## Muons in argon gas (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) | $1.662 \times 10^{-3}$ | 188.0 | 0.19714 | 2.9618 | 1.7635 | 4.4855 | 11.9480 | 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 | $9.834 \times 10^{-1}$ |
| 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 | $1.764 \times 10^2$ | 1.670 | | | | 1.670 | $4.250 \times 10^1$ |
| 140. MeV | $2.218 \times 10^2$ | 1.572 | | | | 1.572 | $6.731 \times 10^1$ |
| 200. MeV | $2.868 \times 10^2$ | 1.525 | | | | 1.526 | $1.062 \times 10^2$ |
| 242. MeV | $3.316 \times 10^2$ | 1.519 | | | 0.000 | 1.520 | *Minimum ionization* |
| 300. MeV | $3.917 \times 10^2$ | 1.525 | | | 0.000 | 1.526 | $1.719 \times 10^2$ |
| 400. MeV | $4.945 \times 10^2$ | 1.551 | 0.000 | | 0.000 | 1.551 | $2.369 \times 10^2$ |
| 800. MeV | $8.995 \times 10^2$ | 1.666 | 0.000 | | 0.000 | 1.667 | $4.854 \times 10^2$ |
| 1.00 GeV | $1.101 \times 10^3$ | 1.714 | 0.000 | | 0.000 | 1.715 | $6.037 \times 10^2$ |
| 1.40 GeV | $1.502 \times 10^3$ | 1.791 | 0.001 | 0.000 | 0.001 | 1.793 | $8.316 \times 10^2$ |
| 2.00 GeV | $2.103 \times 10^3$ | 1.878 | 0.001 | 0.001 | 0.001 | 1.881 | $1.158 \times 10^3$ |
| 3.00 GeV | $3.104 \times 10^3$ | 1.980 | 0.002 | 0.001 | 0.001 | 1.985 | $1.675 \times 10^3$ |
| 4.00 GeV | $4.104 \times 10^3$ | 2.054 | 0.003 | 0.002 | 0.002 | 2.061 | $2.168 \times 10^3$ |
| 8.00 GeV | $8.105 \times 10^3$ | 2.226 | 0.007 | 0.007 | 0.004 | 2.244 | $4.018 \times 10^3$ |
| 10.0 GeV | $1.011 \times 10^4$ | 2.277 | 0.010 | 0.010 | 0.004 | 2.301 | $4.897 \times 10^3$ |
| 14.0 GeV | $1.411 \times 10^4$ | 2.349 | 0.015 | 0.016 | 0.006 | 2.386 | $6.603 \times 10^3$ |
| 20.0 GeV | $2.011 \times 10^4$ | 2.420 | 0.023 | 0.026 | 0.008 | 2.477 | $9.068 \times 10^3$ |
| 30.0 GeV | $3.011 \times 10^4$ | 2.494 | 0.037 | 0.046 | 0.012 | 2.589 | $1.301 \times 10^4$ |
| 40.0 GeV | $4.011 \times 10^4$ | 2.542 | 0.052 | 0.067 | 0.016 | 2.678 | $1.681 \times 10^4$ |
| 80.0 GeV | $8.011 \times 10^4$ | 2.647 | 0.118 | 0.161 | 0.032 | 2.959 | $3.098 \times 10^4$ |
| 100. GeV | $1.001 \times 10^5$ | 2.677 | 0.153 | 0.212 | 0.039 | 3.083 | $3.760 \times 10^4$ |
| 140. GeV | $1.401 \times 10^5$ | 2.721 | 0.225 | 0.318 | 0.055 | 3.319 | $5.010 \times 10^4$ |
| 200. GeV | $2.001 \times 10^5$ | 2.764 | 0.338 | 0.485 | 0.078 | 3.666 | $6.729 \times 10^4$ |
| 300. GeV | $3.001 \times 10^5$ | 2.810 | 0.532 | 0.766 | 0.117 | 4.225 | $9.268 \times 10^4$ |
| 400. GeV | $4.001 \times 10^5$ | 2.842 | 0.732 | 1.058 | 0.156 | 4.787 | $1.149 \times 10^5$ |
| 572. GeV | $5.723 \times 10^5$ | 2.879 | 1.085 | 1.571 | 0.223 | 5.759 | *Muon critical energy* |
| 800. GeV | $8.001 \times 10^5$ | 2.913 | 1.561 | 2.258 | 0.314 | 7.048 | $1.833 \times 10^5$ |
| 1.00 TeV | $1.000 \times 10^6$ | 2.935 | 1.989 | 2.874 | 0.395 | 8.194 | $2.096 \times 10^5$ |
| 1.40 TeV | $1.400 \times 10^6$ | 2.969 | 2.847 | 4.104 | 0.560 | 10.480 | $2.527 \times 10^5$ |
| 2.00 TeV | $2.000 \times 10^6$ | 3.003 | 4.161 | 5.985 | 0.810 | 13.960 | $3.022 \times 10^5$ |
| 3.00 TeV | $3.000 \times 10^6$ | 3.043 | 6.360 | 9.110 | 1.240 | 19.754 | $3.621 \times 10^5$ |
| 4.00 TeV | $4.000 \times 10^6$ | 3.071 | 8.592 | 12.272 | 1.677 | 25.613 | $4.064 \times 10^5$ |
| 8.00 TeV | $8.000 \times 10^6$ | 3.141 | 17.605 | 24.995 | 3.493 | 49.235 | $5.171 \times 10^5$ |
| 10.0 TeV | $1.000 \times 10^7$ | 3.164 | 22.154 | 31.395 | 4.427 | 61.141 | $5.535 \times 10^5$ |
| 14.0 TeV | $1.400 \times 10^7$ | 3.199 | 31.236 | 44.156 | 6.347 | 84.938 | $6.088 \times 10^5$ |
| 20.0 TeV | $2.000 \times 10^7$ | 3.237 | 44.956 | 63.386 | 9.292 | 120.872 | $6.677 \times 10^5$ |
| 30.0 TeV | $3.000 \times 10^7$ | 3.281 | 67.769 | 95.400 | 14.391 | 180.841 | $7.349 \times 10^5$ |
| 40.0 TeV | $4.000 \times 10^7$ | 3.312 | 90.675 | 127.504 | 19.616 | 241.108 | $7.826 \times 10^5$ |
| 80.0 TeV | $8.000 \times 10^7$ | 3.390 | 182.502 | 256.012 | 41.480 | 483.384 | $8.975 \times 10^5$ |
| 100. TeV | $1.000 \times 10^8$ | 3.416 | 228.520 | 320.330 | 52.790 | 605.056 | $9.344 \times 10^5$ |