## Muons in magnesium tetraborate $MgB_4O_7$

| $\langle Z/A \rangle$ | $\rho$ [g/cm$^3$] | $I$ [eV] | $a$ | $k = m_s$ | $x_0$ | $x_1$ | $\overline{C}$ | $\delta_0$ |
|---|---|---|---|---|---|---|---|---|
| 0.49014 | 2.530 | 108.3 | 0.09703 | 3.4893 | 0.1147 | 2.7635 | 3.4328 | 0.00 |

| $T$ | $p$ [MeV/$c$] | Ionization | Brems | Pair prod | Photonucl | Total | CSDA range [g/cm$^2$] |
|---|---|---|---|---|---|---|---|
| | | [MeV cm$^2$/g] | | | | | |
| 10.0 MeV | $4.704 \times 10^1$ | 6.699 | | | | 6.699 | $8.280 \times 10^{-1}$ |
| 14.0 MeV | $5.616 \times 10^1$ | 5.235 | | | | 5.235 | $1.511 \times 10^0$ |
| 20.0 MeV | $6.802 \times 10^1$ | 4.096 | | | | 4.096 | $2.821 \times 10^0$ |
| 30.0 MeV | $8.509 \times 10^1$ | 3.183 | | | | 3.183 | $5.629 \times 10^0$ |
| 40.0 MeV | $1.003 \times 10^2$ | 2.721 | | | | 2.722 | $9.049 \times 10^0$ |
| 80.0 MeV | $1.527 \times 10^2$ | 2.045 | | | | 2.045 | $2.653 \times 10^1$ |
| 100. MeV | $1.764 \times 10^2$ | 1.918 | | | | 1.918 | $3.665 \times 10^1$ |
| 140. MeV | $2.218 \times 10^2$ | 1.790 | | | | 1.790 | $5.834 \times 10^1$ |
| 200. MeV | $2.868 \times 10^2$ | 1.718 | | | | 1.718 | $9.268 \times 10^1$ |
| 300. MeV | $3.917 \times 10^2$ | 1.692 | | | 0.000 | 1.693 | $1.515 \times 10^2$ |
| 307. MeV | $3.990 \times 10^2$ | 1.692 | | | 0.000 | 1.693 | *Minimum ionization* |
| 400. MeV | $4.945 \times 10^2$ | 1.700 | | | 0.000 | 1.701 | $2.105 \times 10^2$ |
| 800. MeV | $8.995 \times 10^2$ | 1.770 | 0.000 | | 0.000 | 1.771 | $4.410 \times 10^2$ |
| 1.00 GeV | $1.101 \times 10^3$ | 1.801 | 0.000 | | 0.000 | 1.802 | $5.530 \times 10^2$ |
| 1.40 GeV | $1.502 \times 10^3$ | 1.851 | 0.000 | 0.000 | 0.001 | 1.852 | $7.718 \times 10^2$ |
| 2.00 GeV | $2.103 \times 10^3$ | 1.906 | 0.001 | 0.000 | 0.001 | 1.908 | $1.091 \times 10^3$ |
| 3.00 GeV | $3.104 \times 10^3$ | 1.968 | 0.001 | 0.001 | 0.001 | 1.972 | $1.606 \times 10^3$ |
| 4.00 GeV | $4.104 \times 10^3$ | 2.012 | 0.002 | 0.001 | 0.002 | 2.016 | $2.107 \times 10^3$ |
| 8.00 GeV | $8.105 \times 10^3$ | 2.111 | 0.004 | 0.004 | 0.004 | 2.122 | $4.035 \times 10^3$ |
| 10.0 GeV | $1.011 \times 10^4$ | 2.141 | 0.005 | 0.005 | 0.005 | 2.155 | $4.969 \times 10^3$ |
| 14.0 GeV | $1.411 \times 10^4$ | 2.184 | 0.008 | 0.008 | 0.006 | 2.207 | $6.802 \times 10^3$ |
| 20.0 GeV | $2.011 \times 10^4$ | 2.228 | 0.012 | 0.013 | 0.009 | 2.263 | $9.486 \times 10^3$ |
| 30.0 GeV | $3.011 \times 10^4$ | 2.275 | 0.019 | 0.024 | 0.013 | 2.332 | $1.384 \times 10^4$ |
| 40.0 GeV | $4.011 \times 10^4$ | 2.308 | 0.027 | 0.035 | 0.017 | 2.387 | $1.807 \times 10^4$ |
| 80.0 GeV | $8.011 \times 10^4$ | 2.382 | 0.062 | 0.084 | 0.034 | 2.561 | $3.422 \times 10^4$ |
| 100. GeV | $1.001 \times 10^5$ | 2.405 | 0.081 | 0.110 | 0.042 | 2.638 | $4.192 \times 10^4$ |
| 140. GeV | $1.401 \times 10^5$ | 2.439 | 0.119 | 0.165 | 0.058 | 2.782 | $5.668 \times 10^4$ |
| 200. GeV | $2.001 \times 10^5$ | 2.475 | 0.179 | 0.253 | 0.083 | 2.989 | $7.748 \times 10^4$ |
| 300. GeV | $3.001 \times 10^5$ | 2.516 | 0.282 | 0.402 | 0.124 | 3.323 | $1.092 \times 10^5$ |
| 400. GeV | $4.001 \times 10^5$ | 2.544 | 0.388 | 0.556 | 0.165 | 3.654 | $1.379 \times 10^5$ |
| 800. GeV | $8.001 \times 10^5$ | 2.615 | 0.832 | 1.200 | 0.333 | 4.980 | $2.313 \times 10^5$ |
| 881. GeV | $8.807 \times 10^5$ | 2.624 | 0.924 | 1.333 | 0.367 | 5.249 | *Muon critical energy* |
| 1.00 TeV | $1.000 \times 10^6$ | 2.637 | 1.061 | 1.532 | 0.419 | 5.650 | $2.690 \times 10^5$ |
| 1.40 TeV | $1.400 \times 10^6$ | 2.672 | 1.523 | 2.193 | 0.594 | 6.981 | $3.326 \times 10^5$ |
| 2.00 TeV | $2.000 \times 10^6$ | 2.709 | 2.231 | 3.205 | 0.859 | 9.005 | $4.080 \times 10^5$ |
| 3.00 TeV | $3.000 \times 10^6$ | 2.752 | 3.418 | 4.890 | 1.317 | 12.377 | $5.024 \times 10^5$ |
| 4.00 TeV | $4.000 \times 10^6$ | 2.783 | 4.624 | 6.597 | 1.782 | 15.787 | $5.738 \times 10^5$ |
| 8.00 TeV | $8.000 \times 10^6$ | 2.859 | 9.505 | 13.474 | 3.718 | 29.557 | $7.560 \times 10^5$ |
| 10.0 TeV | $1.000 \times 10^7$ | 2.884 | 11.972 | 16.937 | 4.715 | 36.508 | $8.168 \times 10^5$ |
| 14.0 TeV | $1.400 \times 10^7$ | 2.922 | 16.895 | 23.837 | 6.768 | 50.423 | $9.097 \times 10^5$ |
| 20.0 TeV | $2.000 \times 10^7$ | 2.964 | 24.338 | 34.243 | 9.922 | 71.467 | $1.009 \times 10^6$ |
| 30.0 TeV | $3.000 \times 10^7$ | 3.011 | 36.728 | 51.560 | 15.393 | 106.693 | $1.123 \times 10^6$ |
| 40.0 TeV | $4.000 \times 10^7$ | 3.045 | 49.180 | 68.932 | 21.008 | 142.165 | $1.204 \times 10^6$ |
| 80.0 TeV | $8.000 \times 10^7$ | 3.130 | 99.107 | 138.475 | 44.554 | 285.266 | $1.399 \times 10^6$ |
| 100. TeV | $1.000 \times 10^8$ | 3.158 | 124.135 | 173.288 | 56.754 | 357.334 | $1.461 \times 10^6$ |