## Table 289: Muons in Liquid argon (Ar)

| Z | $A$ [g/mol] | $\rho$ [g/cm$^3$] | $I$ [eV] | $a$ | $k = m_s$ | $x_0$ | $x_1$ | $\overline{C}$ | $\delta_0$ |
|---|---|---|---|---|---|---|---|---|---|
| 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 | Photonucl | Total | CSDA range [g/cm$^2$] |
|---|---|---|---|---|---|---|---|
| | | [MeV cm$^2$/g] | | | | | |
| 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 | *Minimum ionization* |
| 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 | *Muon critical energy* |
| 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 | $9.678 \times 10^5$ |