

## Muons in liquid argon (Ar)

Z	A [g/mol]	$\rho$ [g/cm <sup>3</sup> ]	I [eV]	$a$	$k = m_s$	$x_0$	$x_1$	$\bar{C}$	$\delta_0$
18 (Ar)	39.948(1)	1.396	188.0	0.19559	3.0000	0.2000	3.0000	5.2146	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	$4.704 \times 10^1$	5.687				5.687	$9.833 \times 10^{-1}$		
14.0 MeV	$5.616 \times 10^1$	4.461				4.461	$1.786 \times 10^0$		
20.0 MeV	$6.802 \times 10^1$	3.502				3.502	$3.321 \times 10^0$		
30.0 MeV	$8.509 \times 10^1$	2.731				2.731	$6.598 \times 10^0$		
40.0 MeV	$1.003 \times 10^2$	2.340				2.340	$1.058 \times 10^1$		
80.0 MeV	$1.527 \times 10^2$	1.771				1.771	$3.084 \times 10^1$		
100. MeV	$1.764 \times 10^2$	1.669				1.670	$4.250 \times 10^1$		
140. MeV	$2.218 \times 10^2$	1.570				1.570	$6.732 \times 10^1$		
200. MeV	$2.868 \times 10^2$	1.518				1.519	$1.063 \times 10^2$		
266. MeV	$3.567 \times 10^2$	1.508			0.000	1.508	<i>Minimum ionization</i>		
300. MeV	$3.917 \times 10^2$	1.509			0.000	1.510	$1.725 \times 10^2$		
400. MeV	$4.945 \times 10^2$	1.526	0.000		0.000	1.526	$2.385 \times 10^2$		
800. MeV	$8.995 \times 10^2$	1.610	0.000		0.000	1.610	$4.934 \times 10^2$		
1.00 GeV	$1.101 \times 10^3$	1.644	0.000		0.000	1.645	$6.163 \times 10^2$		
1.40 GeV	$1.502 \times 10^3$	1.699	0.001	0.000	0.001	1.700	$8.552 \times 10^2$		
2.00 GeV	$2.103 \times 10^3$	1.758	0.001	0.001	0.001	1.761	$1.202 \times 10^3$		
3.00 GeV	$3.104 \times 10^3$	1.825	0.002	0.001	0.001	1.829	$1.758 \times 10^3$		
4.00 GeV	$4.104 \times 10^3$	1.870	0.003	0.002	0.002	1.877	$2.297 \times 10^3$		
8.00 GeV	$8.105 \times 10^3$	1.973	0.007	0.007	0.004	1.991	$4.359 \times 10^3$		
10.0 GeV	$1.011 \times 10^4$	2.003	0.010	0.010	0.004	2.028	$5.354 \times 10^3$		
14.0 GeV	$1.411 \times 10^4$	2.047	0.015	0.016	0.006	2.084	$7.298 \times 10^3$		
20.0 GeV	$2.011 \times 10^4$	2.091	0.023	0.026	0.008	2.149	$1.013 \times 10^4$		
30.0 GeV	$3.011 \times 10^4$	2.137	0.037	0.046	0.012	2.232	$1.469 \times 10^4$		
40.0 GeV	$4.011 \times 10^4$	2.167	0.052	0.067	0.016	2.304	$1.910 \times 10^4$		
80.0 GeV	$8.011 \times 10^4$	2.236	0.118	0.161	0.032	2.548	$3.558 \times 10^4$		
100. GeV	$1.001 \times 10^5$	2.258	0.153	0.212	0.039	2.663	$4.326 \times 10^4$		
140. GeV	$1.401 \times 10^5$	2.289	0.225	0.318	0.055	2.888	$5.768 \times 10^4$		
200. GeV	$2.001 \times 10^5$	2.322	0.338	0.485	0.078	3.224	$7.734 \times 10^4$		
300. GeV	$3.001 \times 10^5$	2.360	0.532	0.766	0.117	3.774	$1.060 \times 10^5$		
400. GeV	$4.001 \times 10^5$	2.386	0.732	1.058	0.156	4.332	$1.307 \times 10^5$		
484. GeV	$4.846 \times 10^5$	2.404	0.905	1.311	0.188	4.808	<i>Muon critical energy</i>		
800. GeV	$8.001 \times 10^5$	2.451	1.561	2.258	0.314	6.585	$2.051 \times 10^5$		
1.00 TeV	$1.000 \times 10^6$	2.472	1.989	2.874	0.395	7.730	$2.331 \times 10^5$		
1.40 TeV	$1.400 \times 10^6$	2.503	2.847	4.104	0.560	10.015	$2.784 \times 10^5$		
2.00 TeV	$2.000 \times 10^6$	2.538	4.161	5.985	0.810	13.494	$3.299 \times 10^5$		
3.00 TeV	$3.000 \times 10^6$	2.577	6.360	9.110	1.240	19.288	$3.915 \times 10^5$		
4.00 TeV	$4.000 \times 10^6$	2.606	8.592	12.272	1.677	25.147	$4.368 \times 10^5$		
8.00 TeV	$8.000 \times 10^6$	2.676	17.605	24.995	3.493	48.769	$5.490 \times 10^5$		
10.0 TeV	$1.000 \times 10^7$	2.698	22.154	31.395	4.427	60.675	$5.857 \times 10^5$		
14.0 TeV	$1.400 \times 10^7$	2.734	31.236	44.156	6.347	84.472	$6.413 \times 10^5$		
20.0 TeV	$2.000 \times 10^7$	2.771	44.956	63.386	9.292	120.406	$7.005 \times 10^5$		
30.0 TeV	$3.000 \times 10^7$	2.815	67.769	95.400	14.391	180.375	$7.679 \times 10^5$		
40.0 TeV	$4.000 \times 10^7$	2.847	90.675	127.504	19.616	240.642	$8.158 \times 10^5$		
80.0 TeV	$8.000 \times 10^7$	2.924	182.502	256.012	41.480	482.918	$9.308 \times 10^5$		
100. TeV	$1.000 \times 10^8$	2.950	228.520	320.330	52.790	604.590	$9.678 \times 10^5$		