \times 10^6$		