## Muons in nitrogen gas ($N_2$)

| Z | $A$ [g/mol] | $\rho$ [g/cm$^3$] | $I$ [eV] | $a$ | $k = m_s$ | $x_0$ | $x_1$ | $\overline{C}$ | $\delta_0$ |
|---|---|---|---|---|---|---|---|---|---|
| 7 (N) | 14.007(2) | $1.165 \times 10^{-3}$ | 82.0 | 0.15349 | 3.2125 | 1.7378 | 4.1323 | 10.5400 | 0.00 |

| $T$ | $p$ [MeV/$c$] | Ionization | Brems | Pair prod | Photonucl | Total | CSDA range [g/cm$^2$] |
|---|---|---|---|---|---|---|---|
| | | [MeV cm$^2$/g] | | | | | |
| 10.0 MeV | $4.704 \times 10^1$ | 7.084 | | | | 7.084 | $7.814 \times 10^{-1}$ |
| 14.0 MeV | $5.616 \times 10^1$ | 5.530 | | | | 5.530 | $1.427 \times 10^0$ |
| 20.0 MeV | $6.802 \times 10^1$ | 4.321 | | | | 4.321 | $2.669 \times 10^0$ |
| 30.0 MeV | $8.509 \times 10^1$ | 3.354 | | | | 3.354 | $5.333 \times 10^0$ |
| 40.0 MeV | $1.003 \times 10^2$ | 2.865 | | | | 2.865 | $8.580 \times 10^0$ |
| 80.0 MeV | $1.527 \times 10^2$ | 2.152 | | | | 2.152 | $2.520 \times 10^1$ |
| 100. MeV | $1.764 \times 10^2$ | 2.025 | | | | 2.025 | $3.481 \times 10^1$ |
| 140. MeV | $2.218 \times 10^2$ | 1.900 | | | | 1.900 | $5.529 \times 10^1$ |
| 200. MeV | $2.868 \times 10^2$ | 1.837 | | | | 1.837 | $8.753 \times 10^1$ |
| 257. MeV | $3.471 \times 10^2$ | 1.825 | | | 0.000 | 1.825 | *Minimum ionization* |
| 300. MeV | $3.917 \times 10^2$ | 1.829 | | | 0.000 | 1.829 | $1.422 \times 10^2$ |
| 400. MeV | $4.945 \times 10^2$ | 1.853 | | | 0.000 | 1.853 | $1.966 \times 10^2$ |
| 800. MeV | $8.995 \times 10^2$ | 1.977 | 0.000 | | 0.000 | 1.977 | $4.054 \times 10^2$ |
| 1.00 GeV | $1.101 \times 10^3$ | 2.029 | 0.000 | | 0.000 | 2.030 | $5.052 \times 10^2$ |
| 1.40 GeV | $1.502 \times 10^3$ | 2.114 | 0.000 | | 0.001 | 2.116 | $6.980 \times 10^2$ |
| 2.00 GeV | $2.103 \times 10^3$ | 2.211 | 0.001 | 0.000 | 0.001 | 2.212 | $9.750 \times 10^2$ |
| 3.00 GeV | $3.104 \times 10^3$ | 2.324 | 0.001 | 0.001 | 0.001 | 2.327 | $1.415 \times 10^3$ |
| 4.00 GeV | $4.104 \times 10^3$ | 2.405 | 0.001 | 0.001 | 0.002 | 2.410 | $1.837 \times 10^3$ |
| 8.00 GeV | $8.105 \times 10^3$ | 2.586 | 0.003 | 0.003 | 0.004 | 2.597 | $3.426 \times 10^3$ |
| 10.0 GeV | $1.011 \times 10^4$ | 2.636 | 0.005 | 0.005 | 0.005 | 2.650 | $4.188 \times 10^3$ |
| 14.0 GeV | $1.411 \times 10^4$ | 2.706 | 0.007 | 0.007 | 0.007 | 2.727 | $5.675 \times 10^3$ |
| 20.0 GeV | $2.011 \times 10^4$ | 2.775 | 0.011 | 0.012 | 0.009 | 2.808 | $7.841 \times 10^3$ |
| 30.0 GeV | $3.011 \times 10^4$ | 2.846 | 0.018 | 0.022 | 0.013 | 2.899 | $1.134 \times 10^4$ |
| 40.0 GeV | $4.011 \times 10^4$ | 2.892 | 0.025 | 0.032 | 0.018 | 2.967 | $1.475 \times 10^4$ |
| 80.0 GeV | $8.011 \times 10^4$ | 2.992 | 0.057 | 0.077 | 0.034 | 3.161 | $2.778 \times 10^4$ |
| 100. GeV | $1.001 \times 10^5$ | 3.021 | 0.074 | 0.102 | 0.042 | 3.240 | $3.403 \times 10^4$ |
| 140. GeV | $1.401 \times 10^5$ | 3.063 | 0.110 | 0.153 | 0.059 | 3.384 | $4.611 \times 10^4$ |
| 200. GeV | $2.001 \times 10^5$ | 3.104 | 0.165 | 0.234 | 0.083 | 3.587 | $6.332 \times 10^4$ |
| 300. GeV | $3.001 \times 10^5$ | 3.150 | 0.261 | 0.372 | 0.124 | 3.907 | $9.002 \times 10^4$ |
| 400. GeV | $4.001 \times 10^5$ | 3.181 | 0.360 | 0.515 | 0.166 | 4.222 | $1.146 \times 10^5$ |
| 800. GeV | $8.001 \times 10^5$ | 3.254 | 0.772 | 1.113 | 0.335 | 5.474 | $1.976 \times 10^5$ |
| 1.00 TeV | $1.000 \times 10^6$ | 3.277 | 0.985 | 1.422 | 0.421 | 6.105 | $2.322 \times 10^5$ |
| 1.15 TeV | $1.154 \times 10^6$ | 3.292 | 1.149 | 1.655 | 0.488 | 6.585 | *Muon critical energy* |
| 1.40 TeV | $1.400 \times 10^6$ | 3.313 | 1.414 | 2.036 | 0.597 | 7.359 | $2.918 \times 10^5$ |
| 2.00 TeV | $2.000 \times 10^6$ | 3.351 | 2.073 | 2.977 | 0.864 | 9.265 | $3.643 \times 10^5$ |
| 3.00 TeV | $3.000 \times 10^6$ | 3.394 | 3.176 | 4.543 | 1.324 | 12.439 | $4.572 \times 10^5$ |
| 4.00 TeV | $4.000 \times 10^6$ | 3.426 | 4.299 | 6.132 | 1.792 | 15.649 | $5.287 \times 10^5$ |
| 8.00 TeV | $8.000 \times 10^6$ | 3.503 | 8.841 | 12.530 | 3.740 | 28.615 | $7.150 \times 10^5$ |
| 10.0 TeV | $1.000 \times 10^7$ | 3.529 | 11.138 | 15.752 | 4.743 | 35.162 | $7.779 \times 10^5$ |
| 14.0 TeV | $1.400 \times 10^7$ | 3.568 | 15.720 | 22.172 | 6.809 | 48.270 | $8.746 \times 10^5$ |
| 20.0 TeV | $2.000 \times 10^7$ | 3.610 | 22.650 | 31.856 | 9.982 | 68.098 | $9.788 \times 10^5$ |
| 30.0 TeV | $3.000 \times 10^7$ | 3.658 | 34.187 | 47.969 | 15.491 | 101.305 | $1.098 \times 10^6$ |
| 40.0 TeV | $4.000 \times 10^7$ | 3.693 | 45.784 | 64.133 | 21.144 | 134.754 | $1.184 \times 10^6$ |
| 80.0 TeV | $8.000 \times 10^7$ | 3.779 | 92.292 | 128.845 | 44.860 | 269.777 | $1.390 \times 10^6$ |
| 100. TeV | $1.000 \times 10^8$ | 3.808 | 115.610 | 161.240 | 57.150 | 337.808 | $1.456 \times 10^6$ |