

**Muons in francium (Fr)**

Z	A [g/mol]	$\rho$ [g/cm <sup>3</sup> ]	I [eV]	$a$	$k = m_s$	$x_0$	$x_1$	$\bar{C}$	$\delta_0$
87 (Fr)	[223.01974(2)]	1.870	827.0	0.43214	3.0000	1.1175	3.0000	8.0292	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	$4.704 \times 10^1$	3.771				3.771	$1.544 \times 10^0$
14.0 MeV	$5.616 \times 10^1$	3.012				3.012	$2.741 \times 10^0$
20.0 MeV	$6.802 \times 10^1$	2.402				2.403	$4.994 \times 10^0$
30.0 MeV	$8.509 \times 10^1$	1.902				1.902	$9.732 \times 10^0$
40.0 MeV	$1.003 \times 10^2$	1.644				1.644	$1.542 \times 10^1$
80.0 MeV	$1.527 \times 10^2$	1.268				1.268	$4.393 \times 10^1$
100. MeV	$1.764 \times 10^2$	1.203				1.203	$6.016 \times 10^1$
140. MeV	$2.218 \times 10^2$	1.142				1.142	$9.443 \times 10^1$
200. MeV	$2.868 \times 10^2$	1.119				1.119	$1.477 \times 10^2$
216. MeV	$3.039 \times 10^2$	1.118				1.118	<i>Minimum ionization</i>
300. MeV	$3.917 \times 10^2$	1.130	0.000		0.000	1.130	$2.368 \times 10^2$
400. MeV	$4.945 \times 10^2$	1.157	0.000		0.000	1.157	$3.243 \times 10^2$
800. MeV	$8.995 \times 10^2$	1.262	0.001		0.000	1.264	$6.543 \times 10^2$
1.00 GeV	$1.101 \times 10^3$	1.304	0.002		0.000	1.306	$8.099 \times 10^2$
1.40 GeV	$1.502 \times 10^3$	1.372	0.002		0.001	1.375	$1.108 \times 10^3$
2.00 GeV	$2.103 \times 10^3$	1.443	0.004	0.001	0.001	1.449	$1.532 \times 10^3$
3.00 GeV	$3.104 \times 10^3$	1.520	0.007	0.003	0.001	1.532	$2.202 \times 10^3$
4.00 GeV	$4.104 \times 10^3$	1.570	0.011	0.006	0.002	1.589	$2.842 \times 10^3$
8.00 GeV	$8.105 \times 10^3$	1.679	0.026	0.022	0.003	1.731	$5.242 \times 10^3$
10.0 GeV	$1.011 \times 10^4$	1.711	0.035	0.032	0.004	1.781	$6.381 \times 10^3$
14.0 GeV	$1.411 \times 10^4$	1.754	0.053	0.052	0.005	1.865	$8.574 \times 10^3$
20.0 GeV	$2.011 \times 10^4$	1.796	0.082	0.086	0.007	1.972	$1.170 \times 10^4$
30.0 GeV	$3.011 \times 10^4$	1.839	0.135	0.152	0.011	2.137	$1.657 \times 10^4$
40.0 GeV	$4.011 \times 10^4$	1.866	0.190	0.224	0.014	2.296	$2.108 \times 10^4$
80.0 GeV	$8.011 \times 10^4$	1.927	0.430	0.543	0.028	2.929	$3.647 \times 10^4$
100. GeV	$1.001 \times 10^5$	1.946	0.557	0.715	0.034	3.254	$4.295 \times 10^4$
140. GeV	$1.401 \times 10^5$	1.973	0.818	1.070	0.048	3.910	$5.415 \times 10^4$
142. GeV	$1.425 \times 10^5$	1.974	0.834	1.092	0.048	3.950	<i>Muon critical energy</i>
200. GeV	$2.001 \times 10^5$	2.002	1.226	1.632	0.068	4.929	$6.780 \times 10^4$
300. GeV	$3.001 \times 10^5$	2.034	1.922	2.570	0.102	6.629	$8.524 \times 10^4$
400. GeV	$4.001 \times 10^5$	2.057	2.641	3.542	0.136	8.377	$9.864 \times 10^4$
800. GeV	$8.001 \times 10^5$	2.113	5.606	7.528	0.274	15.522	$1.332 \times 10^5$
1.00 TeV	$1.000 \times 10^6$	2.131	7.128	9.566	0.344	19.171	$1.448 \times 10^5$
1.40 TeV	$1.400 \times 10^6$	2.158	10.176	13.630	0.487	26.454	$1.625 \times 10^5$
2.00 TeV	$2.000 \times 10^6$	2.188	14.837	19.832	0.705	37.563	$1.814 \times 10^5$
3.00 TeV	$3.000 \times 10^6$	2.222	22.611	30.137	1.077	56.049	$2.031 \times 10^5$
4.00 TeV	$4.000 \times 10^6$	2.247	30.486	40.550	1.455	74.739	$2.185 \times 10^5$
8.00 TeV	$8.000 \times 10^6$	2.307	62.213	82.398	3.020	149.941	$2.555 \times 10^5$
10.0 TeV	$1.000 \times 10^7$	2.327	78.193	103.430	3.823	187.775	$2.674 \times 10^5$
14.0 TeV	$1.400 \times 10^7$	2.358	110.065	145.403	5.470	263.298	$2.853 \times 10^5$
20.0 TeV	$2.000 \times 10^7$	2.390	158.136	208.628	7.994	377.150	$3.043 \times 10^5$
30.0 TeV	$3.000 \times 10^7$	2.428	238.164	313.809	12.351	566.754	$3.257 \times 10^5$
40.0 TeV	$4.000 \times 10^7$	2.456	318.460	419.232	16.808	756.957	$3.410 \times 10^5$
80.0 TeV	$8.000 \times 10^7$	2.523	640.064	841.211	35.408	1519.208	$3.775 \times 10^5$
100. TeV	$1.000 \times 10^8$	2.545	801.110	1052.390	45.010	1901.057	$3.893 \times 10^5$