

## Muons in lanthanum bromide (LaBr<sub>3</sub>)

|          | $\langle Z/A \rangle$ | $\rho$ [g/cm <sup>3</sup> ] | $I$ [eV] | $a$       | $k = m_s$                | $x_0$    | $x_1$                              | $\bar{C}$ | $\delta_0$ |
|----------|-----------------------|-----------------------------|----------|-----------|--------------------------|----------|------------------------------------|-----------|------------|
|          | 0.42787               | 5.290                       | 454.5    | 0.21967   | 3.0000                   | 0.3581   | 3.0000                             | 5.6997    | 0.00       |
| $T$      | $p$<br>[MeV/c]        | Ionization                  | Brems    | Pair prod | Photonucl                | Total    | CSDA range<br>[g/cm <sup>2</sup> ] |           |            |
|          |                       |                             |          |           | [MeV cm <sup>2</sup> /g] |          |                                    |           |            |
| 10.0 MeV | $4.704 \times 10^1$   | 4.709                       |          |           |                          | 4.709    | $1.201 \times 10^0$                |           |            |
| 14.0 MeV | $5.616 \times 10^1$   | 3.715                       |          |           |                          | 3.715    | $2.167 \times 10^0$                |           |            |
| 20.0 MeV | $6.802 \times 10^1$   | 2.932                       |          |           |                          | 2.932    | $4.004 \times 10^0$                |           |            |
| 30.0 MeV | $8.509 \times 10^1$   | 2.300                       |          |           |                          | 2.300    | $7.907 \times 10^0$                |           |            |
| 40.0 MeV | $1.003 \times 10^2$   | 1.978                       |          |           |                          | 1.978    | $1.262 \times 10^1$                |           |            |
| 80.0 MeV | $1.527 \times 10^2$   | 1.510                       |          |           |                          | 1.510    | $3.648 \times 10^1$                |           |            |
| 100. MeV | $1.764 \times 10^2$   | 1.428                       |          |           |                          | 1.428    | $5.013 \times 10^1$                |           |            |
| 140. MeV | $2.218 \times 10^2$   | 1.350                       |          |           |                          | 1.351    | $7.906 \times 10^1$                |           |            |
| 200. MeV | $2.868 \times 10^2$   | 1.316                       |          |           |                          | 1.316    | $1.242 \times 10^2$                |           |            |
| 237. MeV | $3.260 \times 10^2$   | 1.313                       |          |           |                          | 1.313    | <i>Minimum ionization</i>          |           |            |
| 300. MeV | $3.917 \times 10^2$   | 1.319                       | 0.000    |           | 0.000                    | 1.319    | $2.003 \times 10^2$                |           |            |
| 400. MeV | $4.945 \times 10^2$   | 1.340                       | 0.000    |           | 0.000                    | 1.340    | $2.755 \times 10^2$                |           |            |
| 800. MeV | $8.995 \times 10^2$   | 1.429                       | 0.001    |           | 0.000                    | 1.430    | $5.640 \times 10^2$                |           |            |
| 1.00 GeV | $1.101 \times 10^3$   | 1.464                       | 0.001    |           | 0.000                    | 1.465    | $7.021 \times 10^2$                |           |            |
| 1.40 GeV | $1.502 \times 10^3$   | 1.519                       | 0.001    | 0.000     | 0.001                    | 1.521    | $9.698 \times 10^2$                |           |            |
| 2.00 GeV | $2.103 \times 10^3$   | 1.577                       | 0.002    | 0.001     | 0.001                    | 1.582    | $1.356 \times 10^3$                |           |            |
| 3.00 GeV | $3.104 \times 10^3$   | 1.643                       | 0.004    | 0.003     | 0.001                    | 1.651    | $1.974 \times 10^3$                |           |            |
| 4.00 GeV | $4.104 \times 10^3$   | 1.687                       | 0.006    | 0.005     | 0.002                    | 1.700    | $2.570 \times 10^3$                |           |            |
| 8.00 GeV | $8.105 \times 10^3$   | 1.787                       | 0.015    | 0.015     | 0.003                    | 1.820    | $4.836 \times 10^3$                |           |            |
| 10.0 GeV | $1.011 \times 10^4$   | 1.817                       | 0.020    | 0.021     | 0.004                    | 1.862    | $5.922 \times 10^3$                |           |            |
| 14.0 GeV | $1.411 \times 10^4$   | 1.859                       | 0.030    | 0.033     | 0.006                    | 1.928    | $8.031 \times 10^3$                |           |            |
| 20.0 GeV | $2.011 \times 10^4$   | 1.901                       | 0.047    | 0.054     | 0.008                    | 2.010    | $1.108 \times 10^4$                |           |            |
| 30.0 GeV | $3.011 \times 10^4$   | 1.945                       | 0.077    | 0.095     | 0.012                    | 2.128    | $1.591 \times 10^4$                |           |            |
| 40.0 GeV | $4.011 \times 10^4$   | 1.974                       | 0.109    | 0.138     | 0.015                    | 2.237    | $2.049 \times 10^4$                |           |            |
| 80.0 GeV | $8.011 \times 10^4$   | 2.039                       | 0.246    | 0.332     | 0.030                    | 2.648    | $3.689 \times 10^4$                |           |            |
| 100. GeV | $1.001 \times 10^5$   | 2.060                       | 0.319    | 0.437     | 0.037                    | 2.852    | $4.417 \times 10^4$                |           |            |
| 140. GeV | $1.401 \times 10^5$   | 2.090                       | 0.468    | 0.652     | 0.051                    | 3.261    | $5.728 \times 10^4$                |           |            |
| 200. GeV | $2.001 \times 10^5$   | 2.121                       | 0.702    | 0.992     | 0.073                    | 3.888    | $7.411 \times 10^4$                |           |            |
| 237. GeV | $2.373 \times 10^5$   | 2.136                       | 0.848    | 1.201     | 0.086                    | 4.273    | <i>Muon critical energy</i>        |           |            |
| 300. GeV | $3.001 \times 10^5$   | 2.156                       | 1.101    | 1.562     | 0.109                    | 4.929    | $9.691 \times 10^4$                |           |            |
| 400. GeV | $4.001 \times 10^5$   | 2.182                       | 1.513    | 2.153     | 0.146                    | 5.994    | $1.153 \times 10^5$                |           |            |
| 800. GeV | $8.001 \times 10^5$   | 2.243                       | 3.218    | 4.575     | 0.294                    | 10.332   | $1.655 \times 10^5$                |           |            |
| 1.00 TeV | $1.000 \times 10^6$   | 2.263                       | 4.095    | 5.815     | 0.369                    | 12.543   | $1.831 \times 10^5$                |           |            |
| 1.40 TeV | $1.400 \times 10^6$   | 2.293                       | 5.852    | 8.289     | 0.523                    | 16.959   | $2.104 \times 10^5$                |           |            |
| 2.00 TeV | $2.000 \times 10^6$   | 2.326                       | 8.540    | 12.065    | 0.757                    | 23.689   | $2.402 \times 10^5$                |           |            |
| 3.00 TeV | $3.000 \times 10^6$   | 2.363                       | 13.030   | 18.340    | 1.158                    | 34.893   | $2.748 \times 10^5$                |           |            |
| 4.00 TeV | $4.000 \times 10^6$   | 2.390                       | 17.581   | 24.683    | 1.565                    | 46.221   | $2.996 \times 10^5$                |           |            |
| 8.00 TeV | $8.000 \times 10^6$   | 2.457                       | 35.936   | 50.185    | 3.253                    | 91.831   | $3.598 \times 10^5$                |           |            |
| 10.0 TeV | $1.000 \times 10^7$   | 2.478                       | 45.187   | 63.005    | 4.120                    | 114.792  | $3.793 \times 10^5$                |           |            |
| 14.0 TeV | $1.400 \times 10^7$   | 2.512                       | 63.640   | 88.584    | 5.901                    | 160.638  | $4.086 \times 10^5$                |           |            |
| 20.0 TeV | $2.000 \times 10^7$   | 2.547                       | 91.487   | 127.119   | 8.630                    | 229.786  | $4.397 \times 10^5$                |           |            |
| 30.0 TeV | $3.000 \times 10^7$   | 2.589                       | 137.847  | 191.235   | 13.347                   | 345.020  | $4.749 \times 10^5$                |           |            |
| 40.0 TeV | $4.000 \times 10^7$   | 2.619                       | 184.379  | 255.507   | 18.176                   | 460.683  | $4.999 \times 10^5$                |           |            |
| 80.0 TeV | $8.000 \times 10^7$   | 2.693                       | 370.802  | 512.781   | 38.344                   | 924.621  | $5.600 \times 10^5$                |           |            |
| 100. TeV | $1.000 \times 10^8$   | 2.717                       | 464.178  | 641.540   | 48.762                   | 1157.198 | $5.793 \times 10^5$                |           |            |