

## Muons in liquid krypton (Kr)

| Z        | A [g/mol]           | $\rho$ [g/cm <sup>3</sup> ] | I [eV]  | $a$                                   | $k = m_s$ | $x_0$    | $x_1$                              | $\bar{C}$ | $\delta_0$ |
|----------|---------------------|-----------------------------|---------|---------------------------------------|-----------|----------|------------------------------------|-----------|------------|
| 36 (Kr)  | 83.798 (2)          | 2.418                       | 352.0   | 0.23491                               | 3.0000    | 0.4454   | 3.0000                             | 5.9674    | 0.00       |
| $T$      | $p$<br>[MeV/c]      | Ionization                  | Brems   | Pair prod<br>[MeV cm <sup>2</sup> /g] | Photonucl | Total    | CSDA range<br>[g/cm <sup>2</sup> ] |           |            |
| 10.0 MeV | $4.704 \times 10^1$ | 4.909                       |         |                                       |           | 4.909    | $1.152 \times 10^0$                |           |            |
| 14.0 MeV | $5.616 \times 10^1$ | 3.870                       |         |                                       |           | 3.870    | $2.079 \times 10^0$                |           |            |
| 20.0 MeV | $6.802 \times 10^1$ | 3.053                       |         |                                       |           | 3.053    | $3.844 \times 10^0$                |           |            |
| 30.0 MeV | $8.509 \times 10^1$ | 2.392                       |         |                                       |           | 2.392    | $7.594 \times 10^0$                |           |            |
| 40.0 MeV | $1.003 \times 10^2$ | 2.055                       |         |                                       |           | 2.055    | $1.213 \times 10^1$                |           |            |
| 80.0 MeV | $1.527 \times 10^2$ | 1.565                       |         |                                       |           | 1.565    | $3.512 \times 10^1$                |           |            |
| 100. MeV | $1.764 \times 10^2$ | 1.479                       |         |                                       |           | 1.479    | $4.829 \times 10^1$                |           |            |
| 140. MeV | $2.218 \times 10^2$ | 1.397                       |         |                                       |           | 1.397    | $7.624 \times 10^1$                |           |            |
| 200. MeV | $2.868 \times 10^2$ | 1.360                       |         |                                       |           | 1.360    | $1.199 \times 10^2$                |           |            |
| 236. MeV | $3.250 \times 10^2$ | 1.357                       |         |                                       |           | 1.357    | <i>Minimum ionization</i>          |           |            |
| 300. MeV | $3.917 \times 10^2$ | 1.364                       | 0.000   |                                       | 0.000     | 1.364    | $1.935 \times 10^2$                |           |            |
| 400. MeV | $4.945 \times 10^2$ | 1.386                       | 0.000   |                                       | 0.000     | 1.386    | $2.662 \times 10^2$                |           |            |
| 800. MeV | $8.995 \times 10^2$ | 1.478                       | 0.001   |                                       | 0.000     | 1.479    | $5.452 \times 10^2$                |           |            |
| 1.00 GeV | $1.101 \times 10^3$ | 1.514                       | 0.001   |                                       | 0.000     | 1.515    | $6.788 \times 10^2$                |           |            |
| 1.40 GeV | $1.502 \times 10^3$ | 1.570                       | 0.001   | 0.000                                 | 0.001     | 1.572    | $9.377 \times 10^2$                |           |            |
| 2.00 GeV | $2.103 \times 10^3$ | 1.630                       | 0.002   | 0.001                                 | 0.001     | 1.634    | $1.312 \times 10^3$                |           |            |
| 3.00 GeV | $3.104 \times 10^3$ | 1.697                       | 0.004   | 0.002                                 | 0.001     | 1.705    | $1.910 \times 10^3$                |           |            |
| 4.00 GeV | $4.104 \times 10^3$ | 1.743                       | 0.005   | 0.004                                 | 0.002     | 1.754    | $2.488 \times 10^3$                |           |            |
| 8.00 GeV | $8.105 \times 10^3$ | 1.844                       | 0.013   | 0.013                                 | 0.003     | 1.874    | $4.686 \times 10^3$                |           |            |
| 10.0 GeV | $1.011 \times 10^4$ | 1.874                       | 0.017   | 0.018                                 | 0.004     | 1.914    | $5.742 \times 10^3$                |           |            |
| 14.0 GeV | $1.411 \times 10^4$ | 1.917                       | 0.026   | 0.029                                 | 0.006     | 1.978    | $7.796 \times 10^3$                |           |            |
| 20.0 GeV | $2.011 \times 10^4$ | 1.959                       | 0.041   | 0.047                                 | 0.008     | 2.055    | $1.077 \times 10^4$                |           |            |
| 30.0 GeV | $3.011 \times 10^4$ | 2.004                       | 0.066   | 0.082                                 | 0.012     | 2.164    | $1.551 \times 10^4$                |           |            |
| 40.0 GeV | $4.011 \times 10^4$ | 2.033                       | 0.094   | 0.120                                 | 0.015     | 2.263    | $2.002 \times 10^4$                |           |            |
| 80.0 GeV | $8.011 \times 10^4$ | 2.099                       | 0.211   | 0.288                                 | 0.030     | 2.630    | $3.639 \times 10^4$                |           |            |
| 100. GeV | $1.001 \times 10^5$ | 2.119                       | 0.274   | 0.379                                 | 0.037     | 2.810    | $4.375 \times 10^4$                |           |            |
| 140. GeV | $1.401 \times 10^5$ | 2.149                       | 0.402   | 0.566                                 | 0.052     | 3.170    | $5.715 \times 10^4$                |           |            |
| 200. GeV | $2.001 \times 10^5$ | 2.181                       | 0.603   | 0.861                                 | 0.074     | 3.720    | $7.461 \times 10^4$                |           |            |
| 277. GeV | $2.772 \times 10^5$ | 2.210                       | 0.866   | 1.241                                 | 0.102     | 4.420    | <i>Muon critical energy</i>        |           |            |
| 300. GeV | $3.001 \times 10^5$ | 2.217                       | 0.946   | 1.356                                 | 0.110     | 4.631    | $9.866 \times 10^4$                |           |            |
| 400. GeV | $4.001 \times 10^5$ | 2.242                       | 1.302   | 1.870                                 | 0.147     | 5.561    | $1.183 \times 10^5$                |           |            |
| 800. GeV | $8.001 \times 10^5$ | 2.303                       | 2.769   | 3.976                                 | 0.298     | 9.347    | $1.732 \times 10^5$                |           |            |
| 1.00 TeV | $1.000 \times 10^6$ | 2.323                       | 3.524   | 5.054                                 | 0.374     | 11.276   | $1.927 \times 10^5$                |           |            |
| 1.40 TeV | $1.400 \times 10^6$ | 2.354                       | 5.038   | 7.205                                 | 0.530     | 15.128   | $2.232 \times 10^5$                |           |            |
| 2.00 TeV | $2.000 \times 10^6$ | 2.386                       | 7.355   | 10.490                                | 0.767     | 20.999   | $2.568 \times 10^5$                |           |            |
| 3.00 TeV | $3.000 \times 10^6$ | 2.424                       | 11.225  | 15.949                                | 1.173     | 30.773   | $2.959 \times 10^5$                |           |            |
| 4.00 TeV | $4.000 \times 10^6$ | 2.451                       | 15.150  | 21.468                                | 1.585     | 40.655   | $3.241 \times 10^5$                |           |            |
| 8.00 TeV | $8.000 \times 10^6$ | 2.518                       | 30.981  | 43.658                                | 3.297     | 80.454   | $3.927 \times 10^5$                |           |            |
| 10.0 TeV | $1.000 \times 10^7$ | 2.540                       | 38.962  | 54.815                                | 4.176     | 100.494  | $4.149 \times 10^5$                |           |            |
| 14.0 TeV | $1.400 \times 10^7$ | 2.573                       | 54.882  | 77.074                                | 5.981     | 140.511  | $4.484 \times 10^5$                |           |            |
| 20.0 TeV | $2.000 \times 10^7$ | 2.609                       | 78.910  | 110.610                               | 8.748     | 200.878  | $4.839 \times 10^5$                |           |            |
| 30.0 TeV | $3.000 \times 10^7$ | 2.651                       | 118.912 | 166.409                               | 13.532    | 301.505  | $5.243 \times 10^5$                |           |            |
| 40.0 TeV | $4.000 \times 10^7$ | 2.681                       | 159.067 | 222.346                               | 18.431    | 402.525  | $5.529 \times 10^5$                |           |            |
| 80.0 TeV | $8.000 \times 10^7$ | 2.755                       | 319.956 | 446.262                               | 38.896    | 807.870  | $6.216 \times 10^5$                |           |            |
| 100. TeV | $1.000 \times 10^8$ | 2.779                       | 400.550 | 558.330                               | 49.470    | 1011.130 | $6.437 \times 10^5$                |           |            |