## Muons in Freon-13b1 ($CF_3Br$)

| $\langle Z/A \rangle$ | $\rho$ [g/cm$^3$] | $I$ [eV] | $a$ | $k = m_s$ | $x_0$ | $x_1$ | $\overline{C}$ | $\delta_0$ |
|---|---|---|---|---|---|---|---|---|
| 0.45665 | 1.500 | 210.5 | 0.03925 | 3.7194 | 0.3522 | 3.7554 | 5.3555 | 0.00 |

| $T$ | $p$ [MeV/$c$] | Ionization | Brems | Pair prod | Photonucl | Total | CSDA range [g/cm$^2$] |
|---|---|---|---|---|---|---|---|
| | | [MeV cm$^2$/g] | | | | | |
| 10.0 MeV | $4.704 \times 10^1$ | 5.678 | | | | 5.678 | $9.844 \times 10^{-1}$ |
| 14.0 MeV | $5.616 \times 10^1$ | 4.454 | | | | 4.454 | $1.788 \times 10^0$ |
| 20.0 MeV | $6.802 \times 10^1$ | 3.498 | | | | 3.498 | $3.325 \times 10^0$ |
| 30.0 MeV | $8.509 \times 10^1$ | 2.729 | | | | 2.729 | $6.606 \times 10^0$ |
| 40.0 MeV | $1.003 \times 10^2$ | 2.339 | | | | 2.339 | $1.059 \times 10^1$ |
| 80.0 MeV | $1.527 \times 10^2$ | 1.771 | | | | 1.771 | $3.086 \times 10^1$ |
| 100. MeV | $1.764 \times 10^2$ | 1.671 | | | | 1.671 | $4.251 \times 10^1$ |
| 140. MeV | $2.218 \times 10^2$ | 1.574 | | | | 1.574 | $6.729 \times 10^1$ |
| 200. MeV | $2.868 \times 10^2$ | 1.524 | | | | 1.524 | $1.062 \times 10^2$ |
| 266. MeV | $3.567 \times 10^2$ | 1.513 | | | 0.000 | 1.513 | *Minimum ionization* |
| 300. MeV | $3.917 \times 10^2$ | 1.515 | | | 0.000 | 1.515 | $1.721 \times 10^2$ |
| 400. MeV | $4.945 \times 10^2$ | 1.531 | 0.000 | | 0.000 | 1.532 | $2.378 \times 10^2$ |
| 800. MeV | $8.995 \times 10^2$ | 1.616 | 0.000 | | 0.000 | 1.616 | $4.919 \times 10^2$ |
| 1.00 GeV | $1.101 \times 10^3$ | 1.650 | 0.001 | | 0.000 | 1.651 | $6.142 \times 10^2$ |
| 1.40 GeV | $1.502 \times 10^3$ | 1.705 | 0.001 | 0.000 | 0.001 | 1.707 | $8.523 \times 10^2$ |
| 2.00 GeV | $2.103 \times 10^3$ | 1.765 | 0.001 | 0.001 | 0.001 | 1.768 | $1.197 \times 10^3$ |
| 3.00 GeV | $3.104 \times 10^3$ | 1.833 | 0.002 | 0.002 | 0.001 | 1.838 | $1.751 \times 10^3$ |
| 4.00 GeV | $4.104 \times 10^3$ | 1.879 | 0.004 | 0.003 | 0.002 | 1.887 | $2.288 \times 10^3$ |
| 8.00 GeV | $8.105 \times 10^3$ | 1.984 | 0.009 | 0.009 | 0.004 | 2.005 | $4.336 \times 10^3$ |
| 10.0 GeV | $1.011 \times 10^4$ | 2.016 | 0.012 | 0.012 | 0.004 | 2.044 | $5.324 \times 10^3$ |
| 14.0 GeV | $1.411 \times 10^4$ | 2.061 | 0.018 | 0.019 | 0.006 | 2.104 | $7.251 \times 10^3$ |
| 20.0 GeV | $2.011 \times 10^4$ | 2.106 | 0.027 | 0.032 | 0.008 | 2.174 | $1.005 \times 10^4$ |
| 30.0 GeV | $3.011 \times 10^4$ | 2.154 | 0.045 | 0.055 | 0.012 | 2.267 | $1.455 \times 10^4$ |
| 40.0 GeV | $4.011 \times 10^4$ | 2.187 | 0.063 | 0.081 | 0.016 | 2.347 | $1.889 \times 10^4$ |
| 80.0 GeV | $8.011 \times 10^4$ | 2.259 | 0.143 | 0.194 | 0.032 | 2.628 | $3.496 \times 10^4$ |
| 100. GeV | $1.001 \times 10^5$ | 2.281 | 0.185 | 0.256 | 0.039 | 2.761 | $4.239 \times 10^4$ |
| 140. GeV | $1.401 \times 10^5$ | 2.313 | 0.272 | 0.382 | 0.055 | 3.023 | $5.623 \times 10^4$ |
| 200. GeV | $2.001 \times 10^5$ | 2.347 | 0.408 | 0.582 | 0.078 | 3.416 | $7.489 \times 10^4$ |
| 300. GeV | $3.001 \times 10^5$ | 2.385 | 0.641 | 0.918 | 0.116 | 4.061 | $1.017 \times 10^5$ |
| 400. GeV | $4.001 \times 10^5$ | 2.412 | 0.882 | 1.267 | 0.155 | 4.717 | $1.245 \times 10^5$ |
| 418. GeV | $4.177 \times 10^5$ | 2.416 | 0.925 | 1.329 | 0.162 | 4.833 | *Muon critical energy* |
| 800. GeV | $8.001 \times 10^5$ | 2.478 | 1.880 | 2.702 | 0.314 | 7.373 | $1.918 \times 10^5$ |
| 1.00 TeV | $1.000 \times 10^6$ | 2.499 | 2.393 | 3.438 | 0.394 | 8.724 | $2.167 \times 10^5$ |
| 1.40 TeV | $1.400 \times 10^6$ | 2.531 | 3.424 | 4.905 | 0.559 | 11.419 | $2.567 \times 10^5$ |
| 2.00 TeV | $2.000 \times 10^6$ | 2.566 | 5.002 | 7.147 | 0.809 | 15.524 | $3.016 \times 10^5$ |
| 3.00 TeV | $3.000 \times 10^6$ | 2.606 | 7.640 | 10.874 | 1.238 | 22.358 | $3.550 \times 10^5$ |
| 4.00 TeV | $4.000 \times 10^6$ | 2.635 | 10.317 | 14.644 | 1.674 | 29.270 | $3.940 \times 10^5$ |
| 8.00 TeV | $8.000 \times 10^6$ | 2.706 | 21.120 | 29.807 | 3.486 | 57.120 | $4.901 \times 10^5$ |
| 10.0 TeV | $1.000 \times 10^7$ | 2.729 | 26.570 | 37.433 | 4.418 | 71.151 | $5.214 \times 10^5$ |
| 14.0 TeV | $1.400 \times 10^7$ | 2.764 | 37.441 | 52.645 | 6.334 | 99.185 | $5.688 \times 10^5$ |
| 20.0 TeV | $2.000 \times 10^7$ | 2.803 | 53.855 | 75.567 | 9.275 | 141.501 | $6.192 \times 10^5$ |
| 30.0 TeV | $3.000 \times 10^7$ | 2.847 | 81.181 | 113.708 | 14.368 | 212.105 | $6.765 \times 10^5$ |
| 40.0 TeV | $4.000 \times 10^7$ | 2.879 | 108.618 | 151.949 | 19.587 | 283.035 | $7.172 \times 10^5$ |
| 80.0 TeV | $8.000 \times 10^7$ | 2.958 | 218.569 | 305.033 | 41.431 | 567.991 | $8.150 \times 10^5$ |
| 100. TeV | $1.000 \times 10^8$ | 2.983 | 273.654 | 381.653 | 52.731 | 711.022 | $8.464 \times 10^5$ |