Section VII

Interaction of Particles with Matter

Energy Loss Calculations for Heavy Charged Particles

A heavy charged particle of mass $M \gg m_e$, charge Z_e and speed βc passing through a medium loses energy primarily through its interaction with the atomic electrons of the medium. The Bethe-Bloch equation gives the mean rate of energy loss per unit path length.

$$\frac{dE}{dx} = \frac{4\pi N_A r_e^2 c^2 Z_{med} \rho_{med}}{A_{med}} \frac{Z^2}{\beta^2} \left\{ \frac{1}{2} \ln \frac{2m_e \gamma^2 \beta^2 c^2 T_{max}}{I_{adj}^2} - \beta^2 - \frac{\delta}{2} - \frac{C}{Z_{med}} \right\}, \tag{VII-1}$$

where Z_{med} is the charge of the medium, ρ_{med} is the density, A_{med} is the atomic mass, I_{adj} is the adjusted ionization potential, δ is a density correction applicable at high energy, C represents Shell corrections, the maximum energy transferred to an electron is

$$T_{max} = \frac{2m_e c^2 \gamma^2 \beta^2}{1 + 2\gamma \frac{m_e}{M} + \left[\frac{m_e}{M}\right]^2} \tag{VII - 2}$$

and the constant

$$4\pi N_A r_e^2 m_e^2 = 0.3070 \text{ MeV cm}^2/\text{g} \tag{VII - 3}$$

is used.

For protons, the above formula is valid at energies above about 1 MeV in all materials provided that the shell corrections are incorporated correctly. They are particularly important at low energies and for large Z_{med} materials. The dE/dx and range curves in this section are accurate to about 5% below 10 MeV. Above 10 MeV the calculations agree within 1-2% with recent compilations.

For heavy ions the stopping power is affected at low velocities by the reduction in effective charge on the ions. When the ion velocity is much greater than that of the electrons of the stopping medium the ion is fully stripped. The stopping power for heavy ions is related to the equation for protons by

$$\frac{dE}{dx}(\text{heavy ion}) = \zeta^2 Z_{HI}^2 \frac{dE}{dx}(\text{proton}), \tag{VII - 4}$$

where the parameter ζ is given by

$$\zeta^2 = 1 - \exp\left(\frac{-0.92\, v_1}{v_o Z_{med}^{2/3}}\right) . \qquad \text{(VII -5)}$$

Here v_1 is the velocity of the ion and $v_{o\,is}$ the Bohr velocity.

The quantity $dE/dx \cdot \delta x$ is the mean energy loss in thickness δx. The actual loss fluctuates due to statistical variations in the number of collisions and the energy transferred to the individual electrons. For thicknesses such that $dE/dx \cdot \delta x \gg 2m_e c^2\gamma^2\beta^2$, the distribution of energy losses becomes a Gaussian. For smaller thicknesses the Landau or Vavilov distributions apply. The thickness limit above is better understood when compared to the expression for T_{max} above.

In using the Vavilov distribution the following parameters are used

$$\kappa = 0.3070 \frac{m_e c^2 Z_{med}}{\beta^2} \frac{x}{A_{med}} \frac{x}{T_{max}} = \frac{\xi}{T_{max}} . \qquad \text{(VII - 6)}$$

The value $\kappa = 0$ corresponds to a Landau distribution, and $\kappa \gg 1$ corresponds to a Gaussian. Plots of ξ and κ for μ, π, K, protons and deuterons are shown in figures VII-1 and VII-2. These parameters can then be used with figure VII-3 to give the difference of the mean energy loss and the most probable energy loss, and the full width at half maximum of the distribution. The curves in figure VII-3 are for $\beta^2 = 0.5$, but the dependence on β^2 is small.

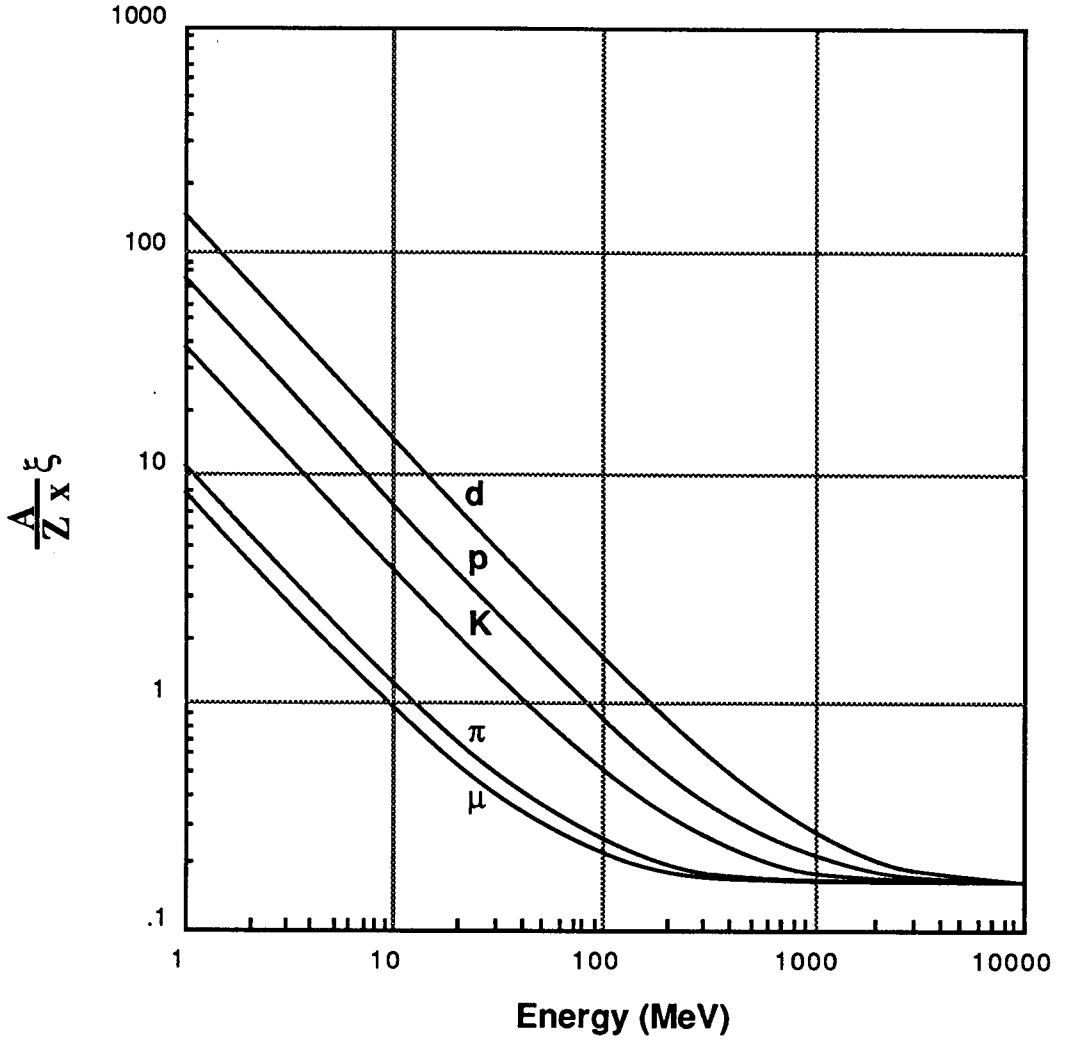


Figure VII - 1

Energy dependence of the parameter $(A/Zx)\xi$ in the Vavilov distribution for various particles.

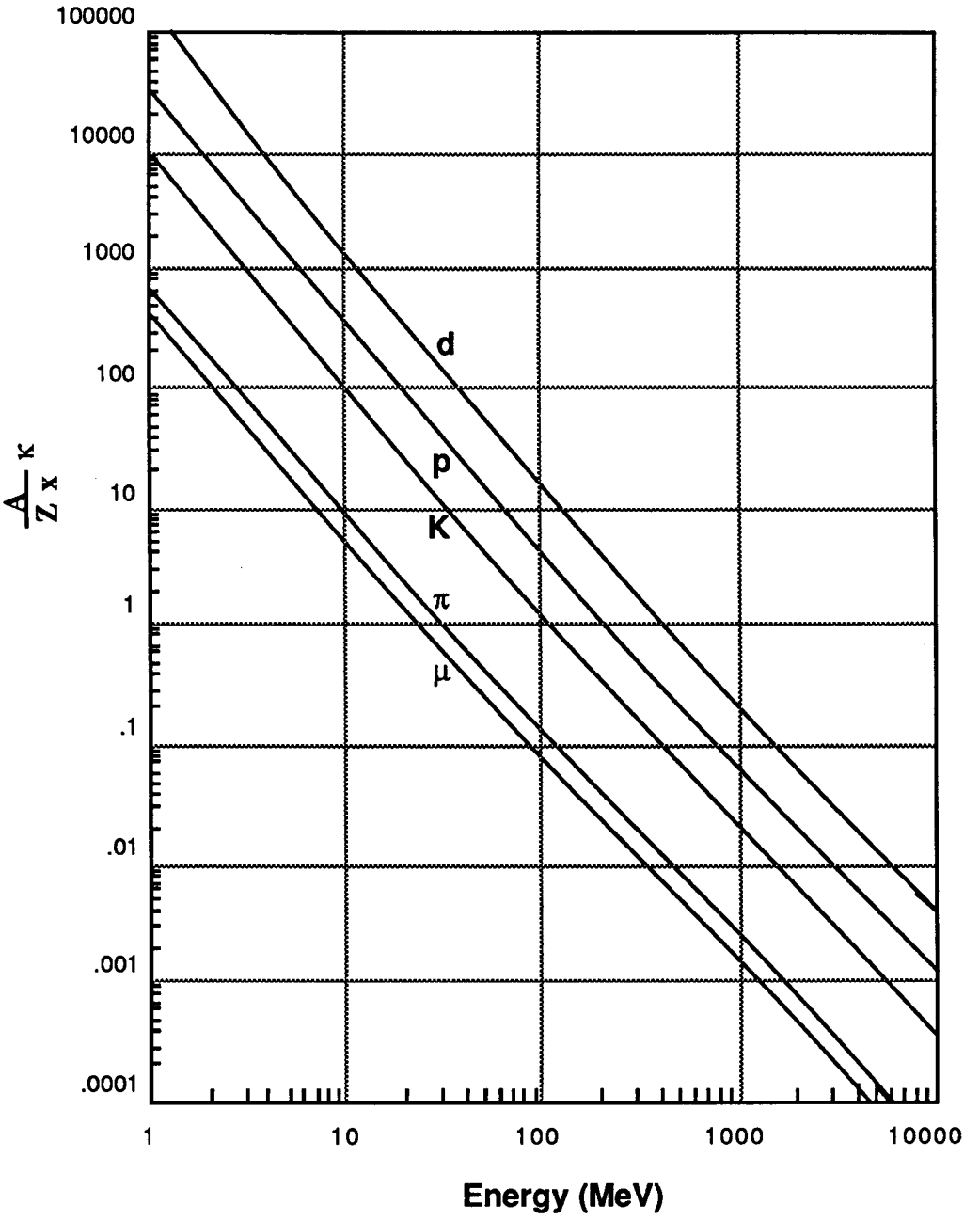


Figure VII - 2

Energy dependence of the parameter $(A/Zx)\kappa$ in the Vavilov distribution for various particles.

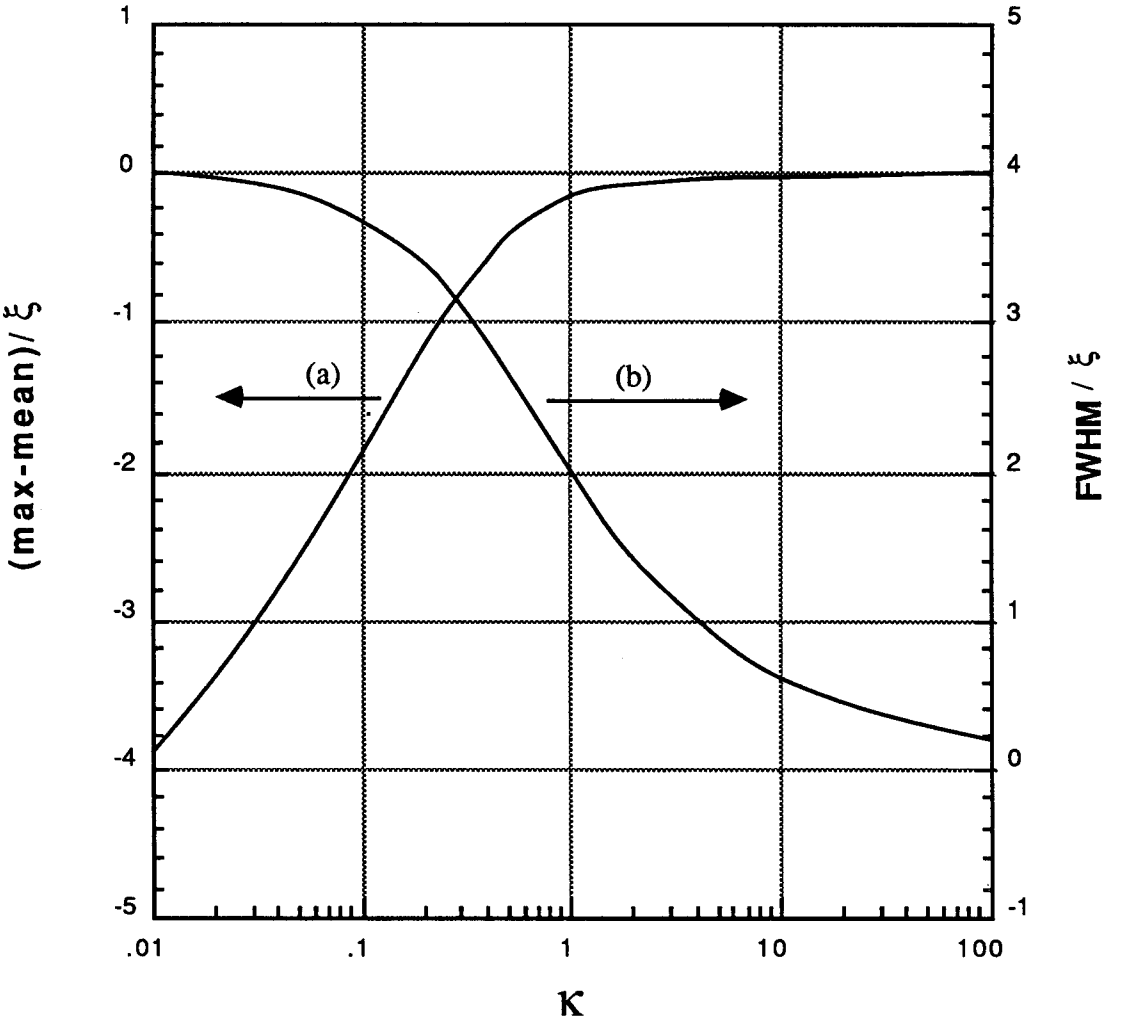


Figure VII - 3

Most probable energy-loss and width of the Vavilov distribution as a function of κ, for $\beta^2 = 0.5$. To obtain the most probable energy-loss Δ_p, the value of $(\Delta_p - \Delta)/\xi$ is read from curve (a) and $\Delta = dE/dx$ and ξ are calculated according to equations VII -1 and VII - 6. Curve (b) is the plot of $(\Delta_1 - \Delta_2)/\xi$, the full width at half maximum of the Vavilov distribution. The dependence of these curves on β^2 is small.

δ–Ray Production

The rate of production of knock-on electrons by a spinless particle of energy T is given by

$$\frac{d^2N}{dT\,dx} \approx 0.1535\,\frac{Z_{med}\,\rho_{med}}{A_{med}}\,\frac{Z^2}{\beta^2}\,\frac{1}{T^2}F\ . \qquad \text{(VII - 7)}$$

The range of validity of the formula is $I \ll T \le T_{max}$. For T close to T_{max} the formula must also be modified. For spin-0 projectiles

$$F = 1 - \beta^2\,\frac{T}{T_{max}}\ ; \qquad \text{(VII - 8)}$$

for spin 1/2 projectiles

$$F = 1 - \beta^2\,\frac{T}{T_{max}} + \frac{1}{2}\left[\frac{T}{T_{inc} + m_{inc}c^2}\right]^2\ , \qquad \text{(VII - 9)}$$

where T_{inc} is the kinetic energy of the projectile; and finally for incident electrons

$$F = \beta^2\,T^2\left[\frac{T_{inc}}{T\,(T_{inc} - T)} - \frac{1}{T_{inc}}\right]^2\ ; \qquad \text{(VII - 10)}$$

and for positrons incident

$$F = \beta^2\left[1 - \frac{T}{T_{inc}} + \left[\frac{T}{T_{inc}}\right]^2\right]^2\ . \qquad \text{(VII - 11)}$$

Coulomb Multiple Scattering

The distribution of the deflection from the initial direction of a particle passing through a medium is approximately Gaussian for small deflections. This small angle behaviour is due to multiple small angle Coulomb scattering. For feflections greater than about 2σ the tail of the distribution becomes non-Gaussian, mainly due to the elastic nuclear cross section and isolated large angle Coulomb scattering. A reasonable approximation to the standard deviation of the PROJECTED PLANE angle is

$$\theta_{0p} = \frac{14.1\ \text{MeV/c}}{p\beta} Z \sqrt{\frac{L}{L_R}} \left\{ 1 + \frac{1}{9} \log_{10} \frac{L}{L_R} \right\} \text{radians}, \qquad \text{(VII - 12)}$$

where p, β and Z are the momentum (MeV/c), speed and charge of the incident particle, L is the thickness of material traversed, and L_R is the radiation length. In the range $10^{-3} < L/L_R < 10$, the value of θ_{0p} is correct to about 10%. The formula is less accurate for small β and for very light elements. The term is brackets is a small correction.

The "approximate" Gaussian distributions for the PROJECTED PLANE angle θ_p and the actual SPACE angle θ_s deviations from the initial trajectory are given by

$$f(\theta_p) = \frac{1}{\sqrt{2\pi\ \theta_{0p}^2}} \exp \left\{ -\frac{\theta_p^2}{2\theta_{op}^2} \right\} d\theta_p \qquad \text{(VII - 13)}$$

and

$$g(\theta_s) = \frac{1}{2\pi\ \theta_{0p}^2} \exp \left\{ -\frac{\theta_s^2}{2\ \theta_{0p}^2} \right\} d\Omega\ . \qquad \text{(VII - 14)}$$

The variable θ_{space} is clearly the sum of two random variables analogous to θ_{plane} (i.e. θ_x and θ_y).

Referring to figure VII-4 below, other quantities relevant to the multiple scattering process are shown. These are the projected displacement from the initial trajectory (y_p), the projected angle the exit point makes with the initial direction (ψ_p), and the deviation of the track from the apparent path through the medium (s_p). The distributions are similar to those given above with

$$y_p^{rms} = \frac{1}{\sqrt{3}} L\,\theta_{0p} = L\,\psi_p^{rms}$$

$$s_p^{rms} = \frac{1}{4}\, y_p^{rms} \,. \qquad \text{(VII - 15)}$$

The SPACE quantities are obtained in the same way as the SPACE multiple scattering angle.

The quantities θ_p and y_p are correlated with correlation coefficient $\rho = \sqrt{3}\,/\,2 = 0.866$. Ignoring the correction term in the expression for θ_{0p} and writing $\omega = p\beta/14.1$ and $t = [L/L_R]^{1/2}$, the joint distribution for these variables is

$$f(\theta_p, y_p) = \frac{\sqrt{3}\,\omega^2}{4\pi t^2} \exp\left\{ -\frac{\omega^2}{2}\left[\frac{\theta_p^2}{t} - \frac{3\theta\, y_p}{t^2} + \frac{3y_p^2}{t^3}\right] \right\} \cdot \text{(VII - 16)}$$

From this expression the conditional distributions when y_p or θ_p is known can be derived

$$f(y \mid \theta_p = \theta_1) = \frac{1}{\sqrt{2\pi\,\sigma_y^2\,(1-\rho^2)}} \exp\left\{ -\frac{1}{2}\frac{(y - t\,\theta_1/2)^2}{\theta_y^2(1-\rho^2)} \right\},$$

$$f(\theta \mid y_p = y_1) = \frac{1}{\sqrt{2\pi\,\theta_{0p}^2\,(1-\rho^2)}} \exp\left\{ -\frac{1}{2}\frac{(\theta - \frac{3y_1}{2t})^2}{\theta_{0p}^2(1-\rho^2)} \right\}. \qquad \text{(VII- 17)}$$

Note that these distributions have non-zero means and that the variances for the individual variables are reduced by the factor $(1 - \rho^2)$.

Losses of Protons due to Nuclear Interactions in Various Media

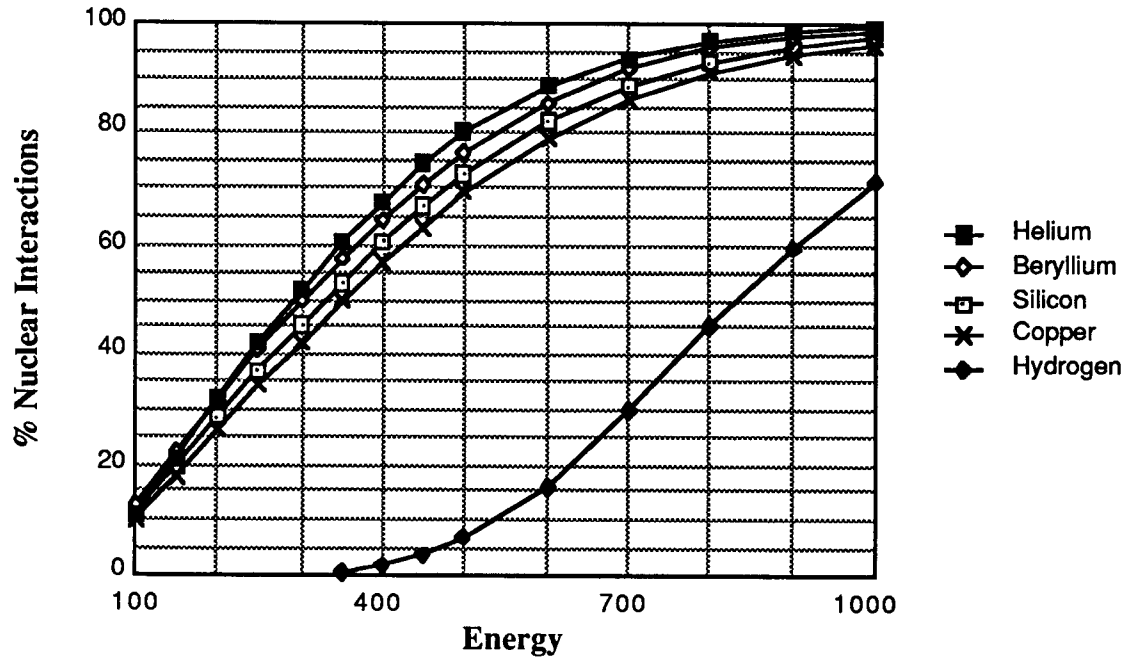
In passing through a material a proton can undergo nuclear interactions which can affect the energy deposited in the material and/or the energy of the proton when it exits the material. Two situations arise where the effect of these interactions is important. When a counter is used to determine the total energy of the proton, nuclear inelastic interactions are important because less energy is usually deposited in the active volume of the detector. Some of the reaction products can be lost from the sensitive volume and the reaction Q-value may be large. For range measurements or cases where absorbers are used to reduce the proton energy before a detector the situation is more complicated. The range of inelastically scattered protons (and large angle elastically scattered protons) will be less than normal. The situation is complicated because it is possible that some of the reaction products may be detected in a final counter, this effect being worst for absorbers that are very thin (<20% of the range) where up to 30% of the inelastic collisions may still be detected.

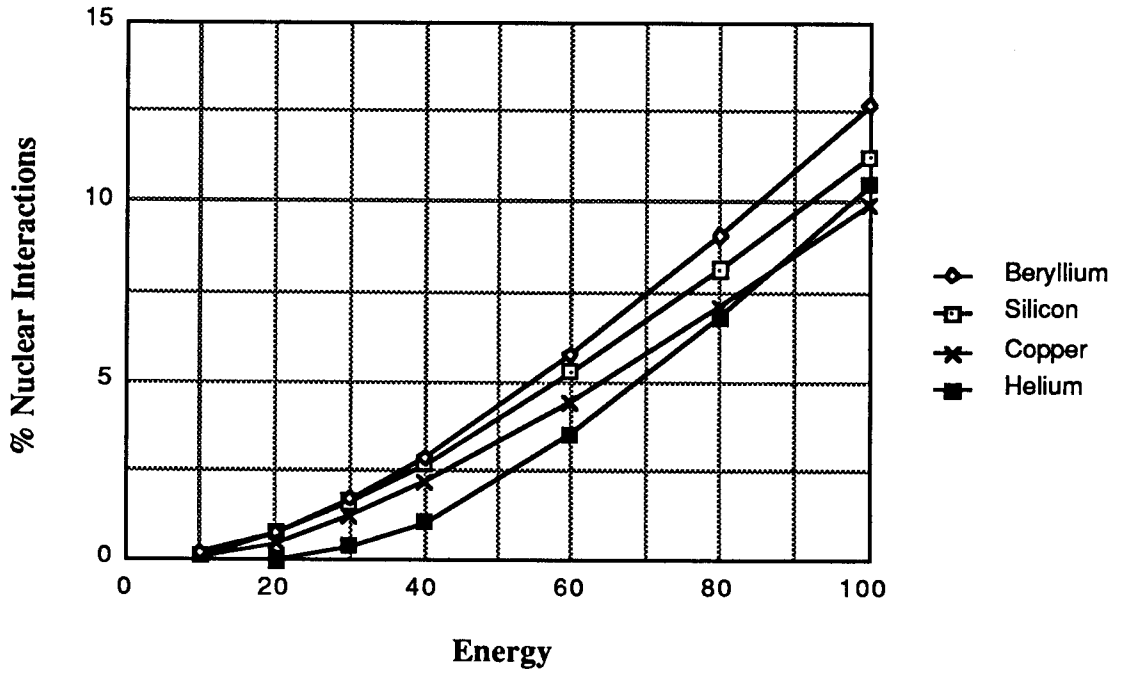
The interaction probabilities presented in the following figures are integrated over the full range with the cross sections being integrated as a function of the stopping energy. There are minor differences between the tabulations of Measday and Serre[1] and Janni[2], but these are of no practical consequence given the large relative uncertainty in the calculations (10-20% at energies below 500 MeV). Above a few GeV almost all protons undergo a nuclear interaction. The figures are produced from the tabulations of reference 1.

Note that the earlier tabulations by Janni (1966) are in error and give interaction probabilities that are too large.

References

1. **Loss of Protons by Nuclear Interactions in Various Materials**, by D.F. Measday and C. Richard-Serre, CERN Yellow Report 69-17.
2. **Proton Range-Energy Tables, 1 keV – 10 Gev**, J.F. Janni, Atomic Data and Nuclear Data Tables, **27** (1982)1 150-529.





Typical calculated interaction probabilities as a function of energy. The separation of the curves is representative of the maximum spread for different materials. Carbon is very similar to Beryllium. Most materials apart from Hydrogen are similar. The spread in the interaction probabilities is also comparable to possible uncertainties in the calculations.

Energy Losses and Ranges of Electrons and Positrons

The formula for the mean energy loss due to ionizing collisions for electrons is given by Bethe's stopping power formalism

$$\left[\frac{dE}{dx}\right]^{\pm}_{coll} = \frac{0.1535}{\beta^2}\frac{\rho Z}{A}\left\{ \ln\frac{\tau^2(\tau+2)}{2(I_{adj}/m_e c^2)^2} + F^{\pm}(\tau) - \delta \right\}$$

$$F^{-}(\tau) = 1 - \beta^2 + \frac{[\tau^2/8 - (2\tau+1)\ln 2]}{(\tau+1)^2}\text{ , for electrons} \qquad \text{(VII - 18)}$$

$$F^{+}(\tau) = 2\ln 2 - \frac{\beta^2}{12}\left[23 + \frac{14}{\tau+2} + \frac{10}{(\tau+2)^2} + \frac{4}{(\tau+2)^3}\right]\text{ , for positrons.}$$

The symbols have the same meaning as for heavy charged particles. τ is the kinetic energy of the particle in units of $m_e c^2$. The velocity of the particle can be expressed as

$$\beta = \frac{[\tau(\tau+2)]^2}{\tau+1} \qquad \text{(VII - 19)}$$

For low energy electrons the ionization loss dominates. The energy at which the bremsstrahlung contribution reaches 25% is about 2MeV for Pb, 10 MeV for Fe, 15 MeV in Ar, 20 MeV in Al, 35 MeV in C, and 125 MeV in H.

References

1. **Proton Range-Energy Tables, 1 keV – 10 GeV**, by J.F Janni, Atomic data and Nuclear Data Tables, **27** (1982) 150-529. This reference contains a complete practical description of the calculations including the choice of constants used, effects of shell corrections, density effect and a low energy parameterization. There are tables of energy losses, range, path length, time-of-flight, straggling, and nuclear interaction probability. These tables are available for most elements and a large selection of compounds.

2. **Stopping Powers and Ranges of Electrons and Positrons (2nd ed.)**, M.J. Berger and S.M. Seltzer, U.S. National Bureau of Standards Report NBSIR 82-2550-A (1982), and NASA SP-3012 (1964).

3. **Range and Stopping Power TAbles for Heavy Ions**, L.C. Northcliffe and R.F. Schilling, Nuclear Data Tables **A7** (1970) 223.

4. **Loss of Protons by Nuclear Interactions in Various Materials**, D.F. Measday and C. Richard-Serre, CERN Yellow Report CERN 69-17 (1969).

5. **Energy Loss of Muons in the Energy Range 1 – 10000 GeV**, W. Lohmann, R. Kopp and R. Voss, CERN Yellow Report CERN 85-03 (1985).

6. **Studies in Penetration of Charged Particles in Matter**, National Acadamy of Sciences – National research Council, Nuclear Science Series Report #39, Committee on Nuclear Science (1964). This document contains detailed descriptions of the theory of energy losses and multiple scattering for heavy ions, protons, and electrons and positrons.

7. **Some Practical Remarks on Multiple Scattering**, V.L. Highland, Nuclear Instrum. and Methods **129** (1975) 497, and important modification in Nucl. Instr. and Methods **161** (1979) 171. These articles describe the rationale for the use of the approximate form of the rms multiple scattering formula given above. For the description of the Moliere theory see ref 6.

Photon Attenuation

For photons passing through a homogeneous medium of density ρ and thickness t, the intensity remaining is given by the expression

$$I = I_o e^{-t\mu} = I_o e^{-t\rho/\lambda} . \qquad \text{(VII - 20)}$$

Here μ is the mass attenuation coefficient, $\lambda = \rho/\mu$ is the mass attenuation length, and I_o is the initial intensity. Interpolation to other Z values should be done by scaling the cross section

$$\sigma = A / \lambda N_A \ \ cm^2 / g, \qquad \text{(VII - 21)}$$

where A is the atomic weight of the absorber material in grams and N_A is the Avogadro number. For a chemical compound or mixture the formula

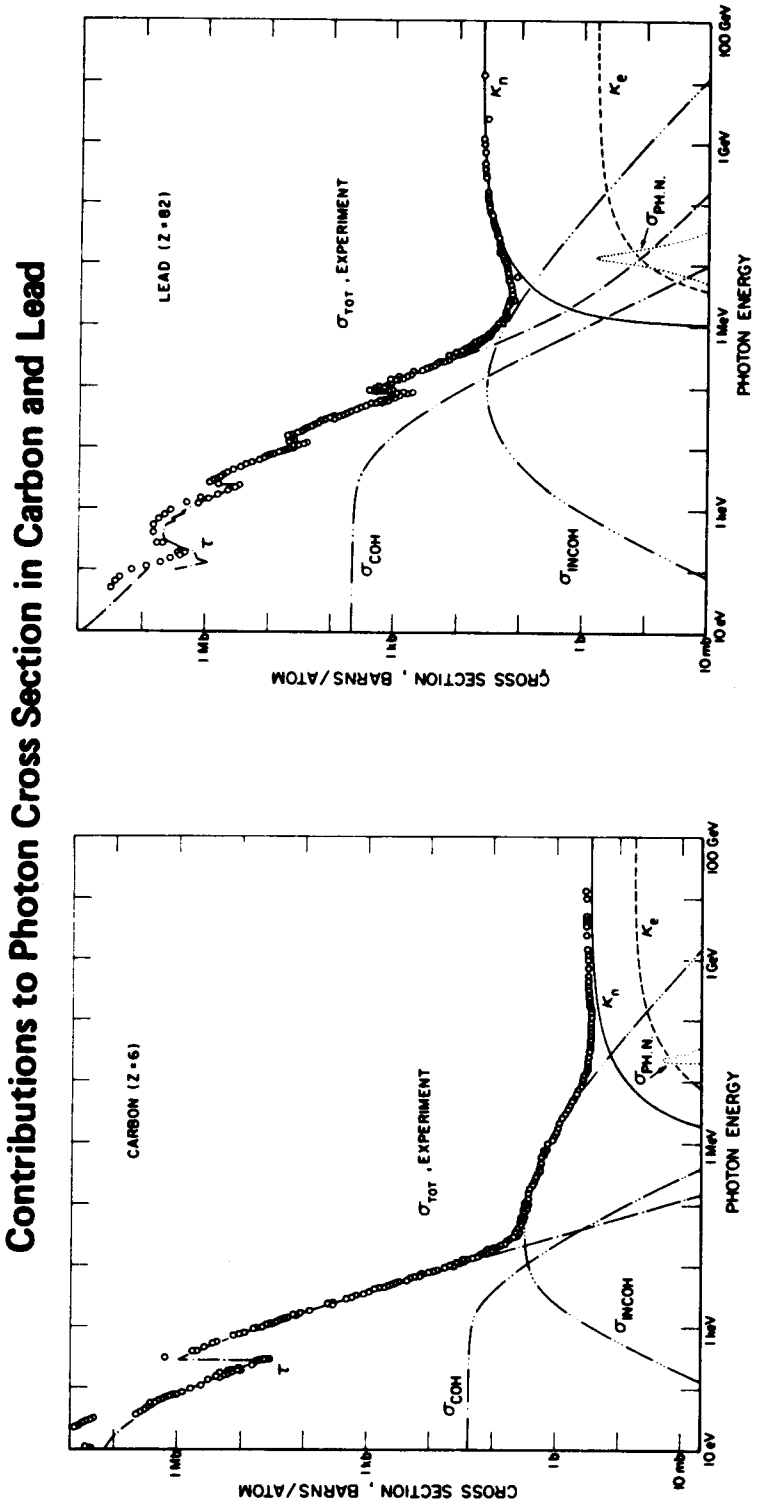
$$\frac{1}{\lambda_{eff}} \approx \sum f_i \frac{1}{\lambda_i} , \qquad \text{(VII - 22)}$$

where f_i is the proportion by weight of the i^{th} conpoment.

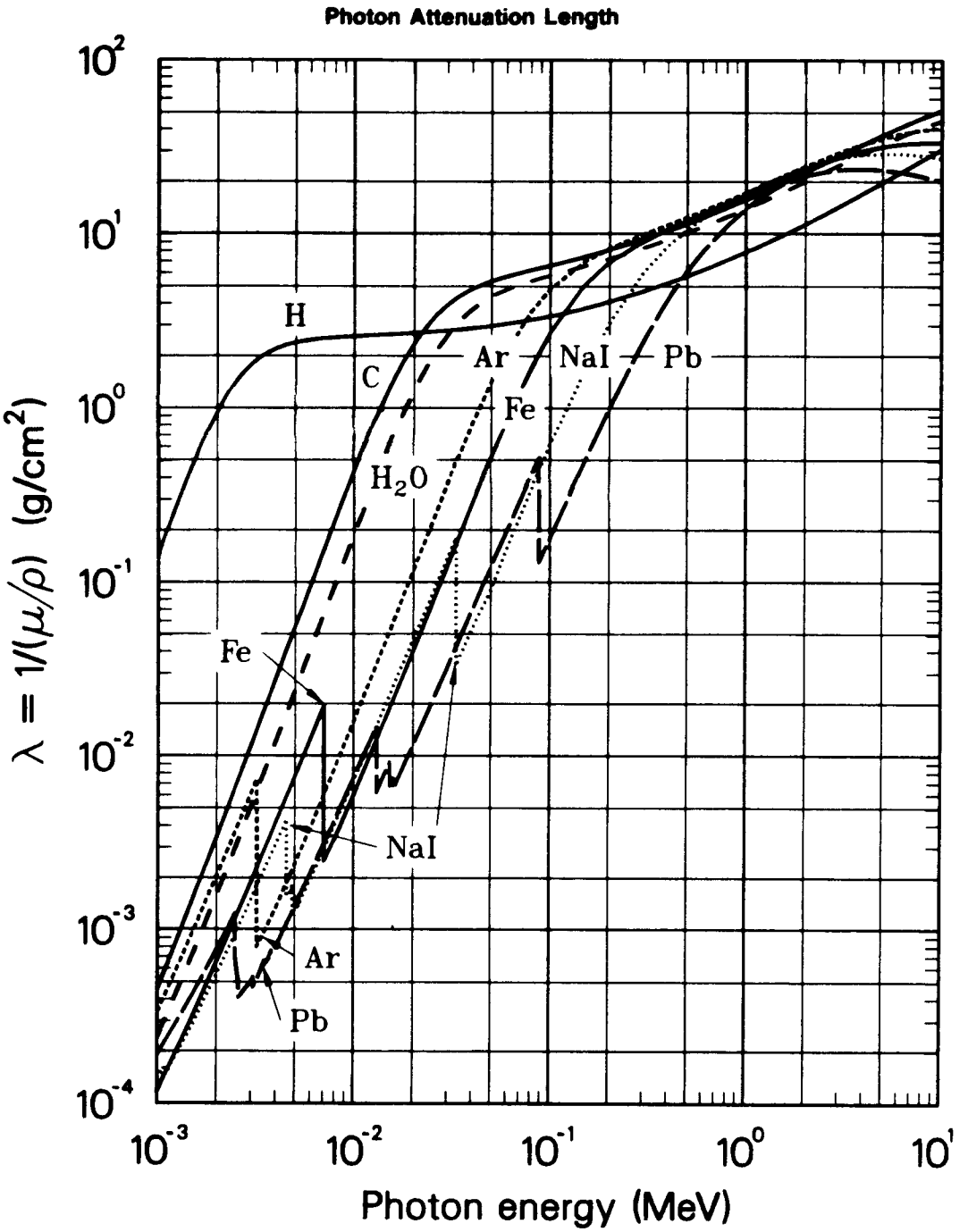
The contributions to the photon cross section vary strongly as a function of the photon energy. The processes are listed below in order of their inportance as the photon energy increases.

τ	= Atomic photo-effect (electron ejection, photon absorbtion)
σ_{COH}	= Corerent scattering (Rayleigh scattering - atom in ground state)
σ_{INCOH}	= Compton scattering (incoherent scattering off an electron)
κ_n	= Pair production in the nuclear field
κ_e	= Pair production iin the electron field
$\sigma_{PH.N}$	= Photo-nuclear absorption

The data and figures in this section are taken from the Reviews of Particle properties, 1986. The data and figures are originally from J. H. Hubbell.

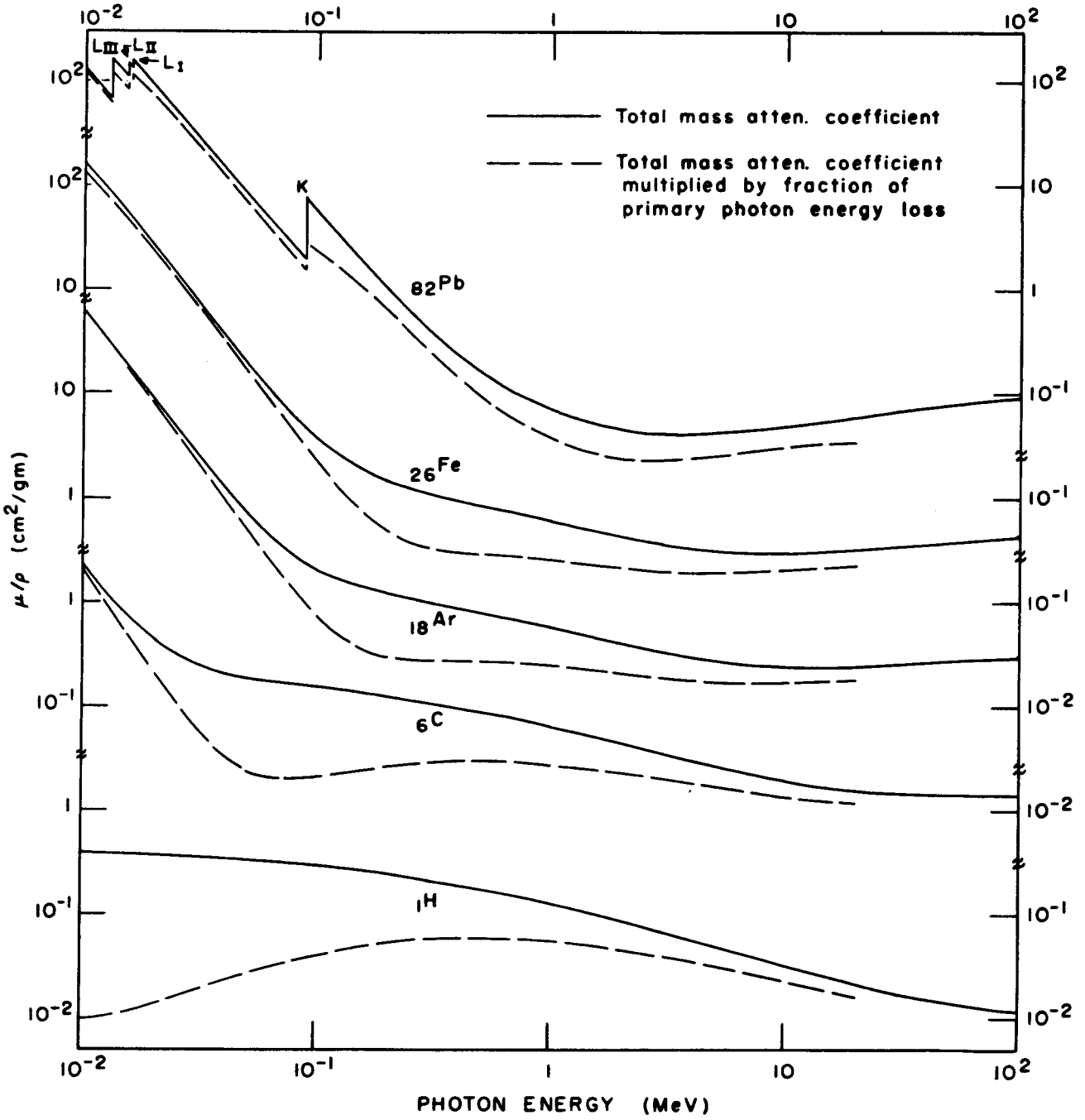


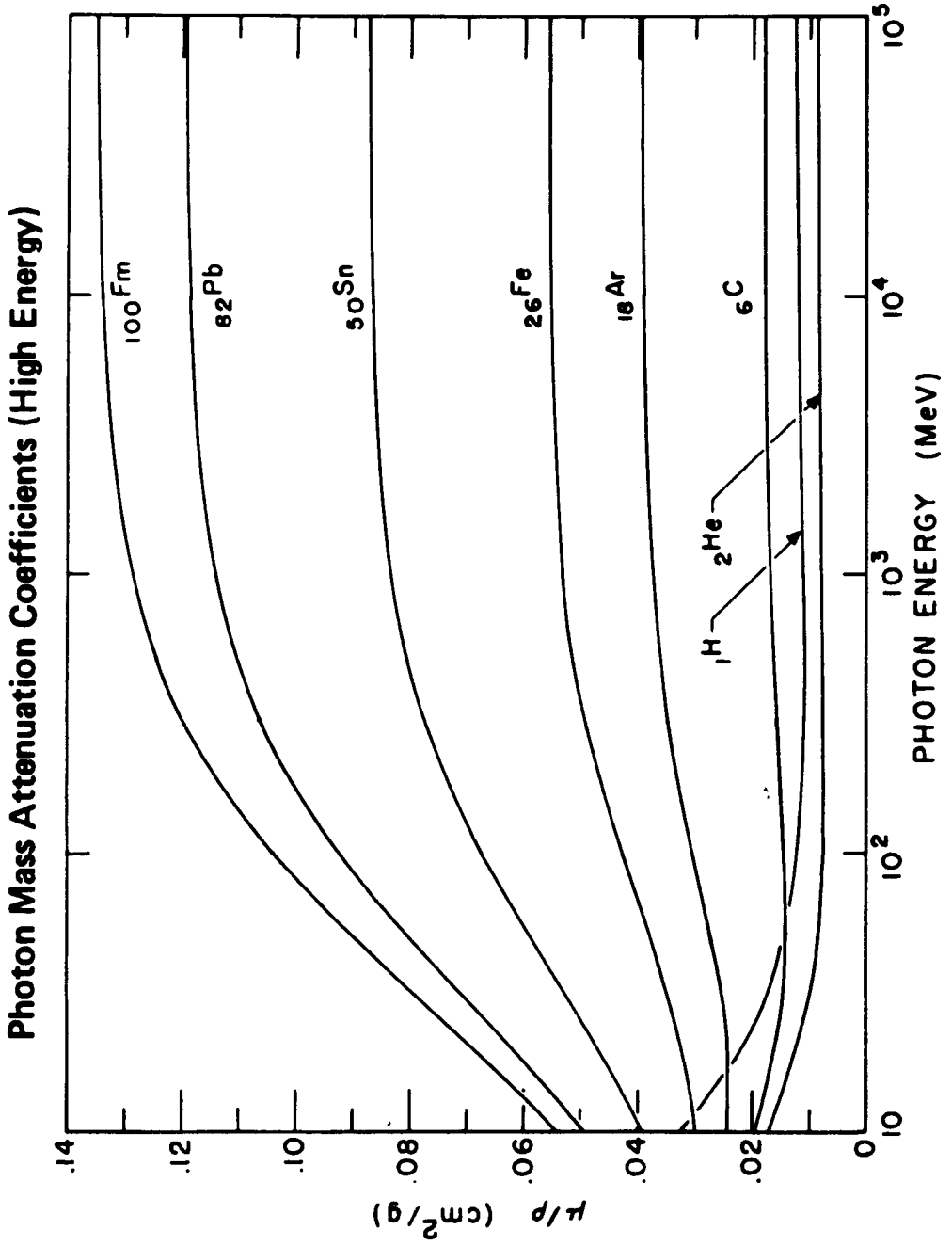
Photon total cross sections as a function of energy in carbon and lead, showing the contributions of the different processes



The photon mass attenuation length $\lambda = 1 / (\mu / \rho)$ (also known as the mean free path) for various absorbers as a function of photon energy, where μ is the mass attenuation coefficient.

Photon Mass Attenuation Coefficients, Energy Deposition




Photon Mass Attenuation Coefficients (High Energy)
μ/ρ (cm²/g)
.14
.12
.10
.08
.06
.04
.02
0
10
10²
10³
10⁴
10⁵
PHOTON ENERGY (MeV)
100Fm
82Pb
50Sn
26Fe
18Ar
6C
2He
1H

Plots of Ranges and Stopping Powers for μ, π, K, p and d Particles

The plots of ranges and stopping powers for heavy charged particles were generated by a program available to VAX users at TRIUMF. The program is accessible using the command LOSSPROG and is pre-defined by the system at login time. An extensive HELP file is available with examples for use of the program. LOSSPROG uses the Bethe-Bloch equation and is able to provide the user with the following:

RANGE mode: tables of ranges and stopping powers for a list of elements or compounds, for the series of energies specified.

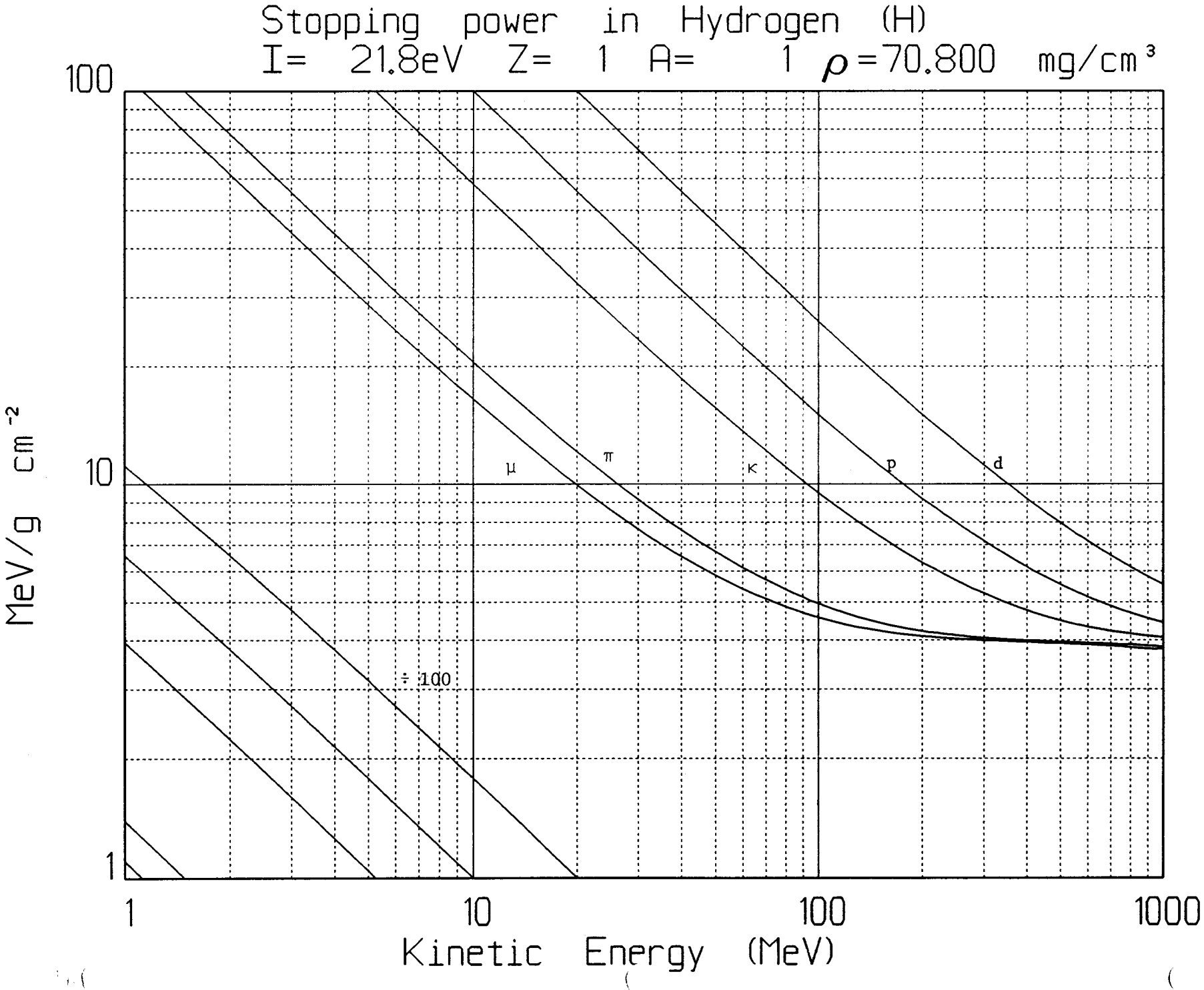
DEDX mode: tables of stopping powers only for a list of elements or compounds, for the series of energies specified.

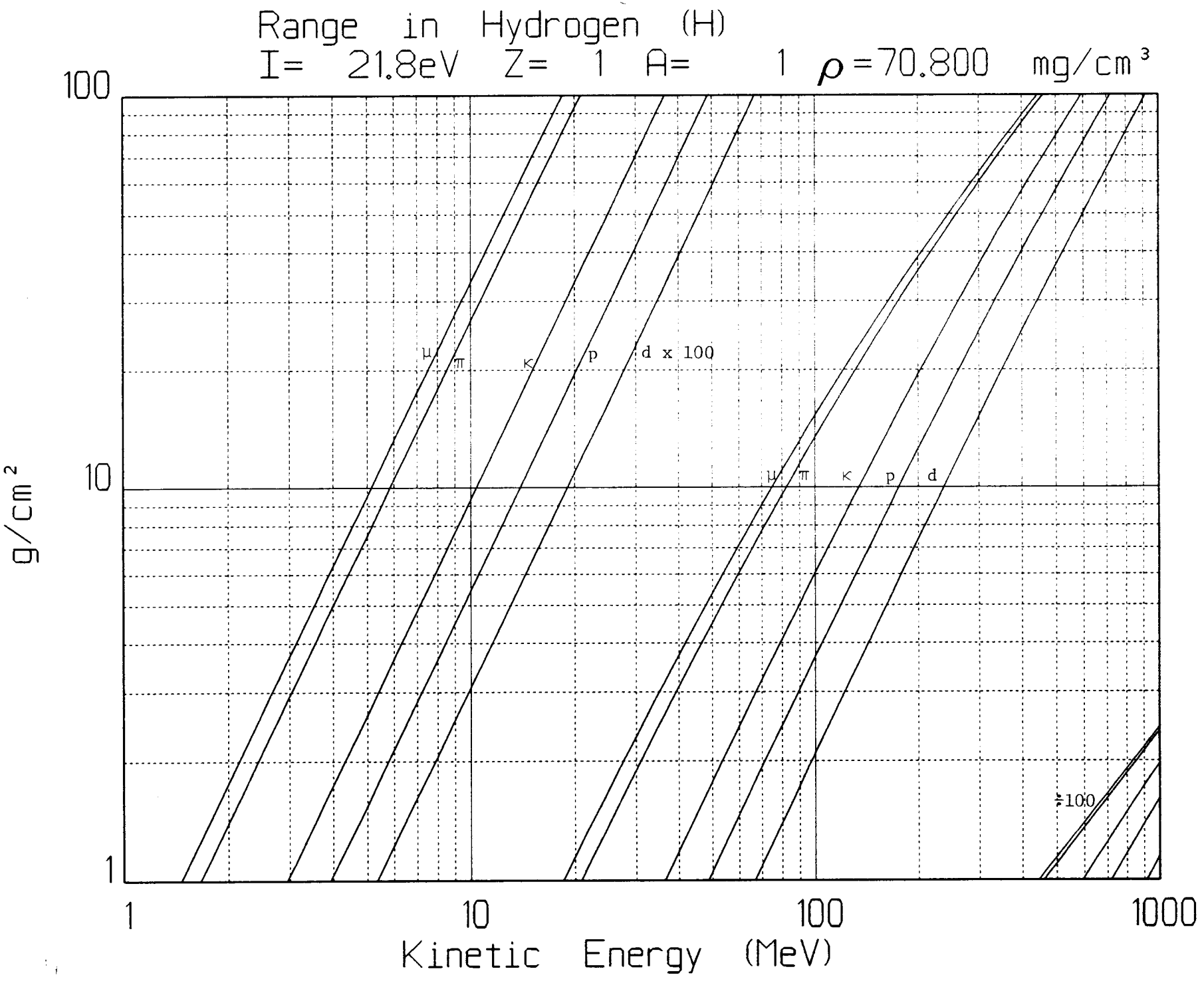
TRACK mode: tracks a particle through a specified series of media (forwards or backwards as desired) and outputs a choice of energy loss, dE/dx, time-of-flight, rms multiple scattering, energy straggling, rms displacement as desired for the series of energies specified.

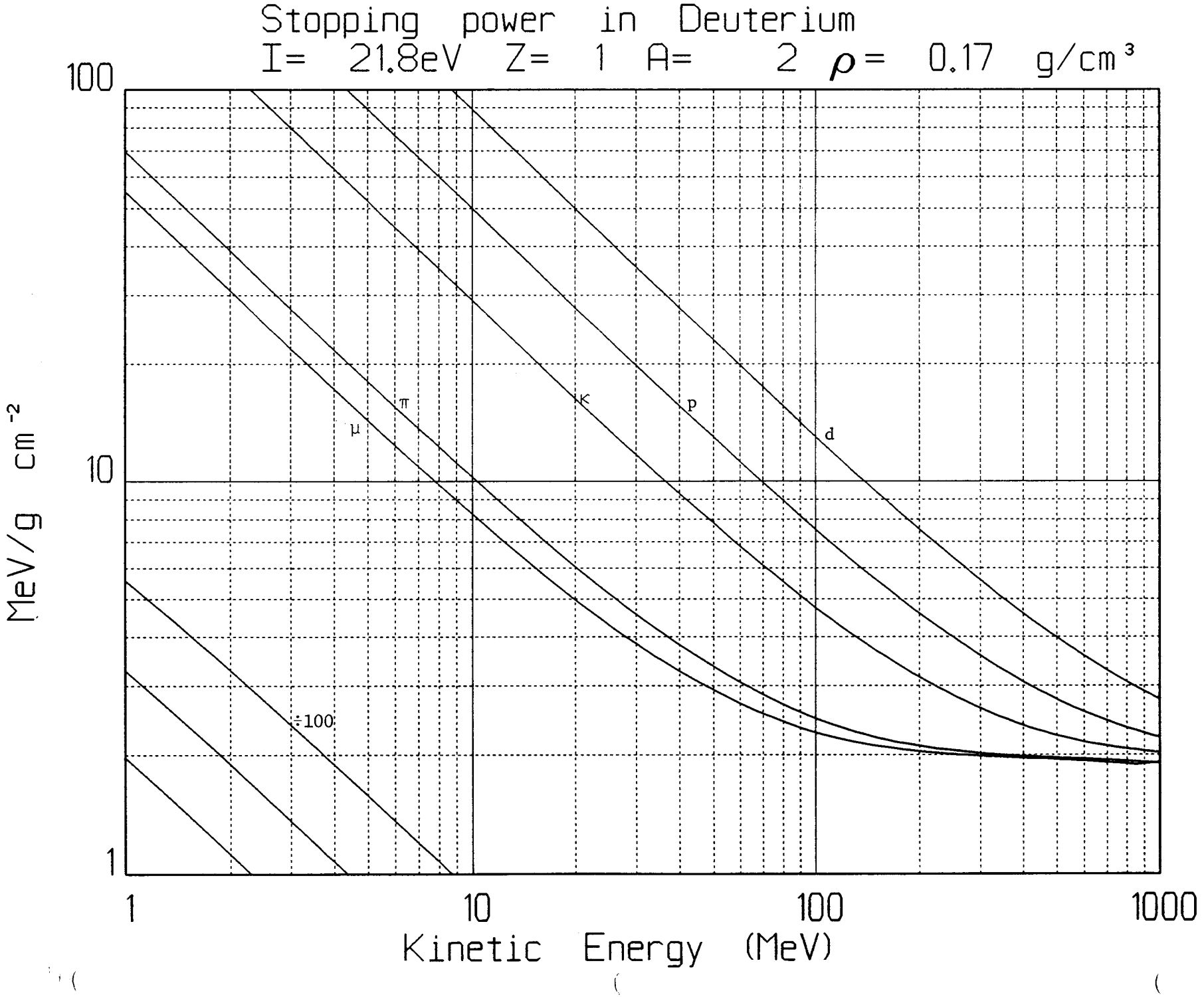
The program does NOT provide access to random fluctuations in energy loss (i.e. Vavilov or Landau distributions). It is valid in the range 1 – 1000 MeV and can be used with caution at higher energies since the density effect is not included in a rigorously correct manner. Errors below 10 MeV are not negligible for media with large Z. Output from the program has been compared to the results in Janni (Ref. 1 above). Typical errors for protons are indicated below. The energy scale for comparable errors varies in proportion to the incident particle mass.

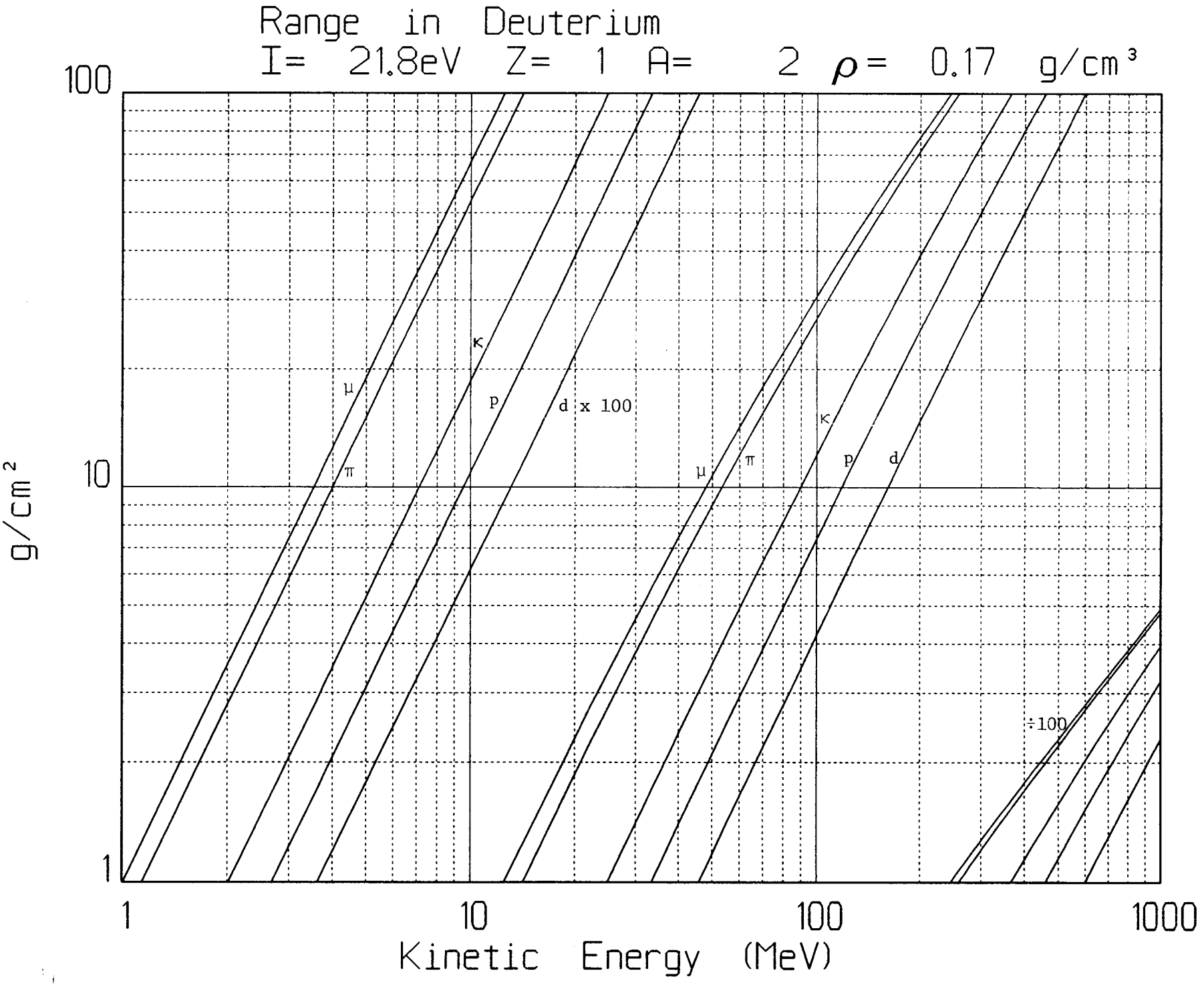
Material	1 – 5 MeV	5 – 10 MeV	10 – 1000 MeV
Hydrogen	1%	1%	1%
Carbon	2%	1%	1%
Silicon	4%	2%	1%
Calcium	3%	2%	2%
Iron	5%	3%	1%
Gold	8%	5%	2%

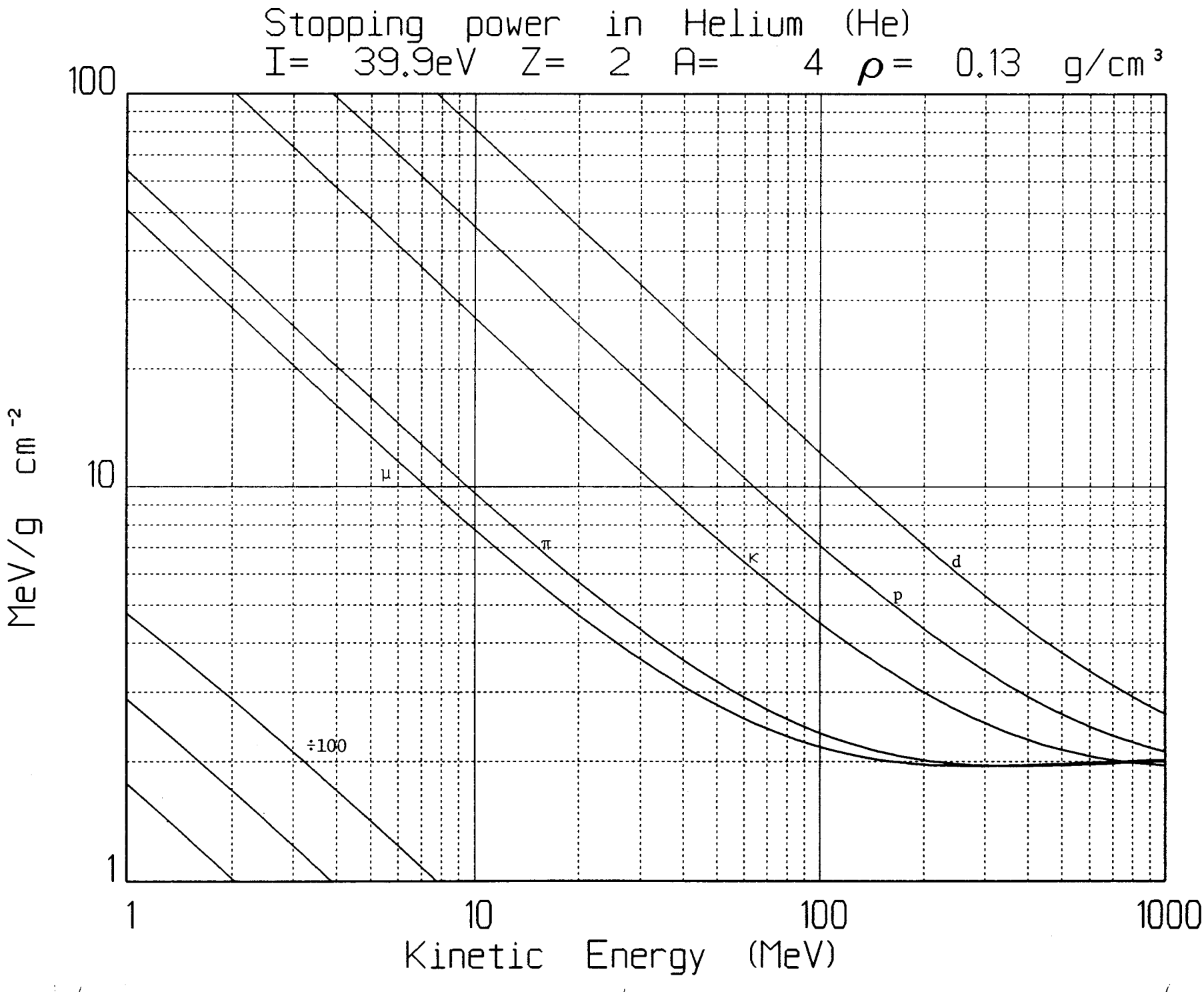
In using the RANGE curves on the following pages note that they are scaled by factors of 0.01 or 100 as needed to remain within the limits of the plot. The ranges nearest the left side of the plot have been multiplied by 100, nearest the right hand side they are divided by 100. Some DEDX curves are scales downwards by a factor 100 at very low energies. Note that the accuracy of the DEDX curves will be poor if the slope approaches zero in the low energy region.

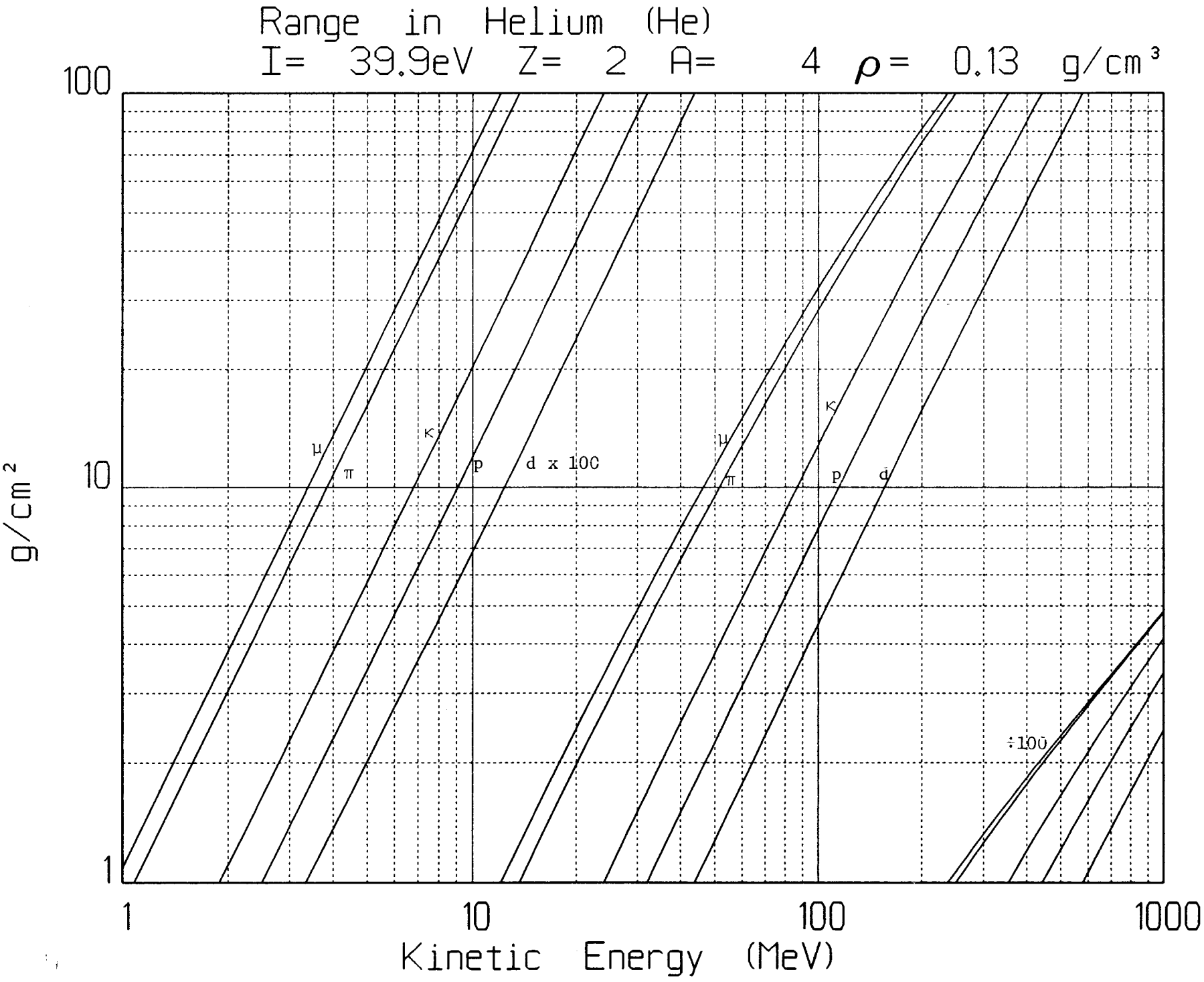

Stopping power in Hydrogen (H)
I= 21.8eV Z= 1 A= 1 ρ=70.800 mg/cm³
100
10
1
MeV/g cm⁻²
μ
π
κ
p
d
÷ 100
1
10
100
1000
Kinetic Energy (MeV)

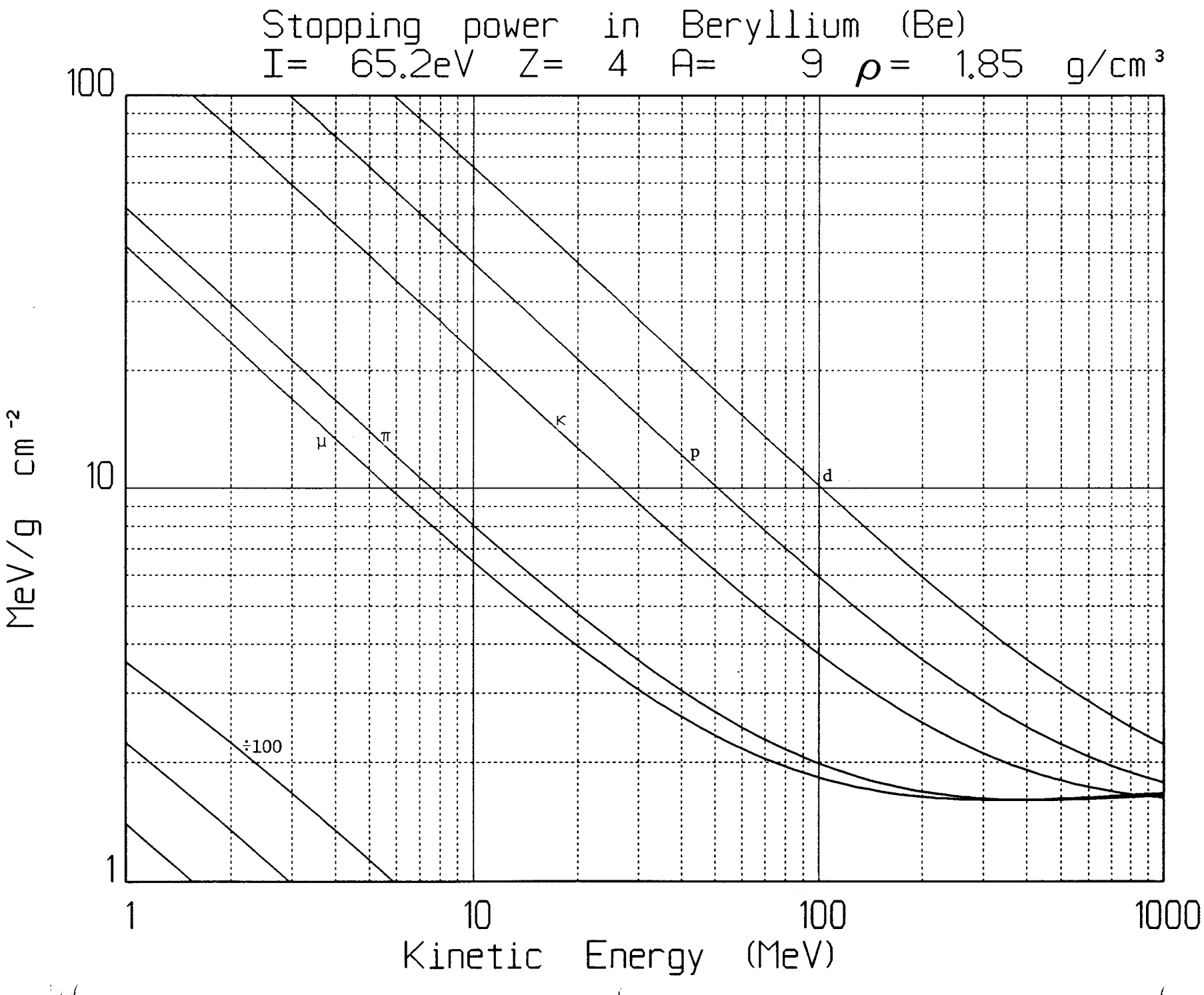

Range in Hydrogen (H)
I= 21.8eV Z= 1 A= 1 ρ=70.800 mg/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

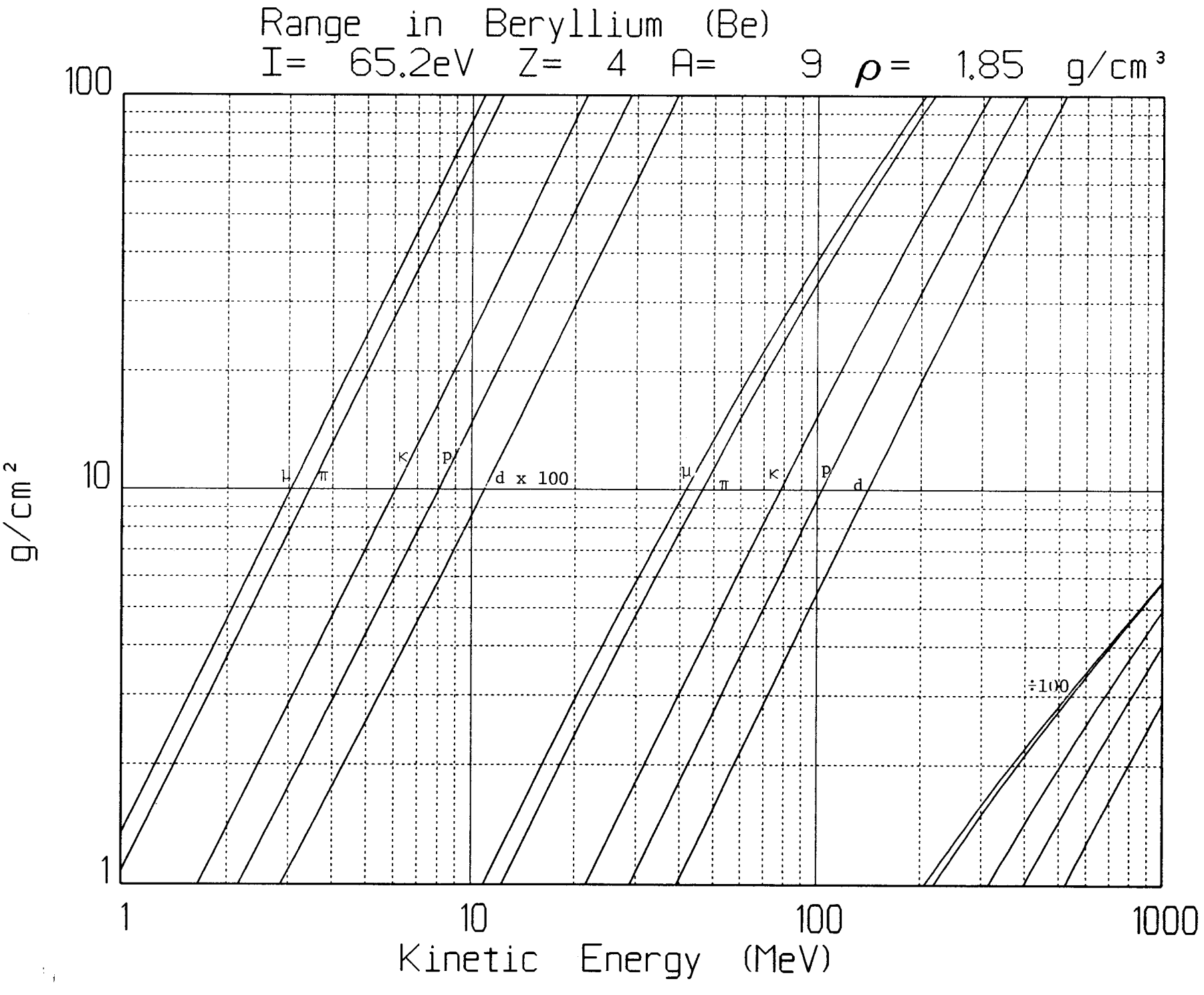

Stopping power in Deuterium
I= 21.8eV Z= 1 A= 2 ρ = 0.17 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

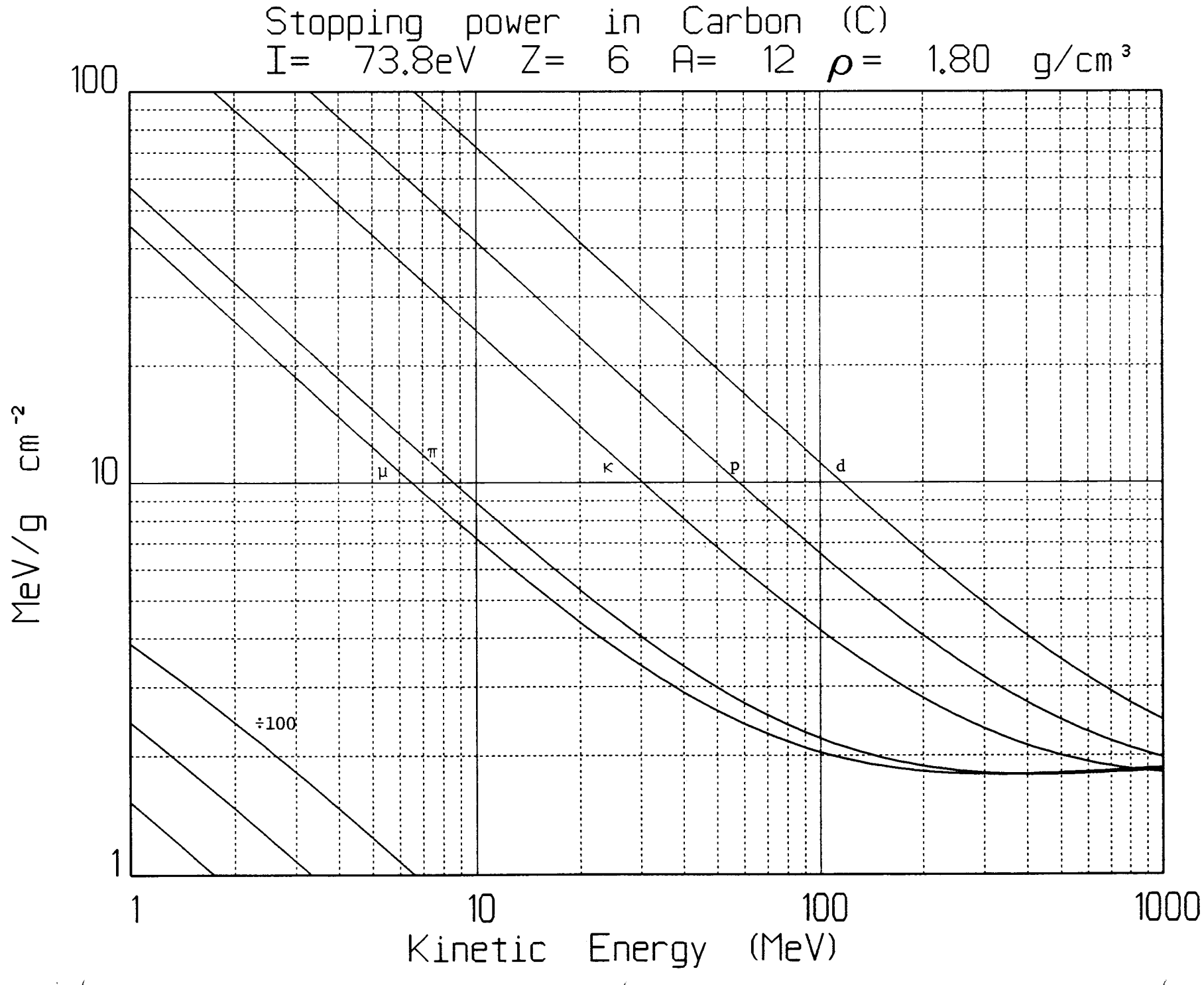

Range in Deuterium
I= 21.8eV Z= 1 A= 2 ρ = 0.17 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

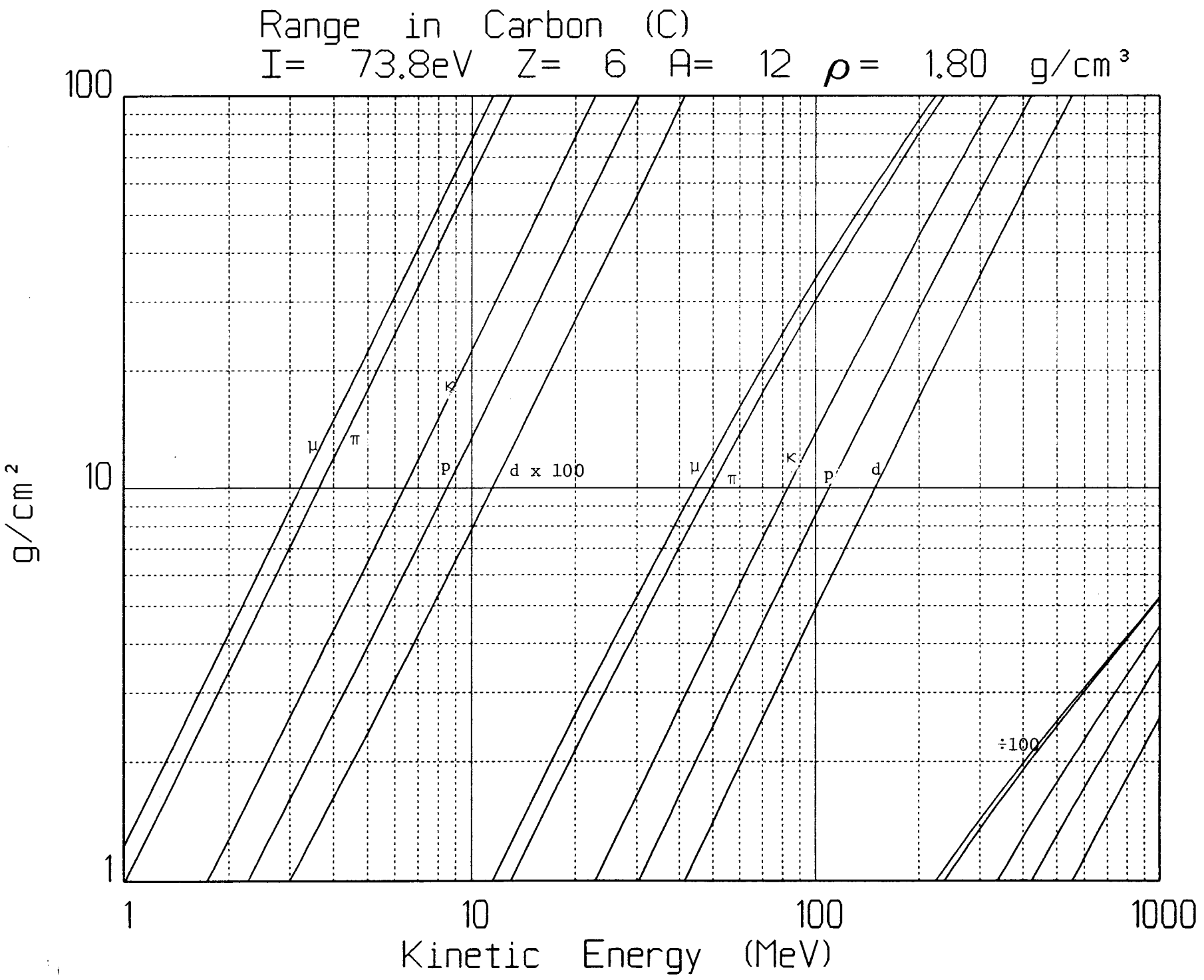

Stopping power in Helium (He)
I= 39.9eV Z= 2 A= 4 ρ= 0.13 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
d
p
÷100
1
10
100
1000
Kinetic Energy (MeV)

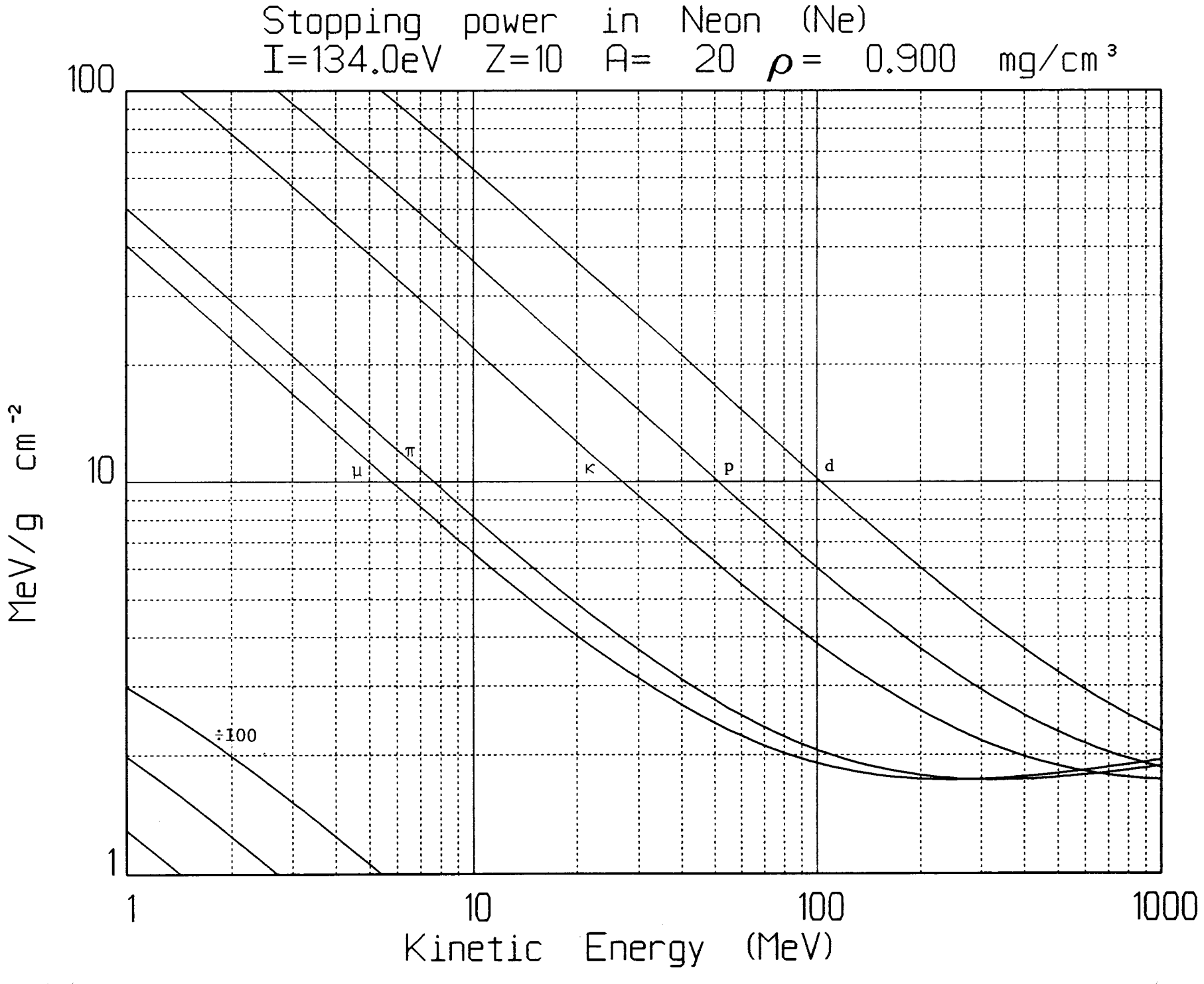

Range in Helium (He)
I= 39.9eV Z= 2 A= 4 ρ= 0.13 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

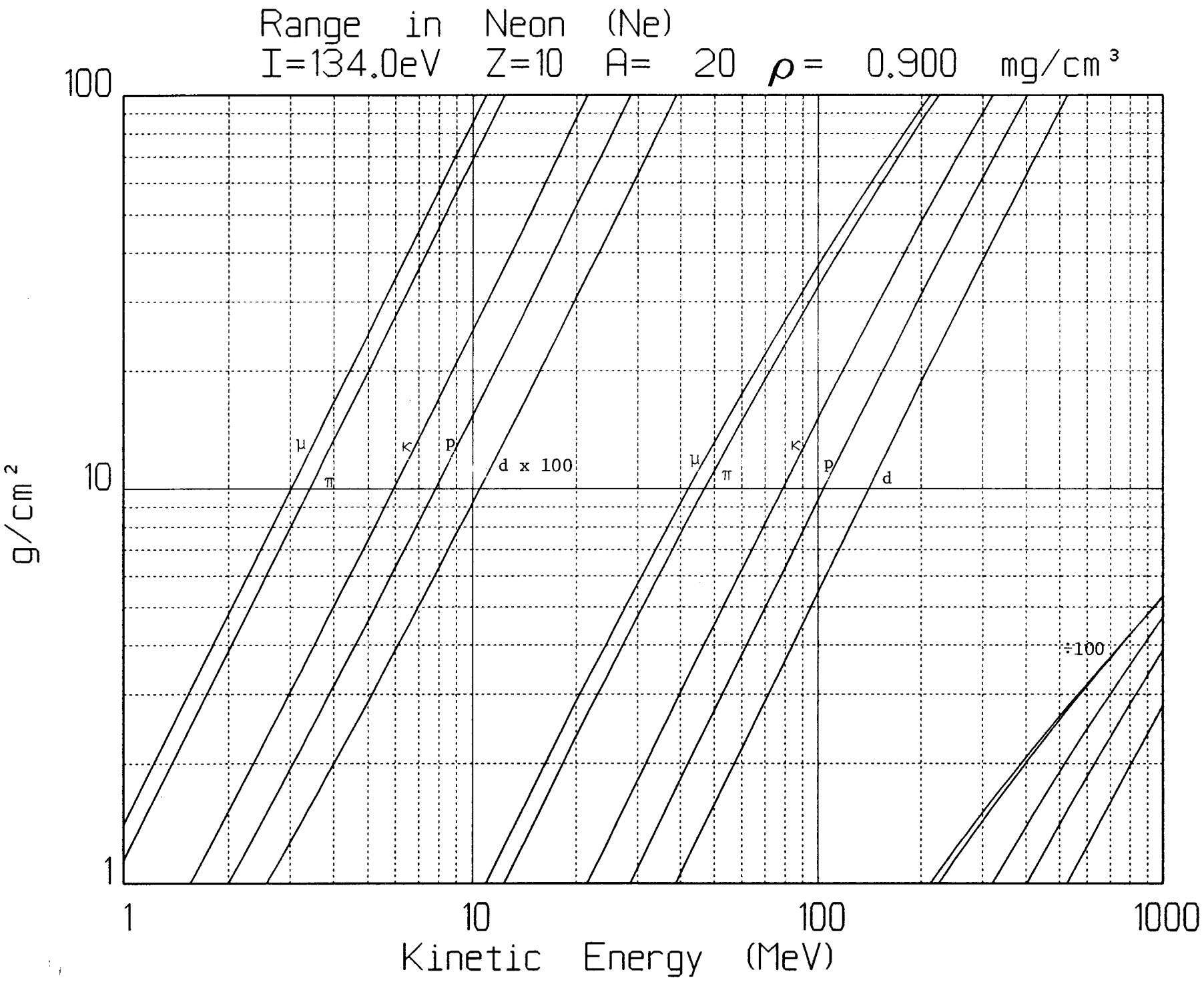

Stopping power in Beryllium (Be)
I= 65.2eV Z= 4 A= 9 ρ = 1.85 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

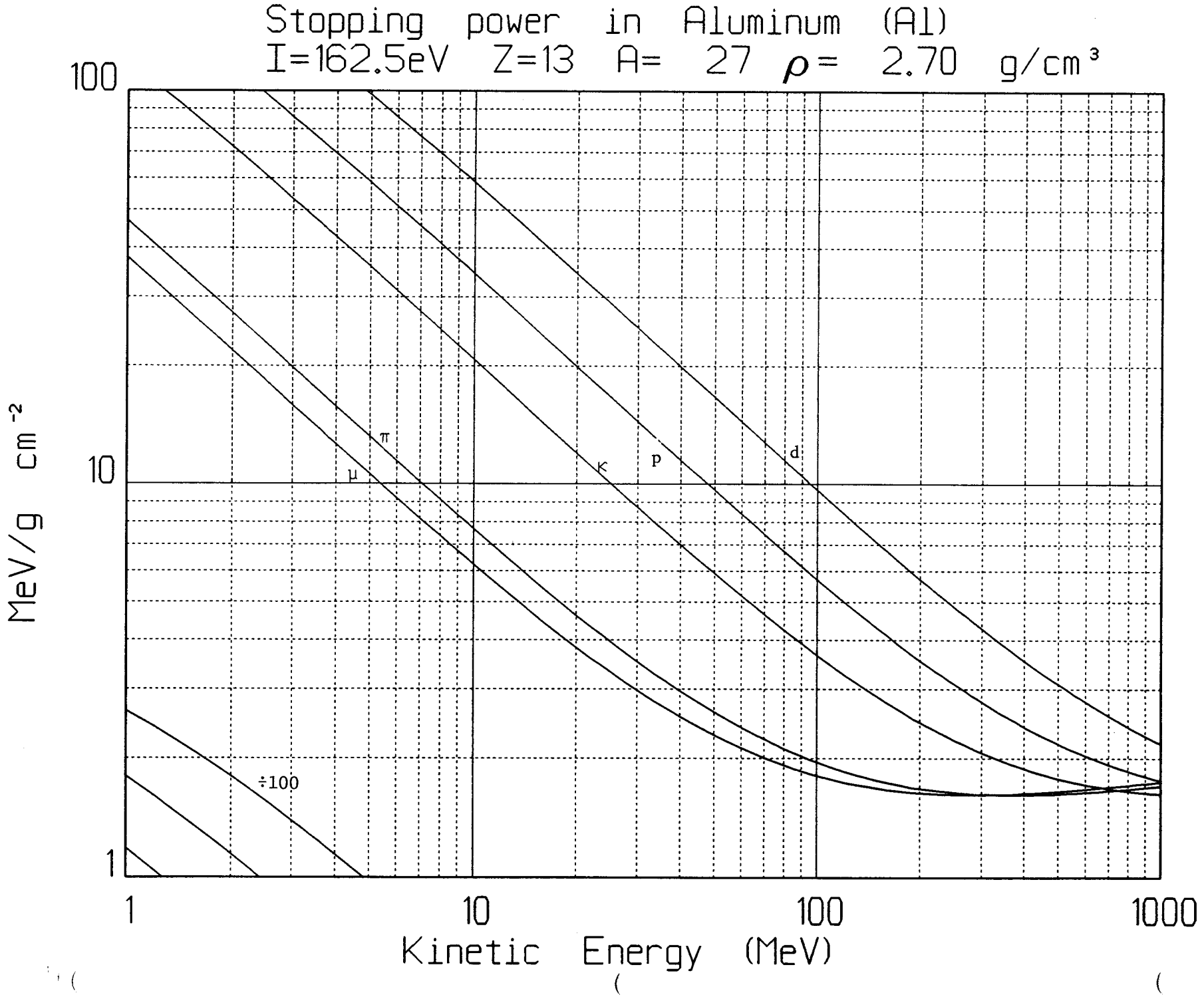

Range in Beryllium (Be)
I= 65.2eV Z= 4 A= 9 ρ = 1.85 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

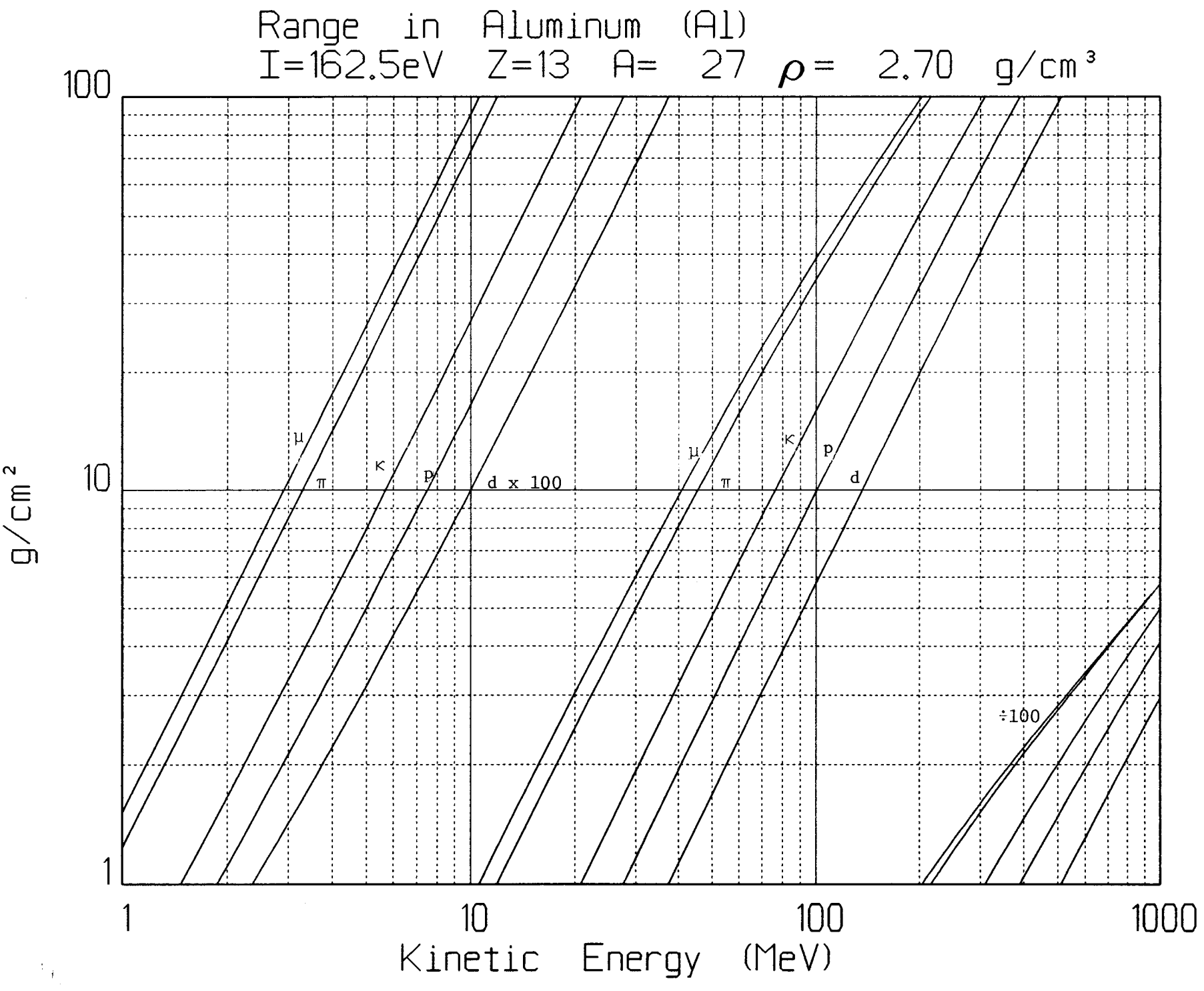

Stopping power in Carbon (C)
I= 73.8eV Z= 6 A= 12 ρ = 1.80 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

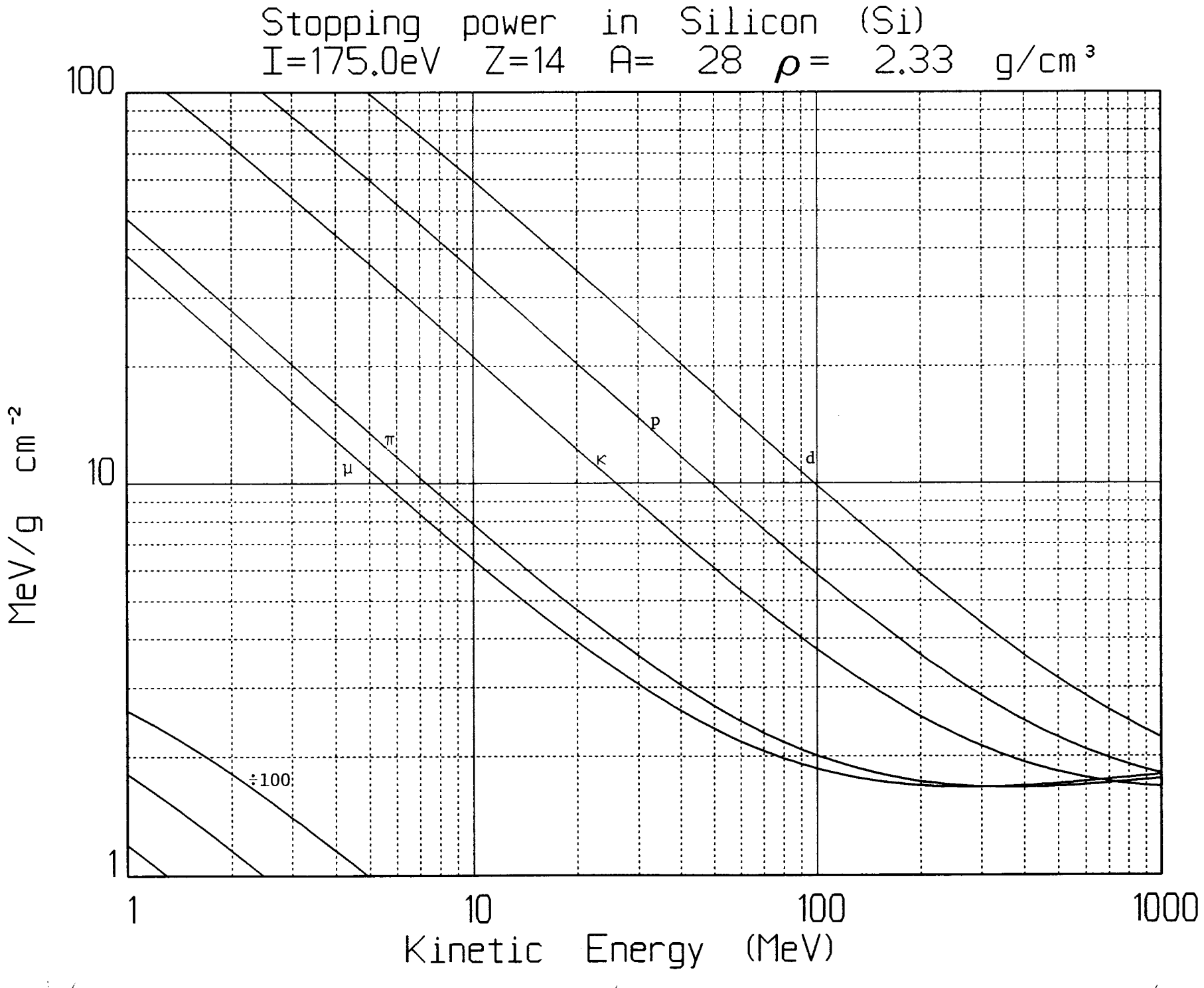

Range in Carbon (C)
I= 73.8eV Z= 6 A= 12 ρ = 1.80 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

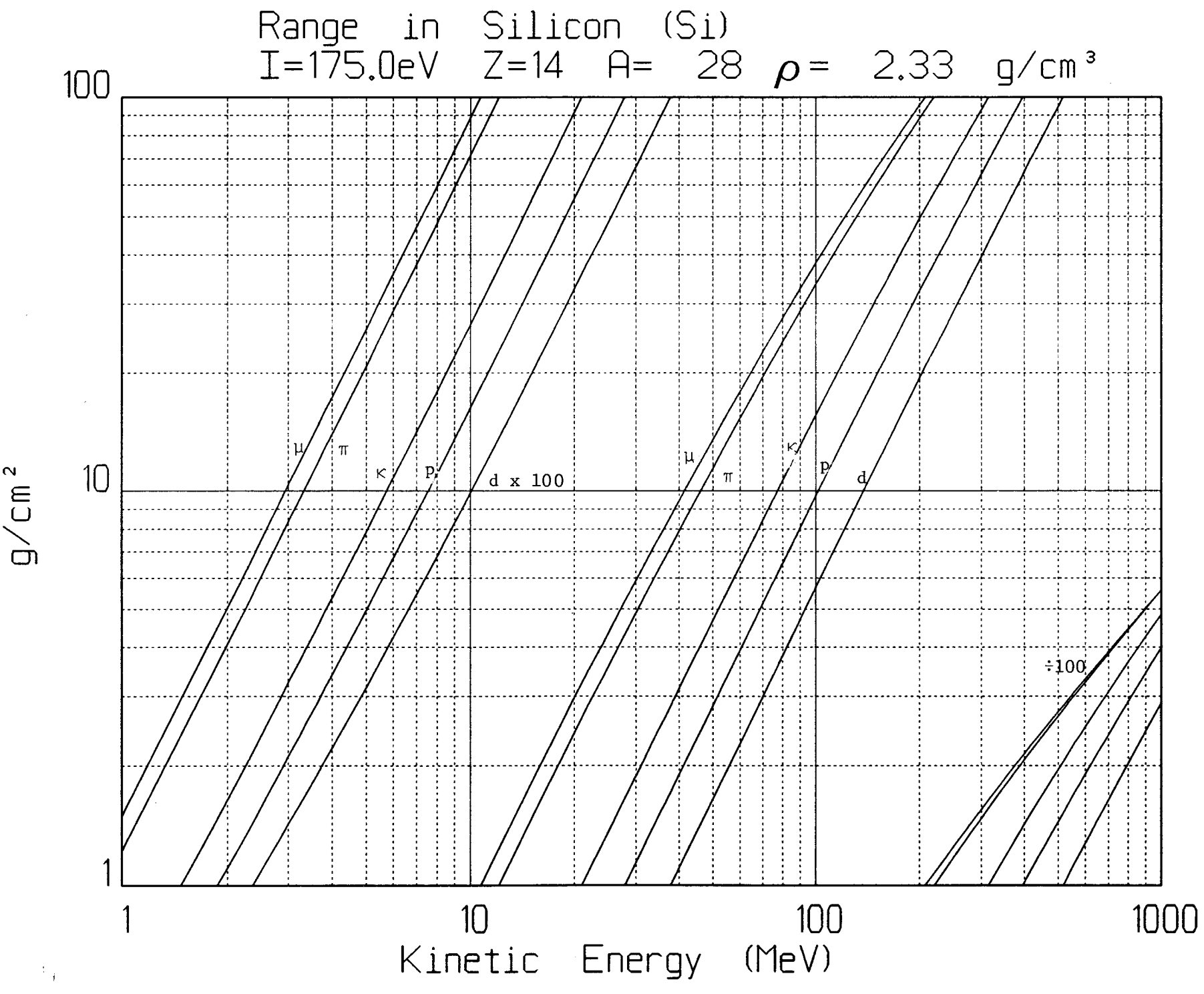

Stopping power in Neon (Ne)
I=134.0eV Z=10 A= 20 ρ = 0.900 mg/cm³
100
10
1
MeV/g cm⁻²
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

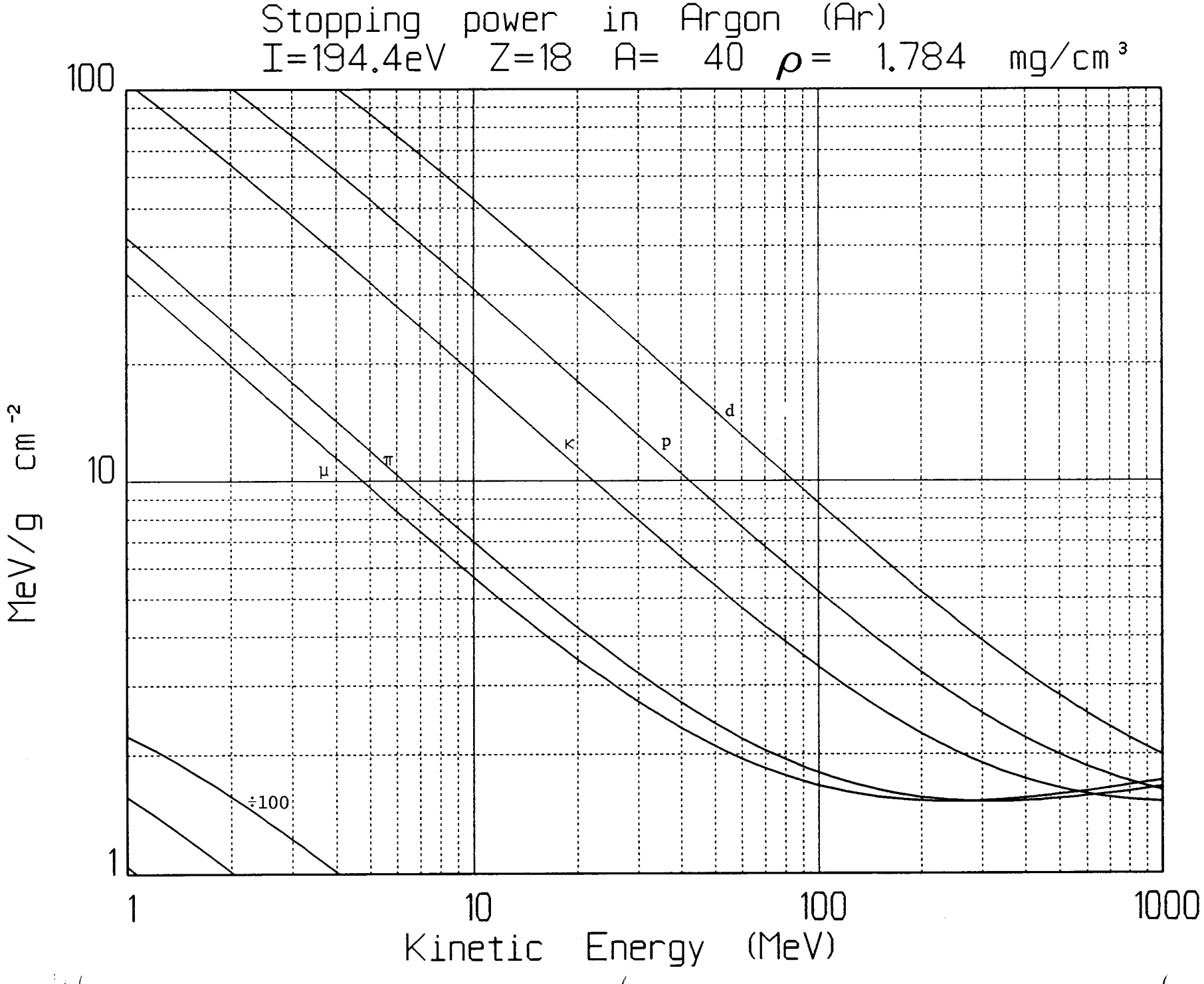

Range in Neon (Ne)
I=134.0eV Z=10 A= 20 ρ = 0.900 mg/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

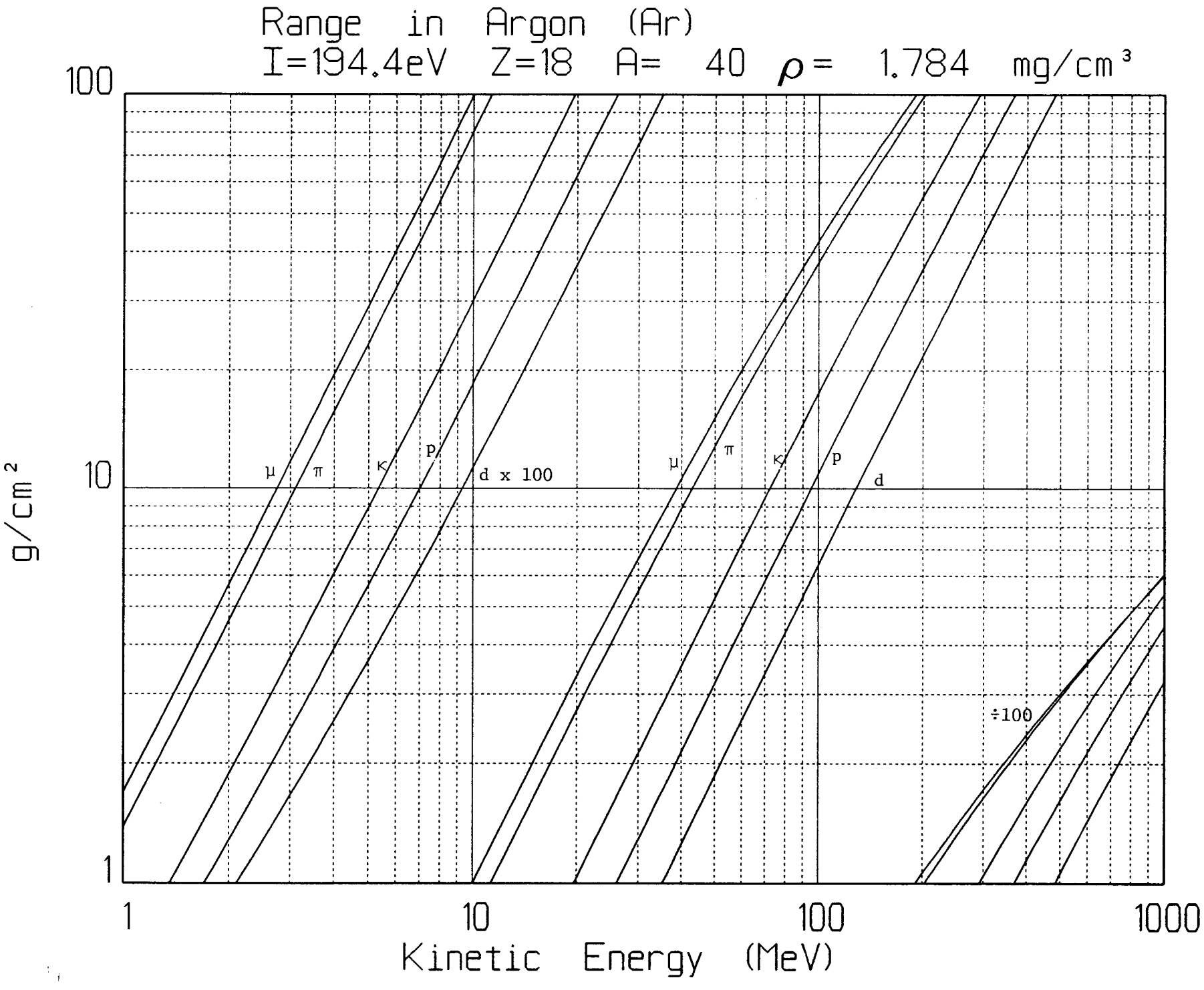

Stopping power in Aluminum (Al)
I=162.5eV Z=13 A= 27 ρ = 2.70 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

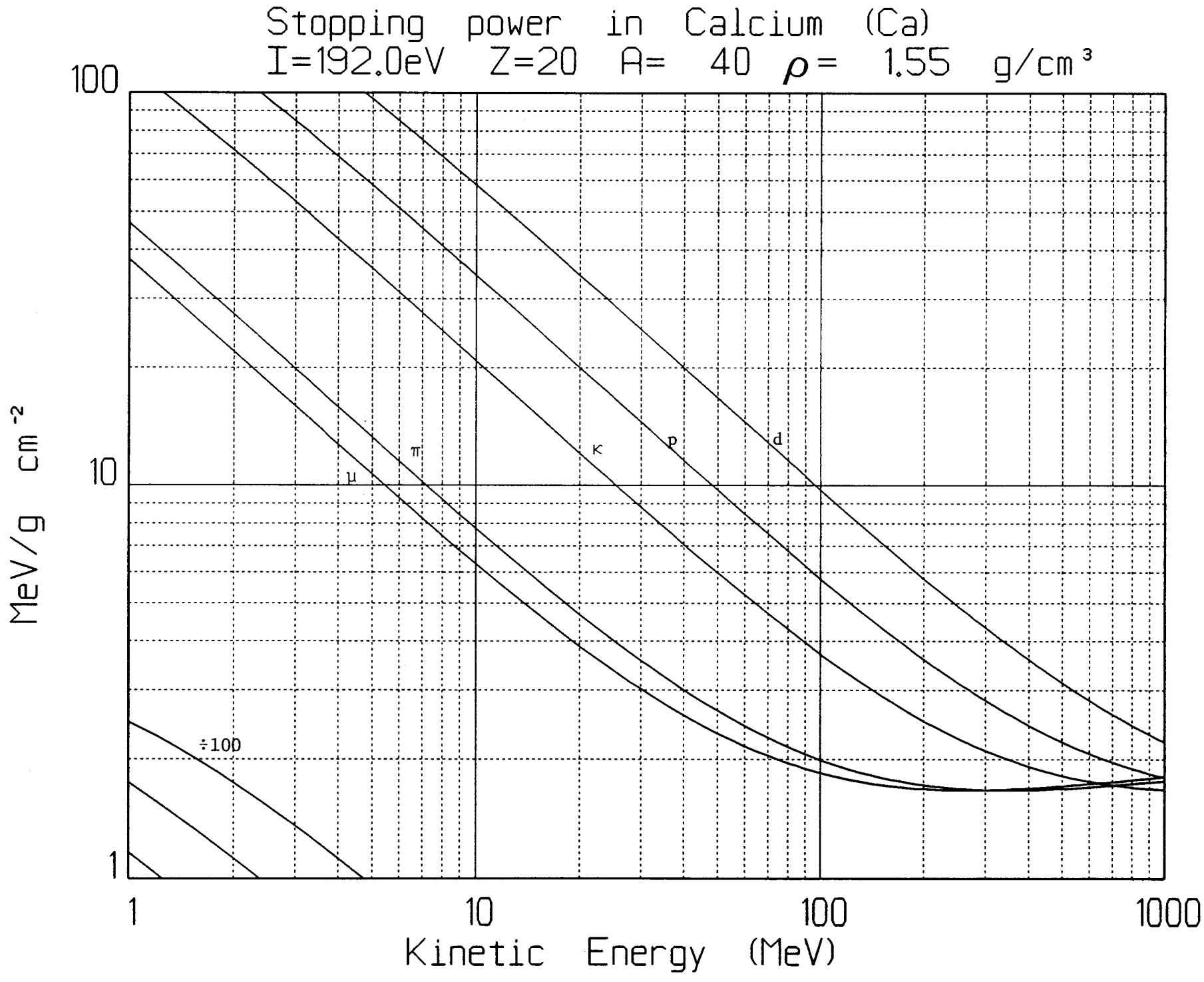

Range in Aluminum (Al)
I=162.5eV Z=13 A= 27 ρ = 2.70 g/cm³
100
10
1
g/cm²
μ
π
κ
p
d x 100
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

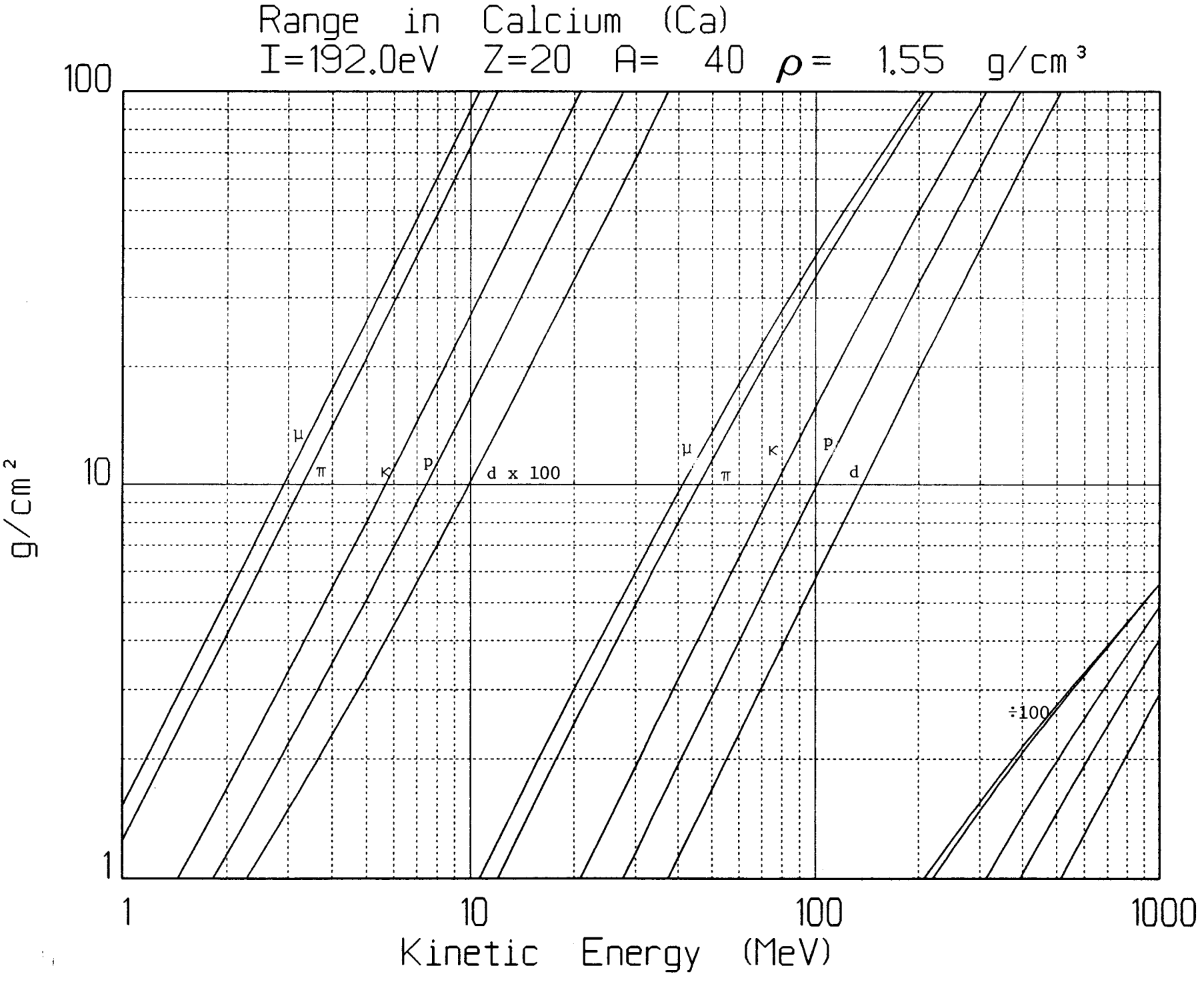

Stopping power in Silicon (Si)
I=175.0eV Z=14 A= 28 ρ = 2.33 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

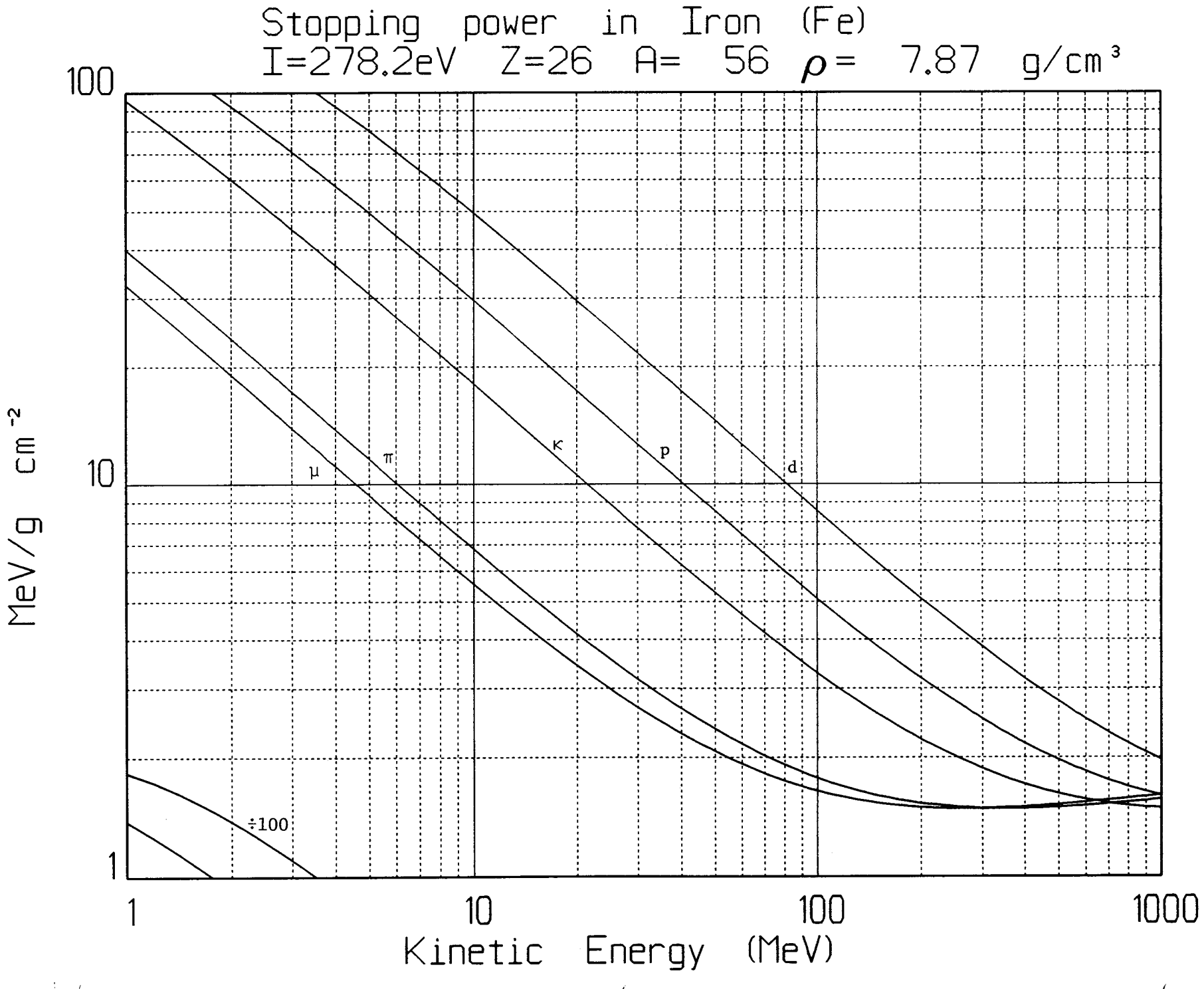

Range in Silicon (Si)
I=175.0eV Z=14 A= 28 ρ = 2.33 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

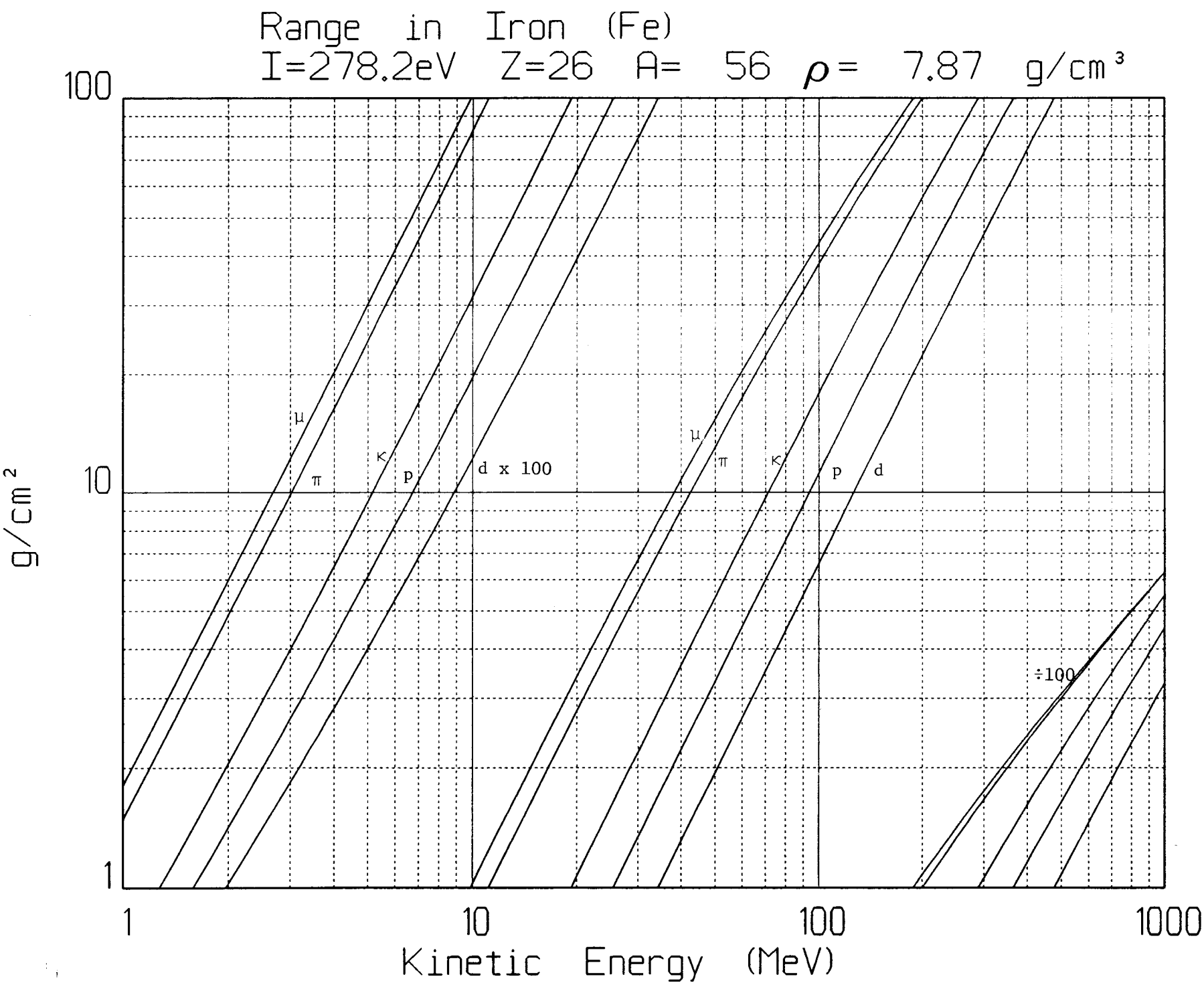

Stopping power in Argon (Ar)
I=194.4eV Z=18 A= 40 ρ = 1.784 mg/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

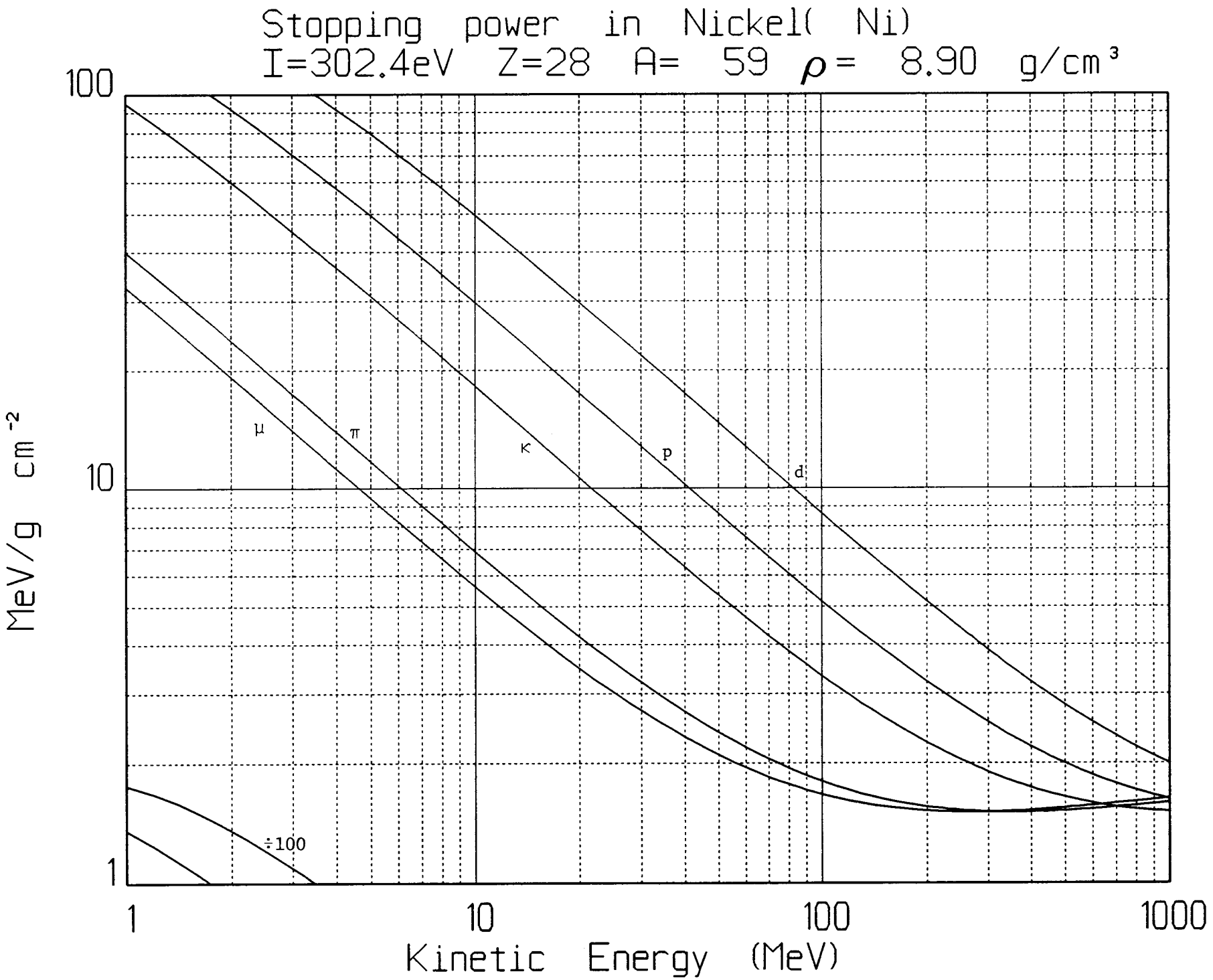

Range in Argon (Ar)
I=194.4eV Z=18 A= 40 ρ = 1.784 mg/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

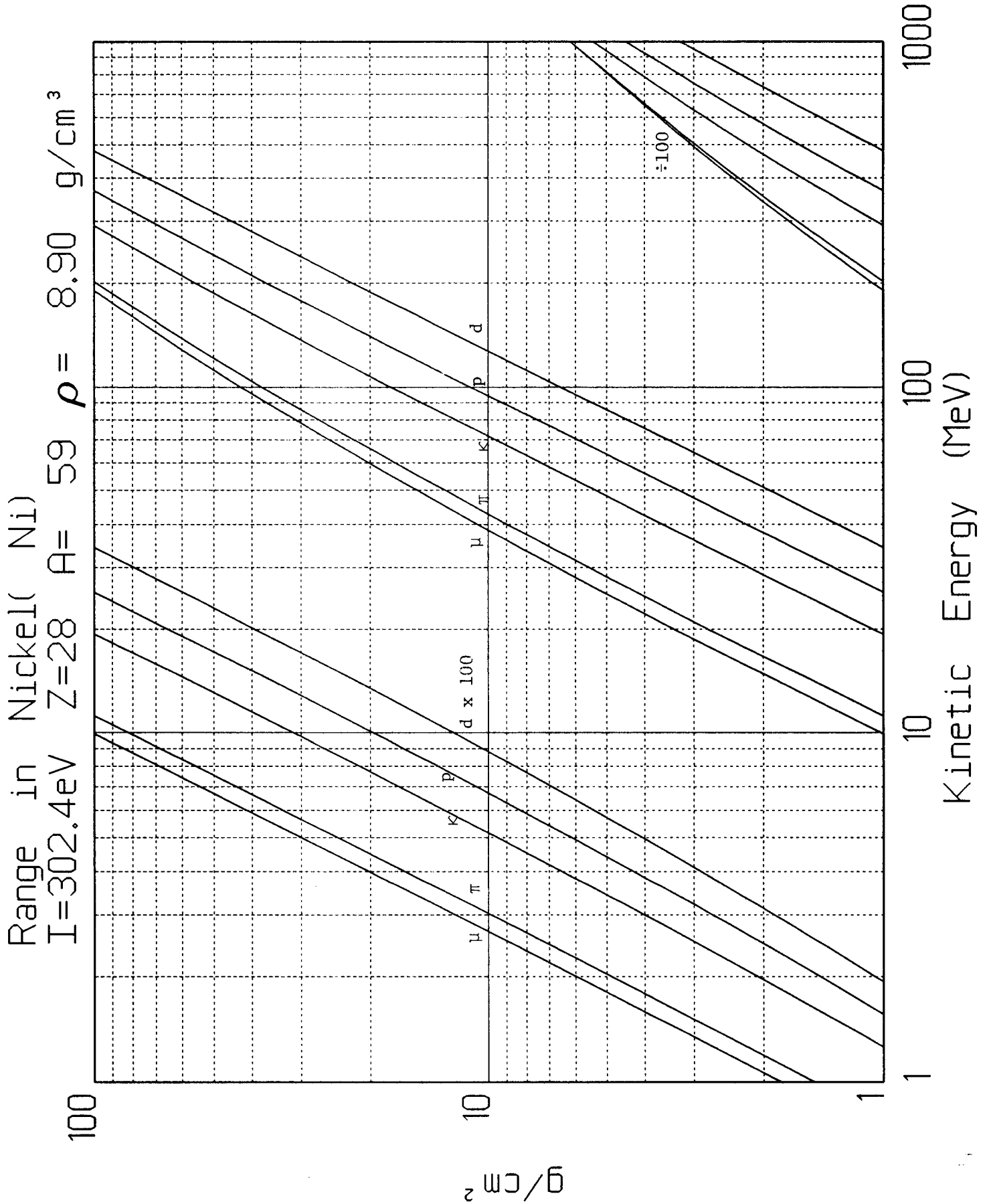

Stopping power in Calcium (Ca)
I=192.0eV Z=20 A= 40 ρ= 1.55 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

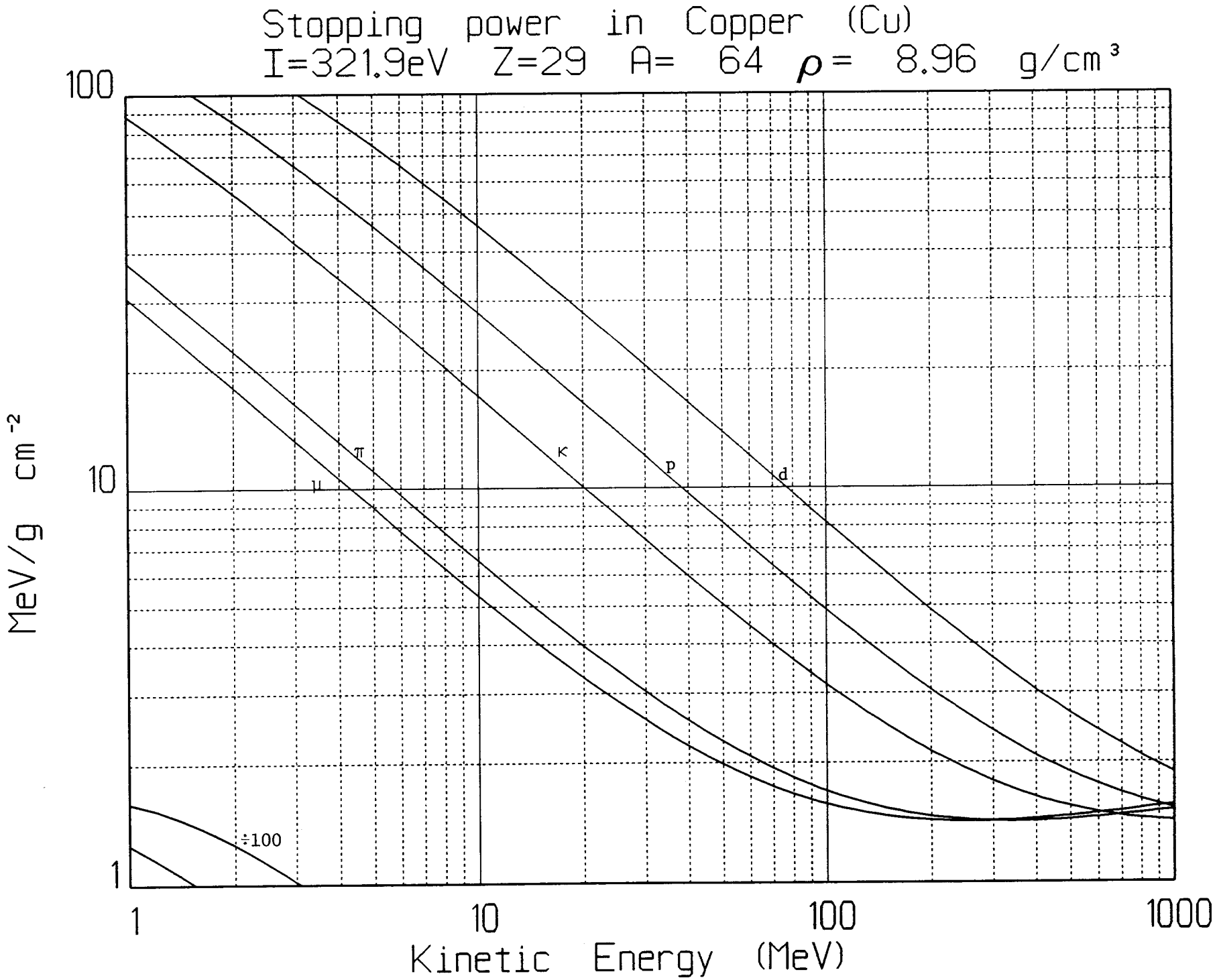

Range in Calcium (Ca)
I=192.0eV Z=20 A= 40 ρ = 1.55 g/cm³
100
10
1
g/cm²
μ
π
κ
p
d x 100
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

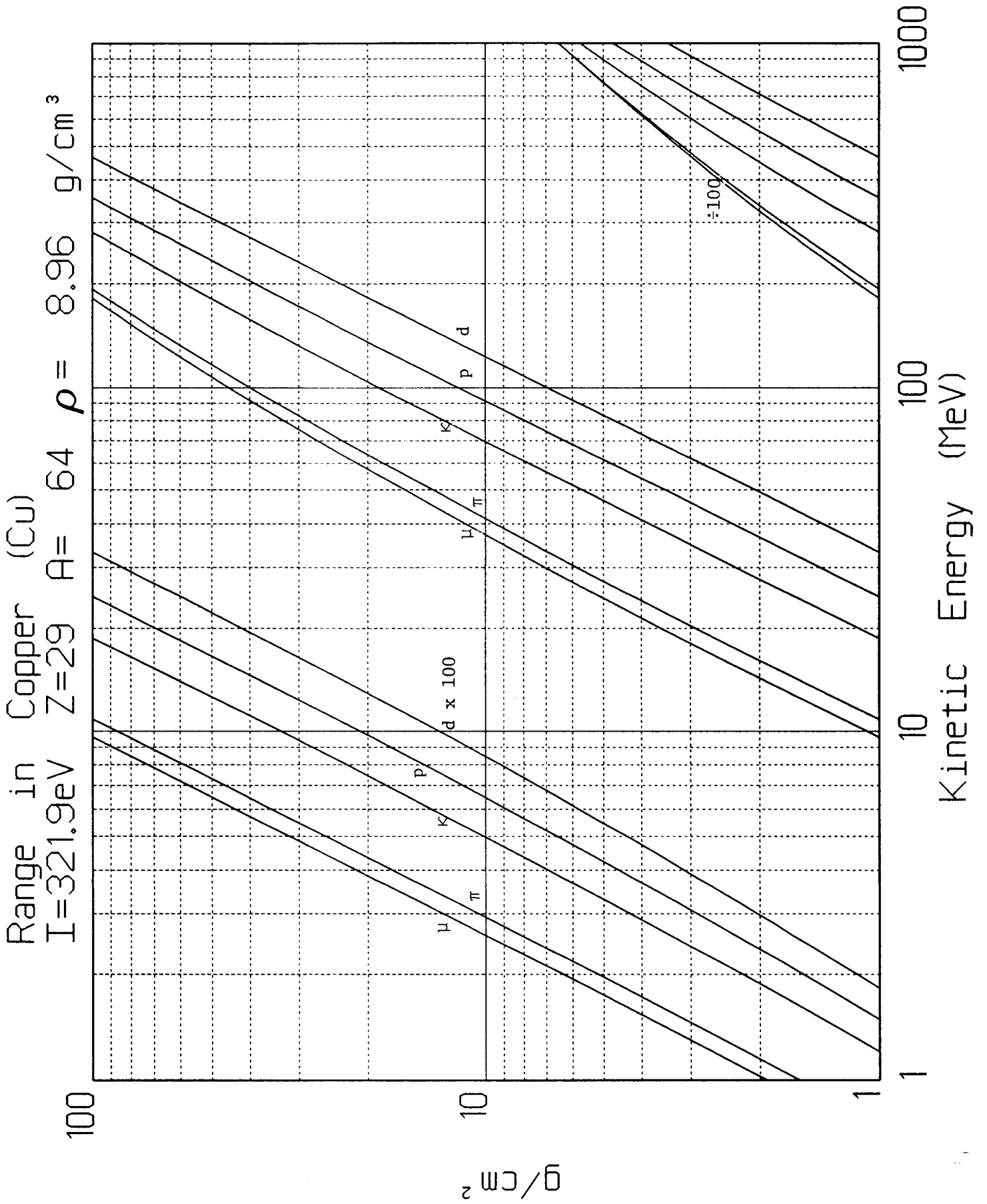

Stopping power in Iron (Fe)
I=278.2eV Z=26 A= 56 ρ = 7.87 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

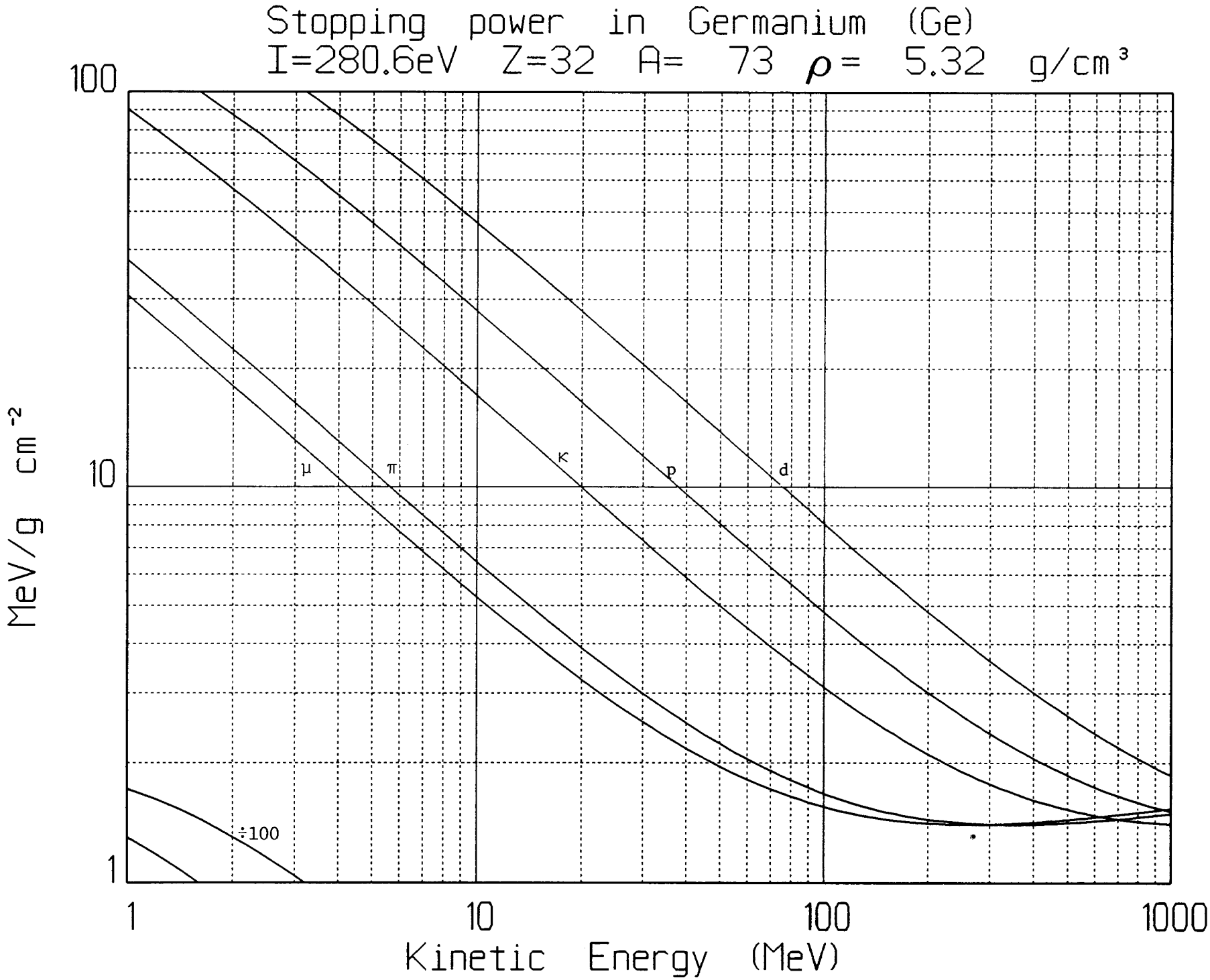

Range in Iron (Fe)
I=278.2eV Z=26 A= 56 ρ = 7.87 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

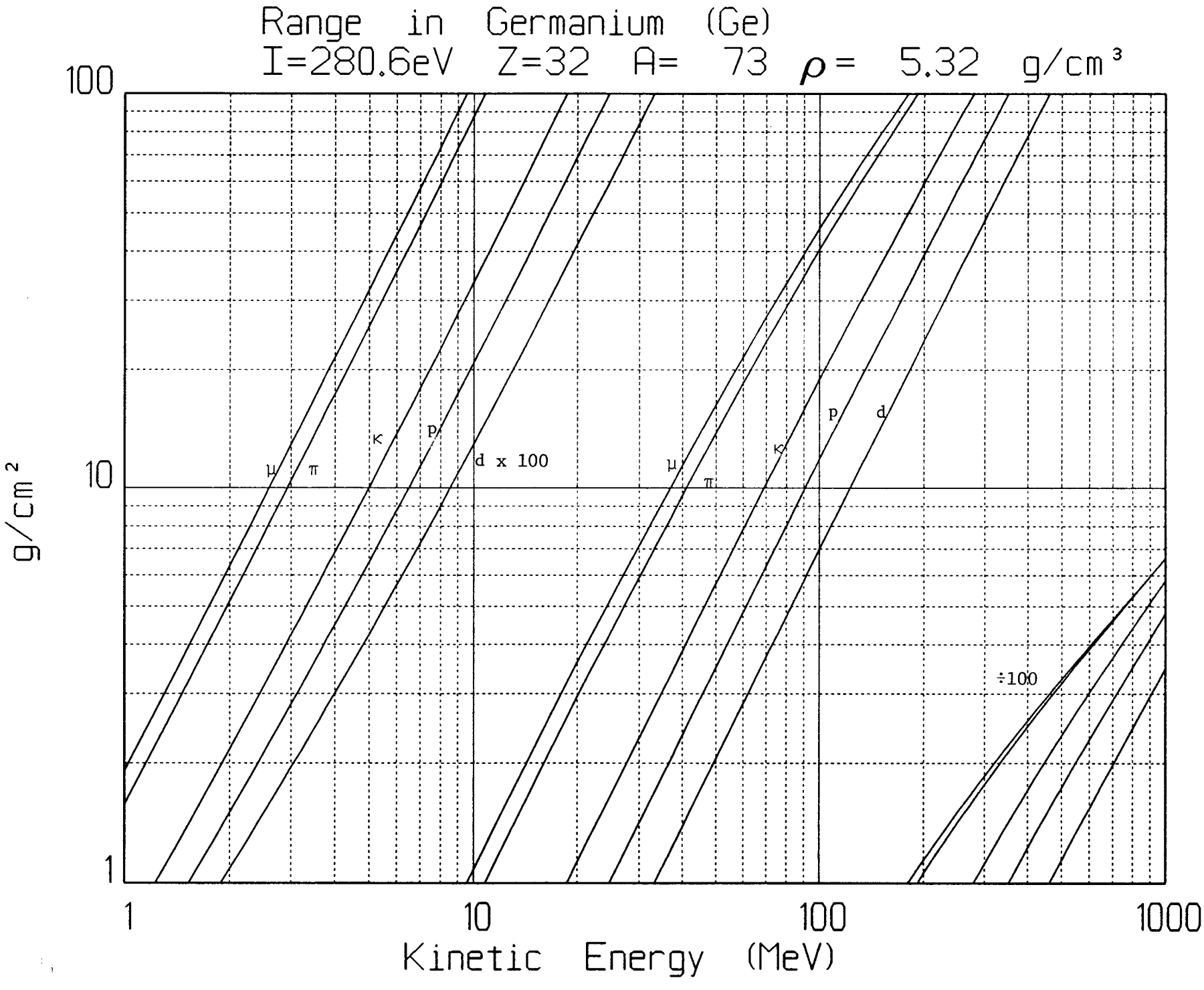

Stopping power in Nickel(Ni)
I=302.4eV Z=28 A= 59 ρ = 8.90 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

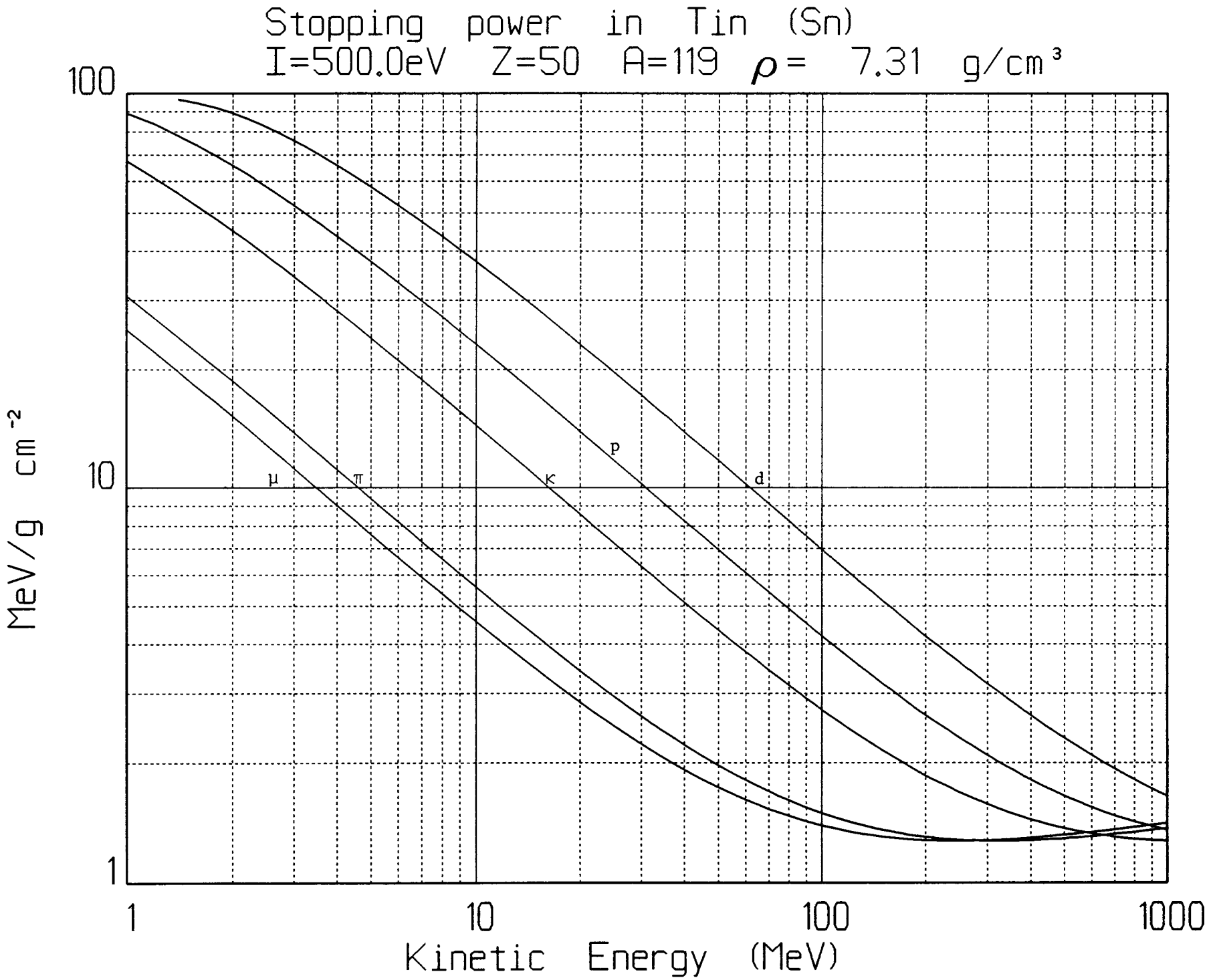

Range in Nickel(Ni)
I=302.4eV Z=28 A= 59 ρ= 8.90 g/cm³
g/cm²
100
10
1
1
10
100
1000
Kinetic Energy (MeV)
÷100
d
p
K
π
μ
d x 100
p
K
π
μ

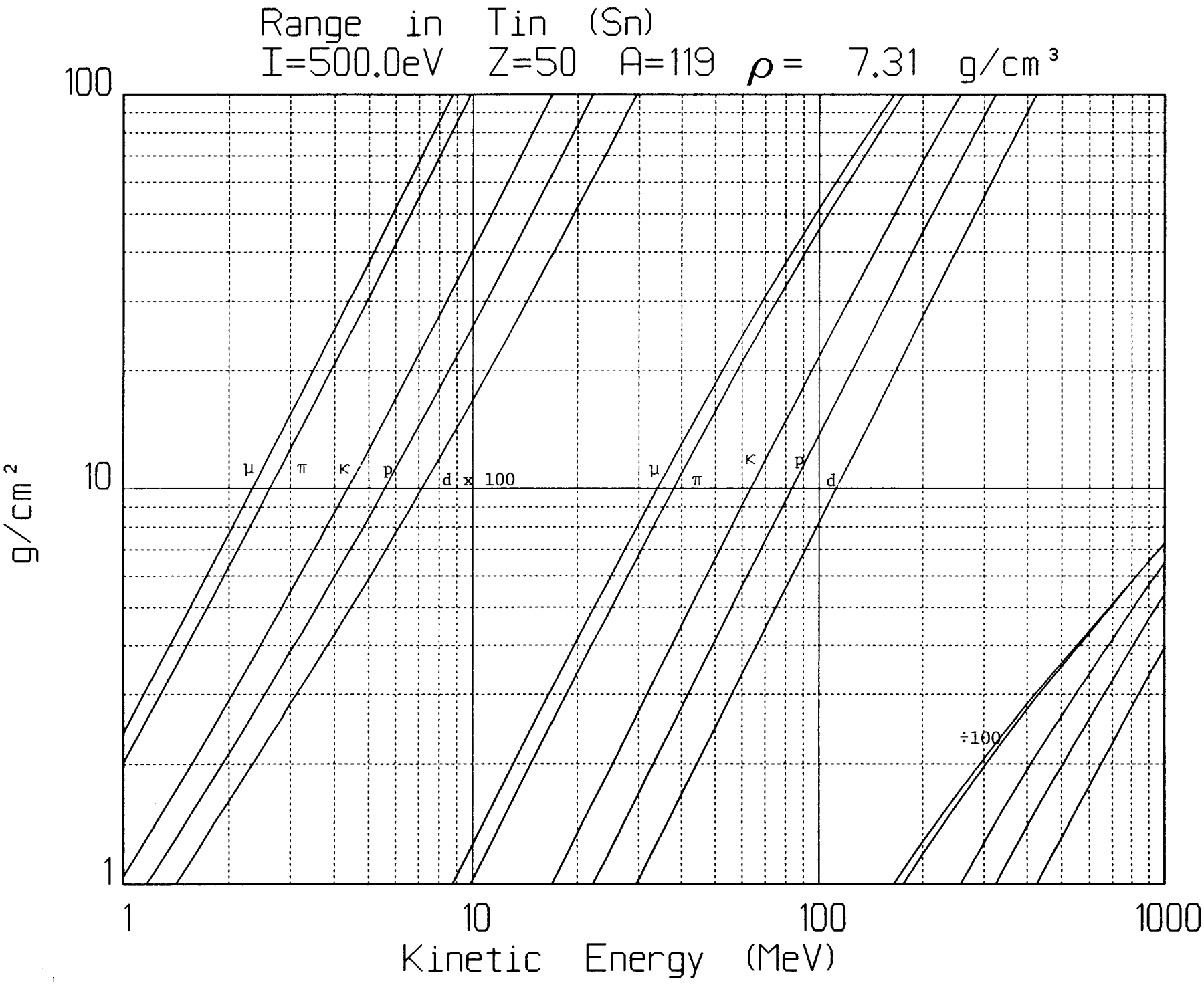

Stopping power in Copper (Cu)
I=321.9eV Z=29 A= 64 ρ = 8.96 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

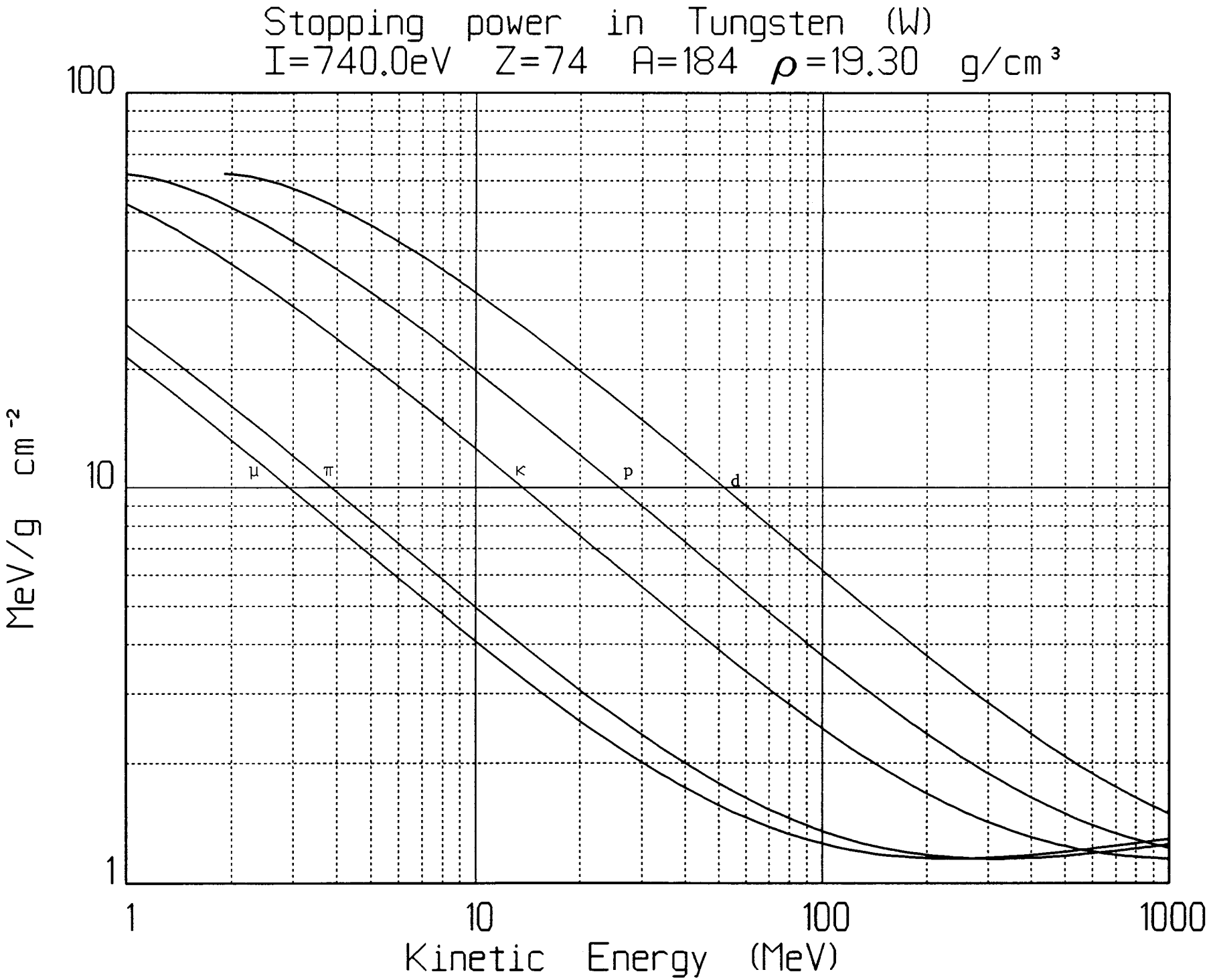

Range in Copper (Cu)
I=321.9eV Z=29 A= 64 ρ= 8.96 g/cm³
g/cm²
100
10
1
1
10
100
1000
Kinetic Energy (MeV)
μ
π
K
p
d
d x 100
÷100

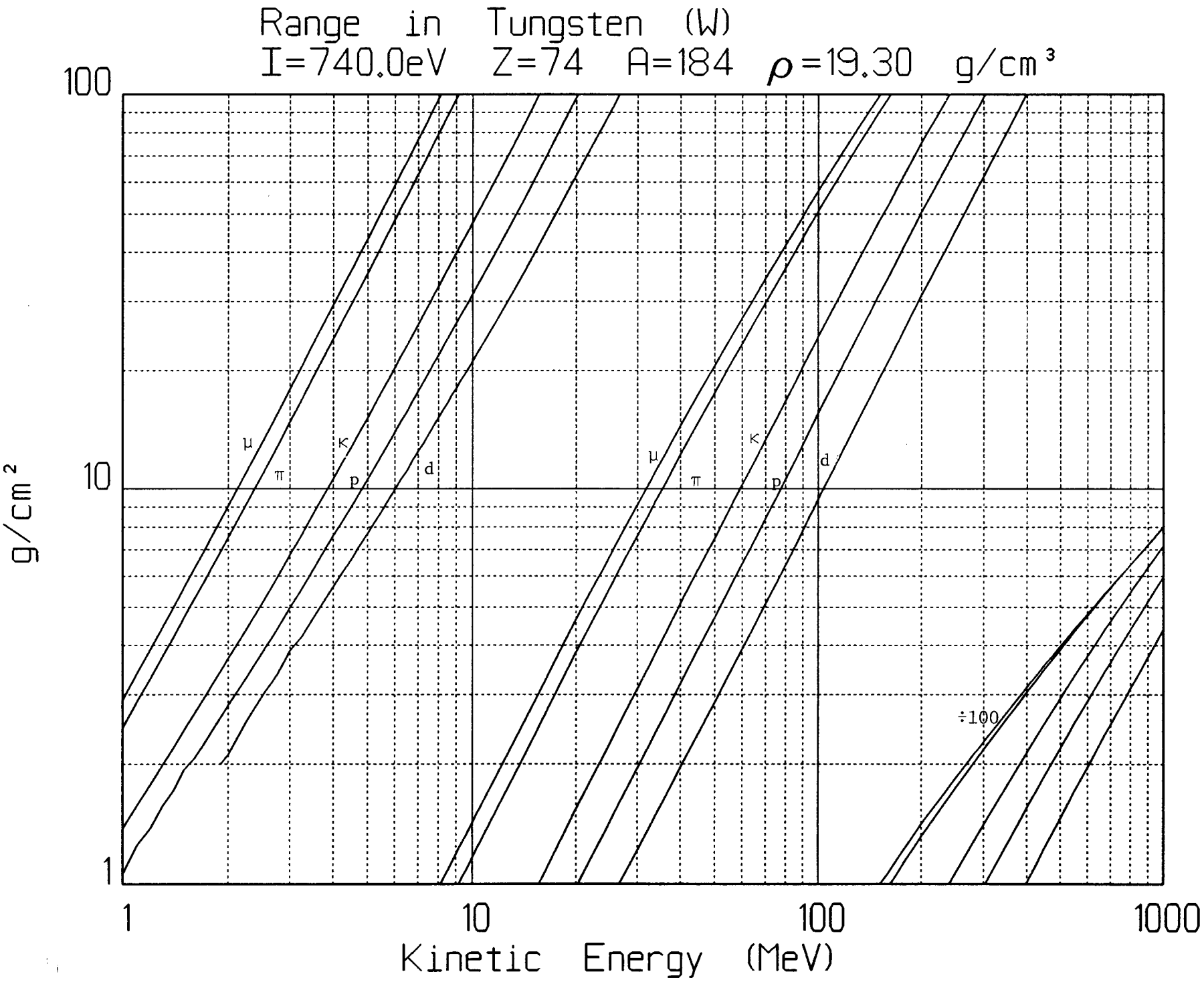

Stopping power in Germanium (Ge)
I=280.6eV Z=32 A= 73 ρ = 5.32 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

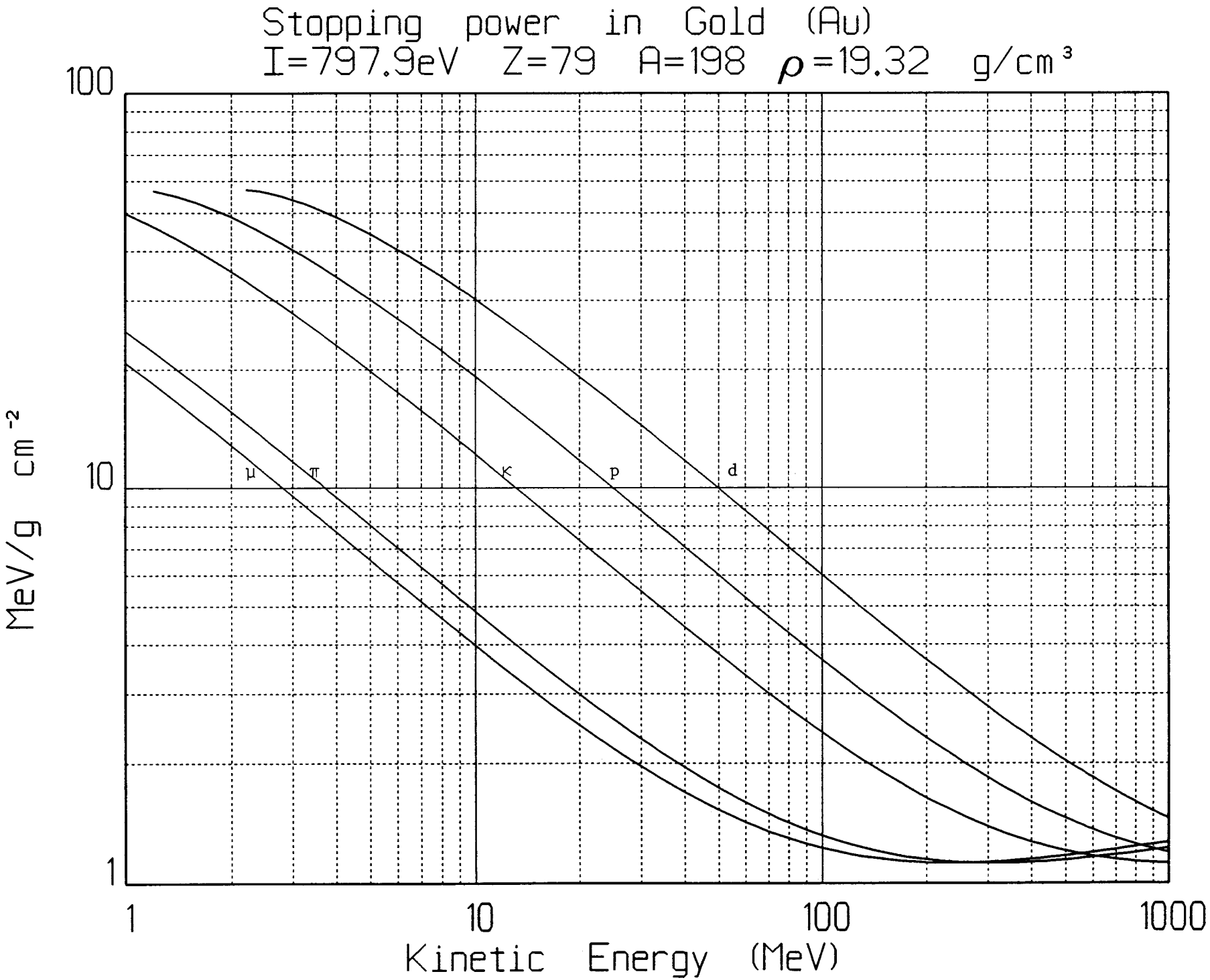

Range in Germanium (Ge)
I=280.6eV Z=32 A= 73 ρ = 5.32 g/cm³
100
10
1
g/cm²
μ
π
κ
p
d x 100
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

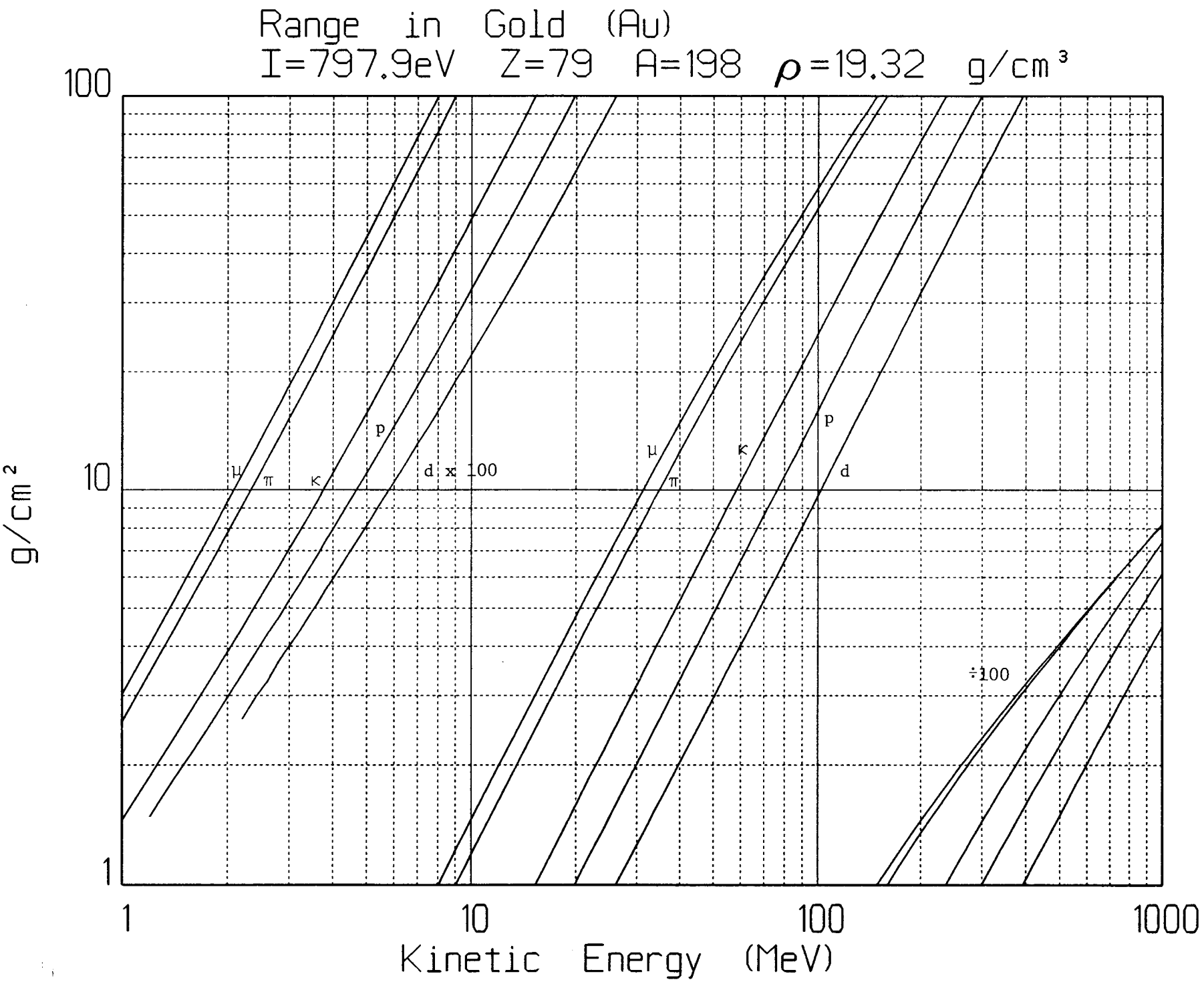

Stopping power in Tin (Sn)
I=500.0eV Z=50 A=119 ρ = 7.31 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
1
10
100
1000
Kinetic Energy (MeV)

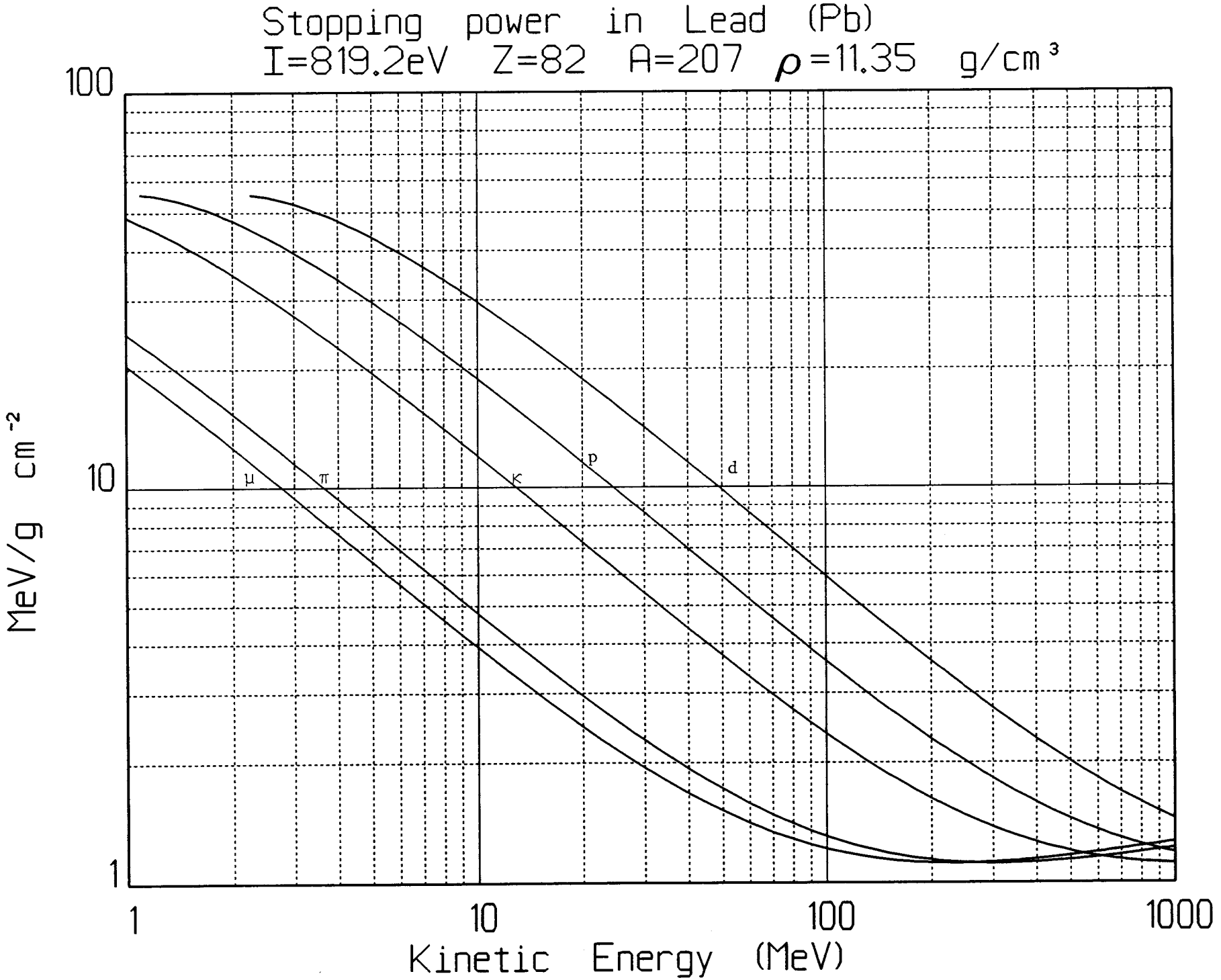

Range in Tin (Sn)
I=500.0eV Z=50 A=119 ρ = 7.31 g/cm³
100
10
1
g/cm²
μ
π
K
p
d
x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

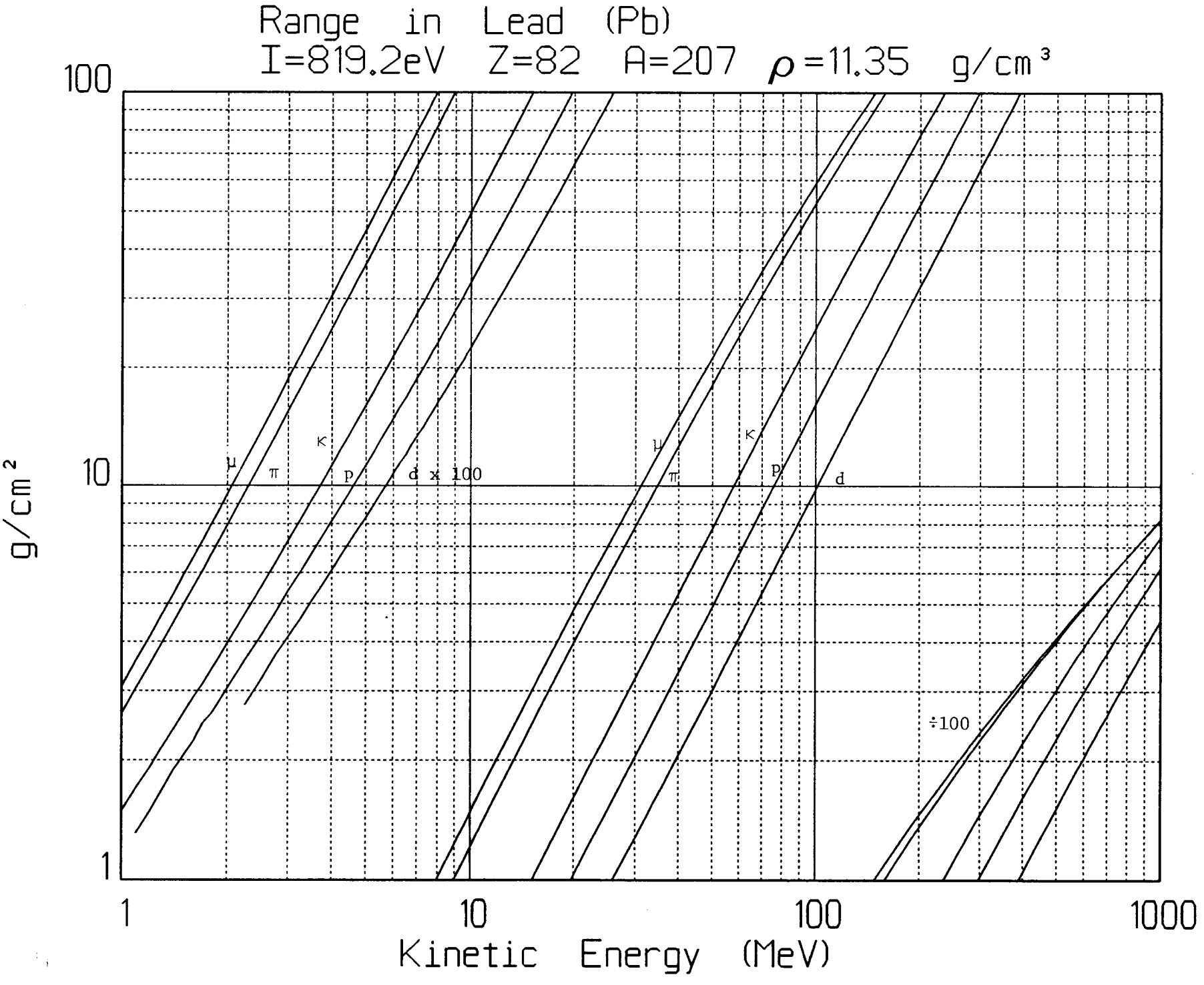

Stopping power in Tungsten (W)
I=740.0eV Z=74 A=184 ρ=19.30 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
1
10
100
1000
Kinetic Energy (MeV)

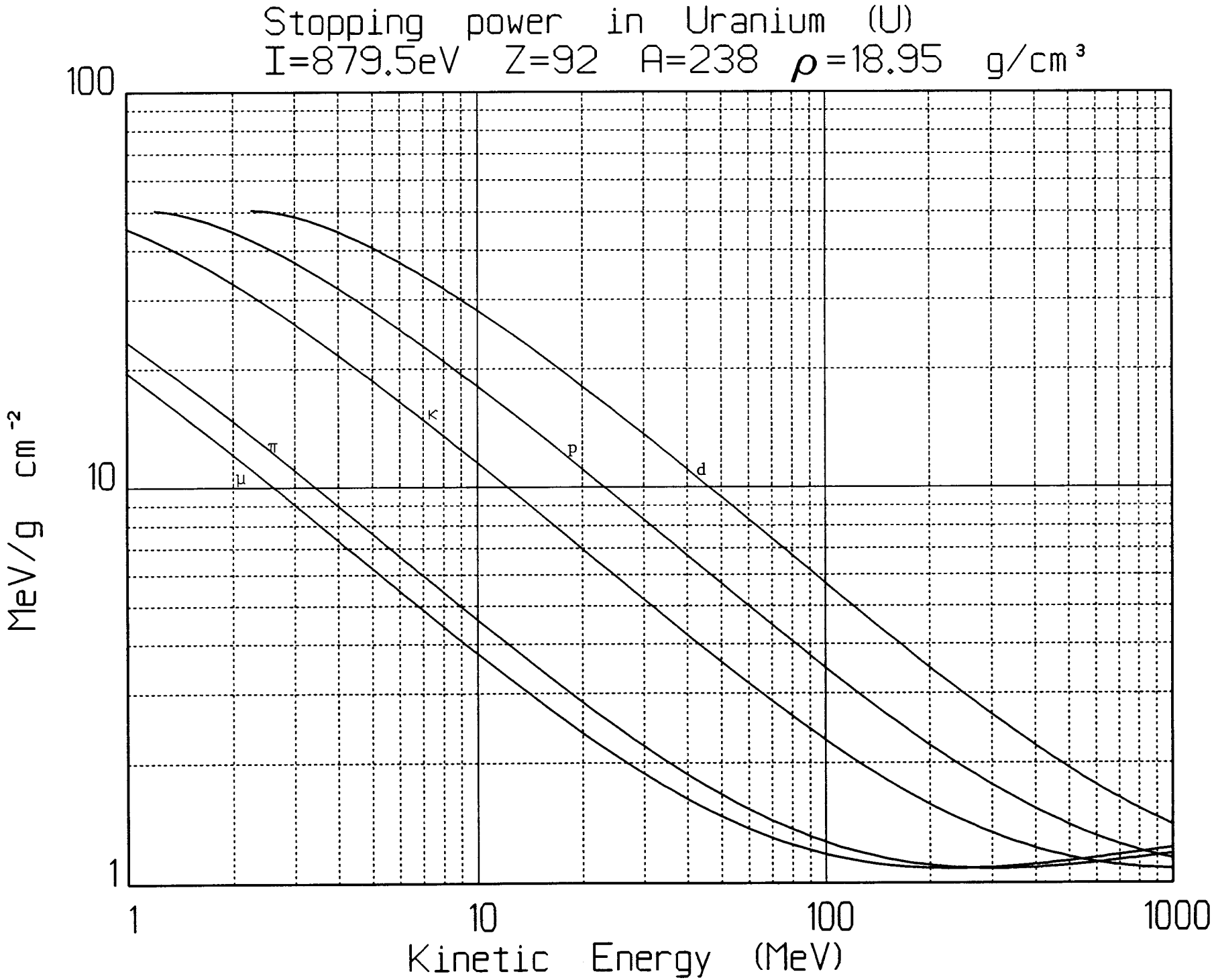

Range in Tungsten (W)
I=740.0eV Z=74 A=184 ρ=19.30 g/cm³
100
10
1
g/cm²
μ
π
K
p
d
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

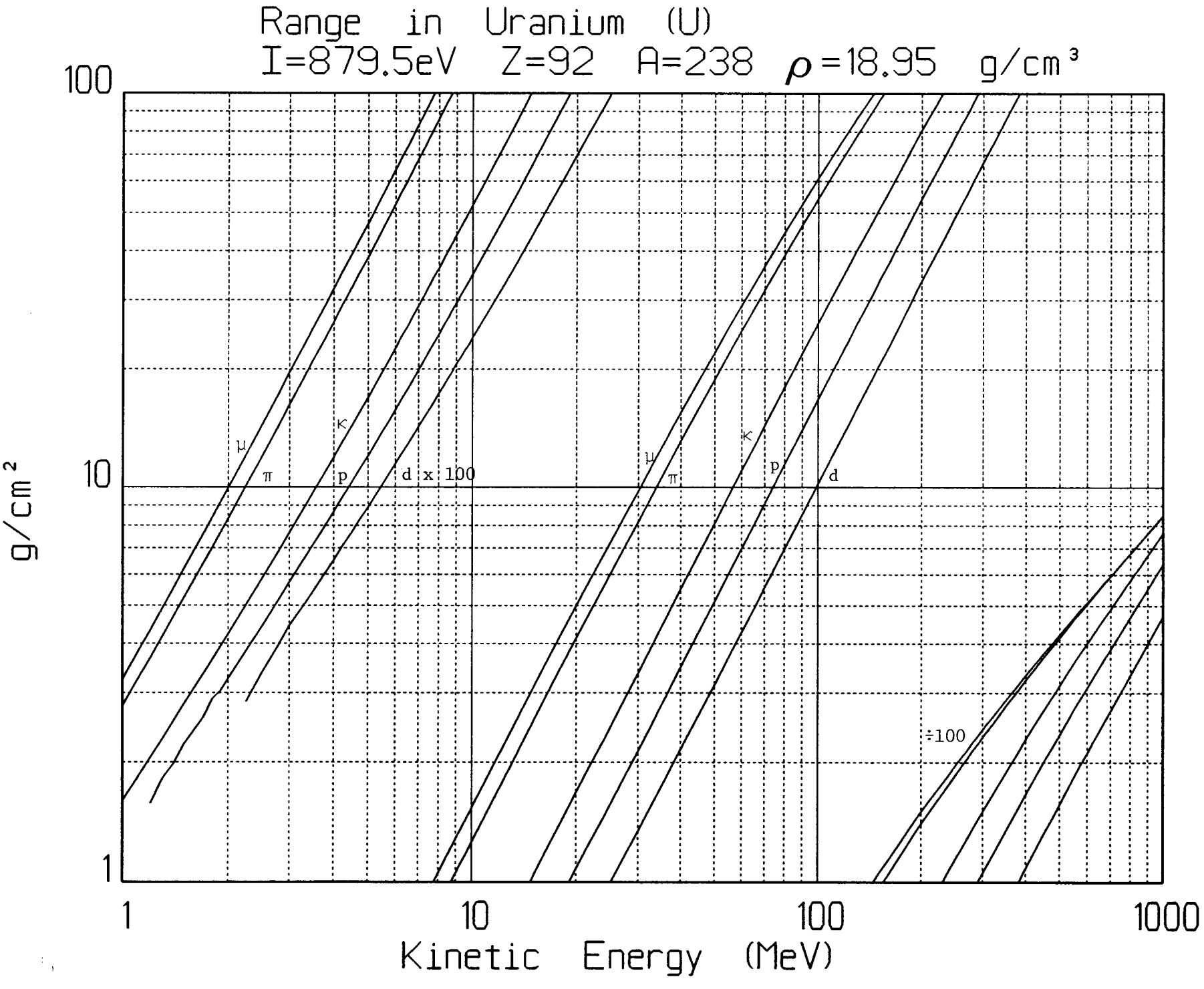

Stopping power in Gold (Au)
I=797.9eV Z=79 A=198 ρ=19.32 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
1
10
100
1000
Kinetic Energy (MeV)

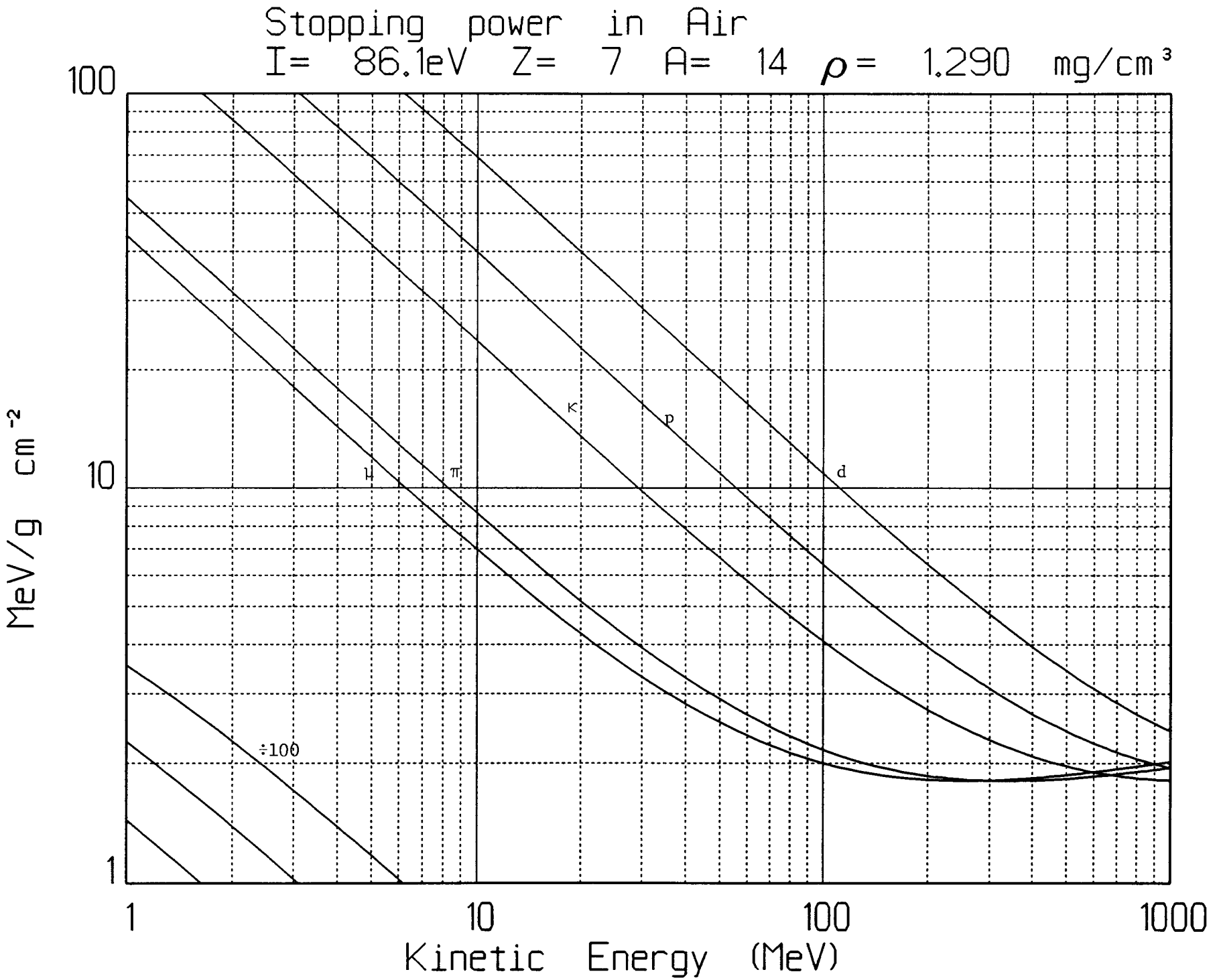

Range in Gold (Au)
I=797.9eV Z=79 A=198 ρ=19.32 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

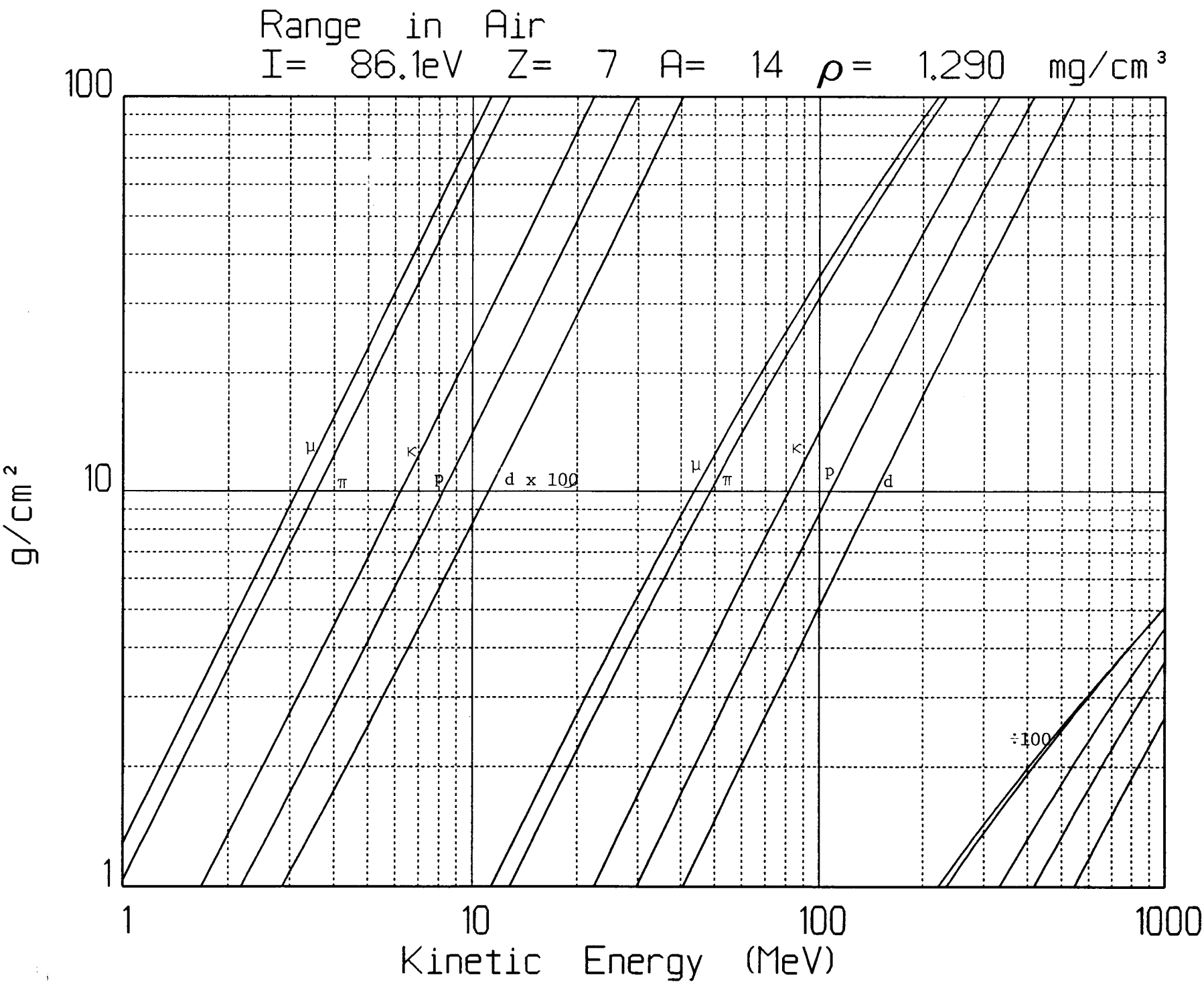

Stopping power in Lead (Pb)
I=819.2eV Z=82 A=207 ρ=11.35 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
1
10
100
1000
Kinetic Energy (MeV)

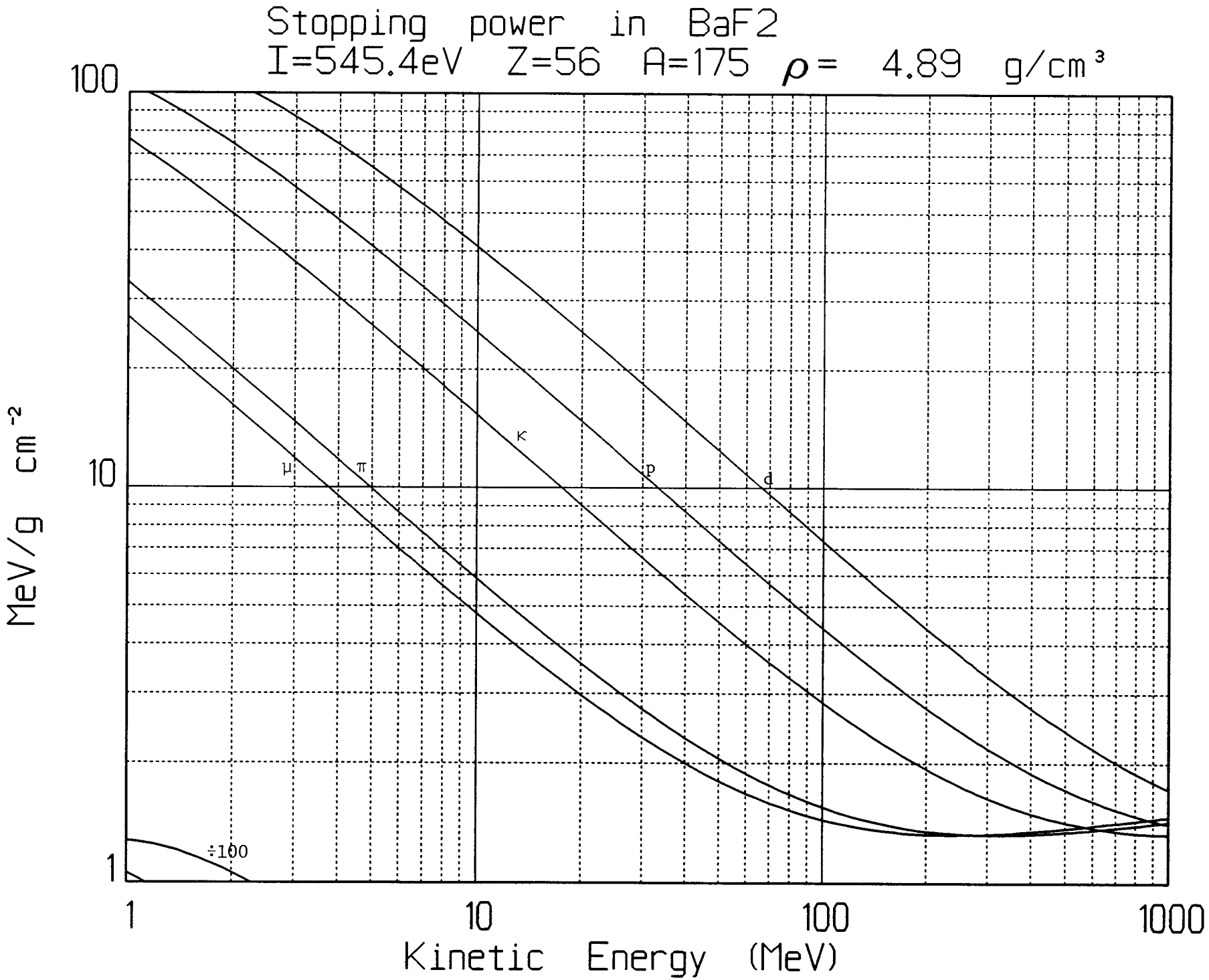

Range in Lead (Pb)
I=819.2eV Z=82 A=207 ρ=11.35 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

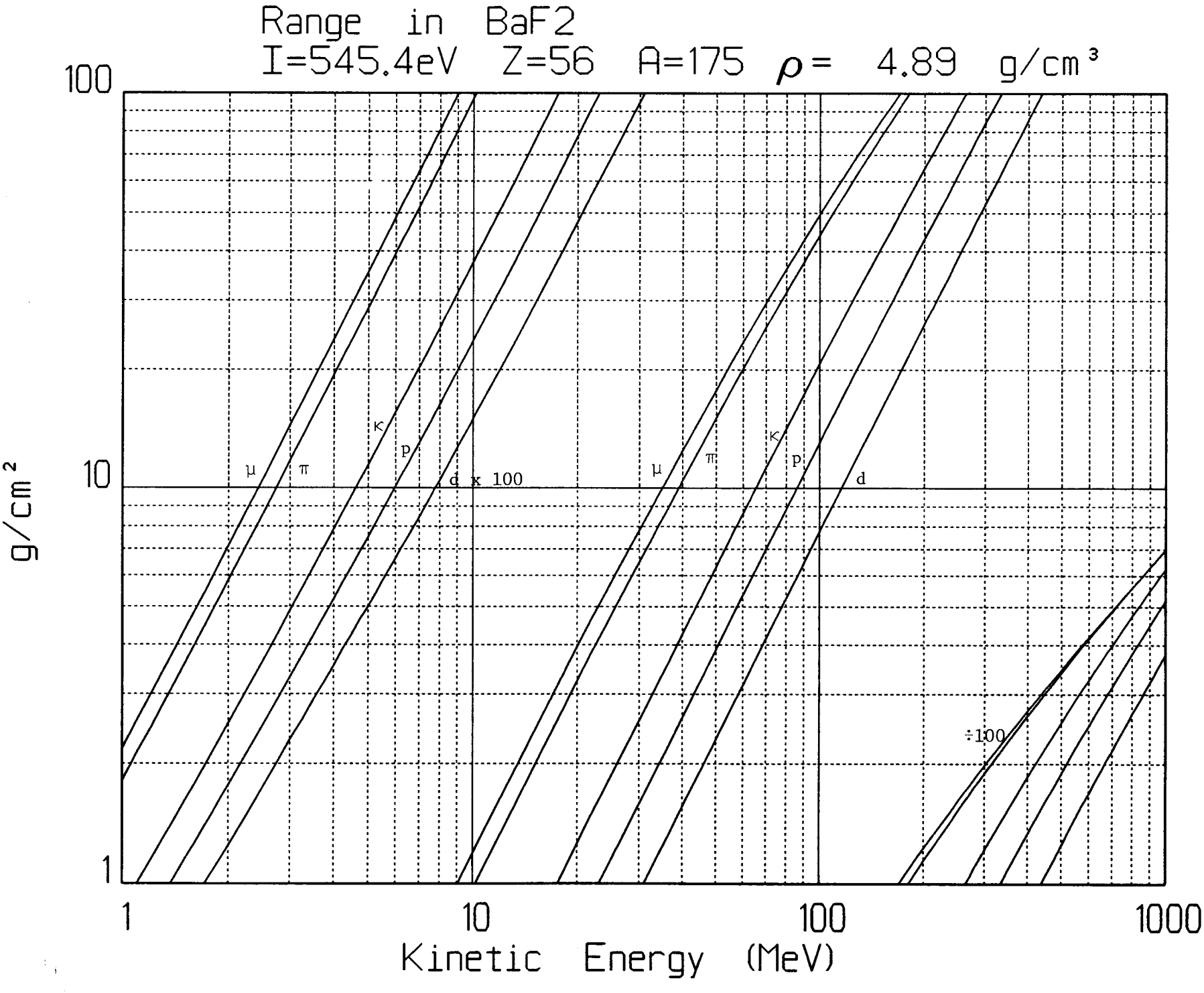

Stopping power in Uranium (U)
I=879.5eV Z=92 A=238 ρ=18.95 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
1
10
100
1000
Kinetic Energy (MeV)

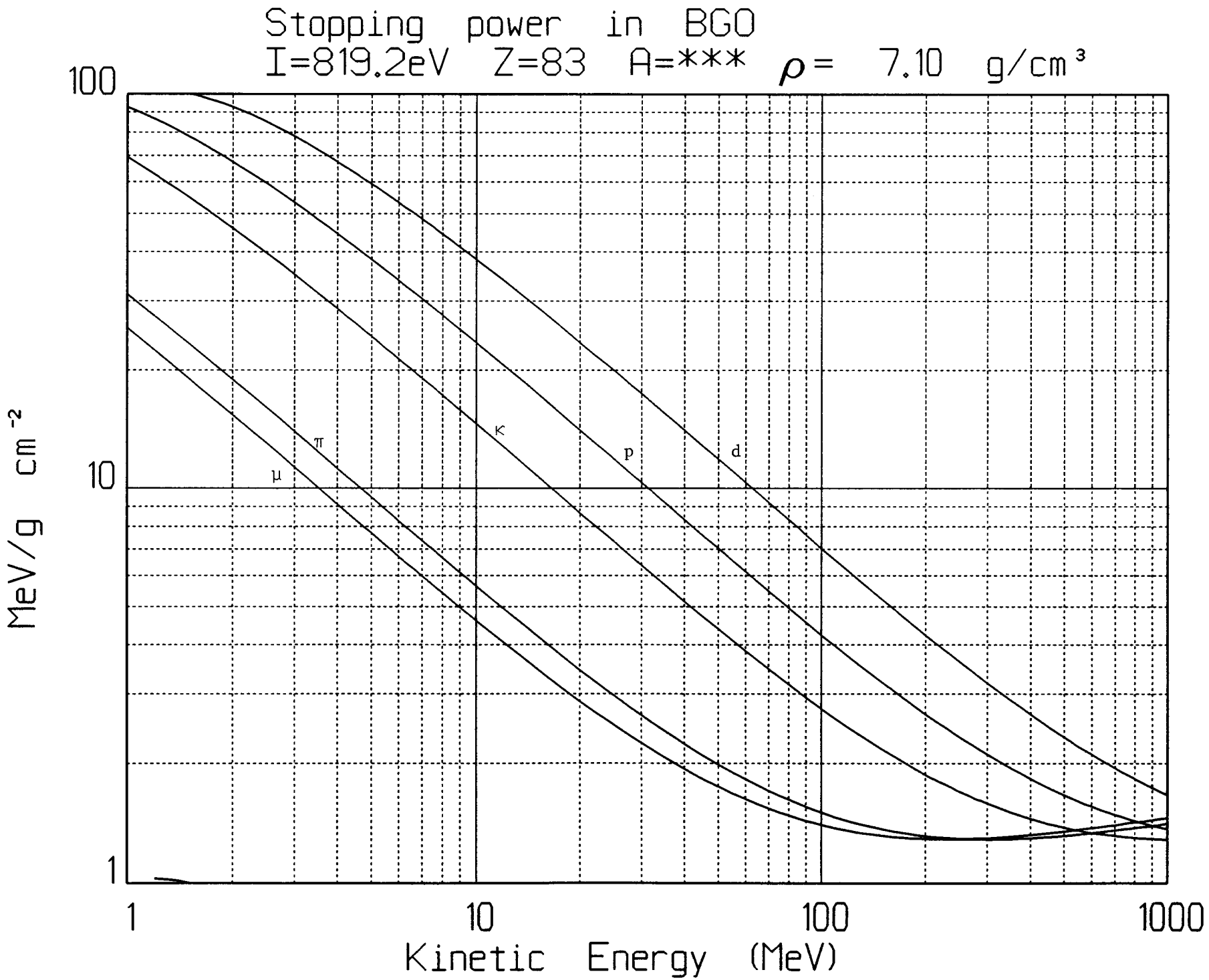

Range in Uranium (U)
I=879.5eV Z=92 A=238 ρ=18.95 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

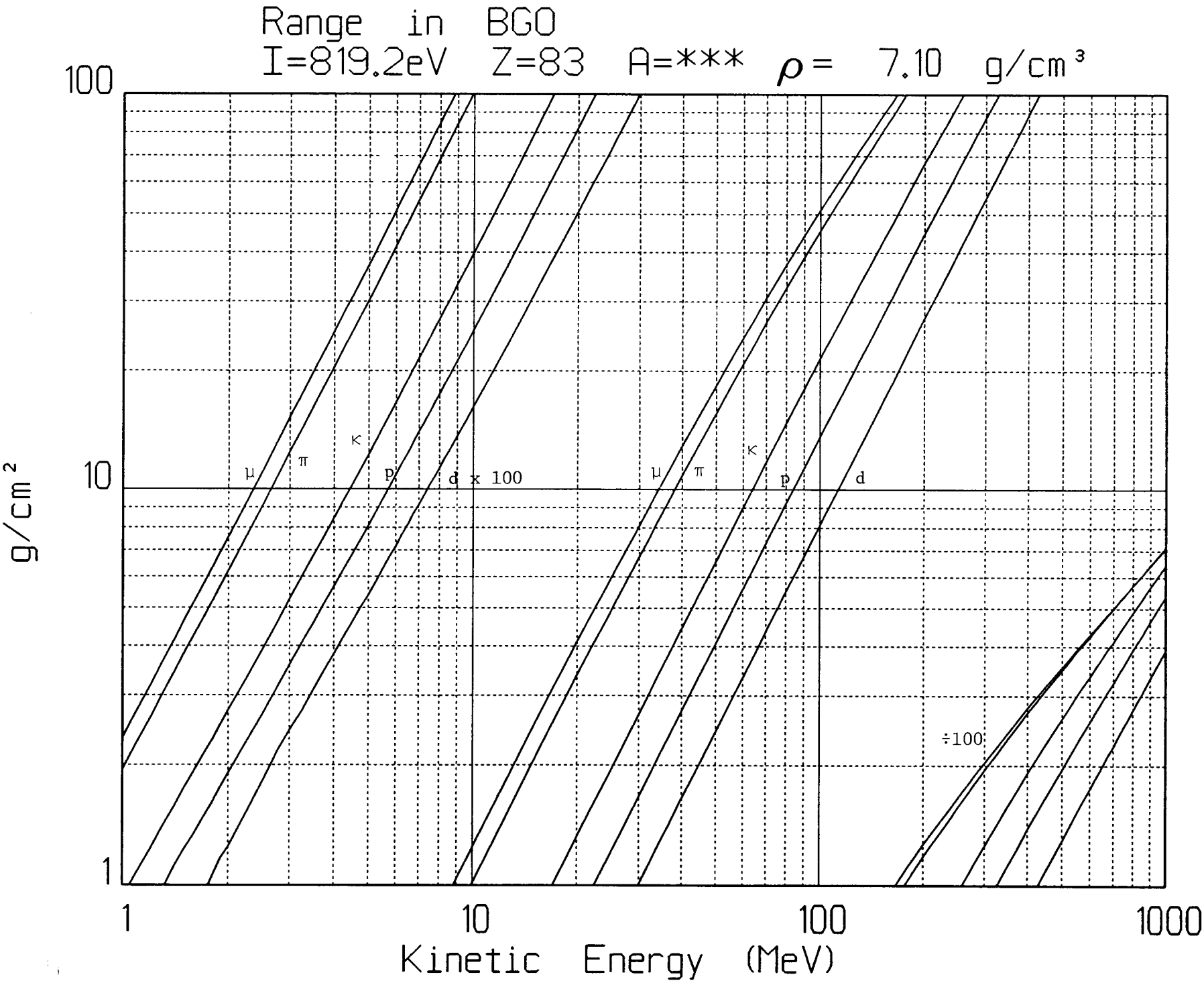

Stopping power in Air
I= 86.1eV Z= 7 A= 14 ρ = 1.290 mg/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

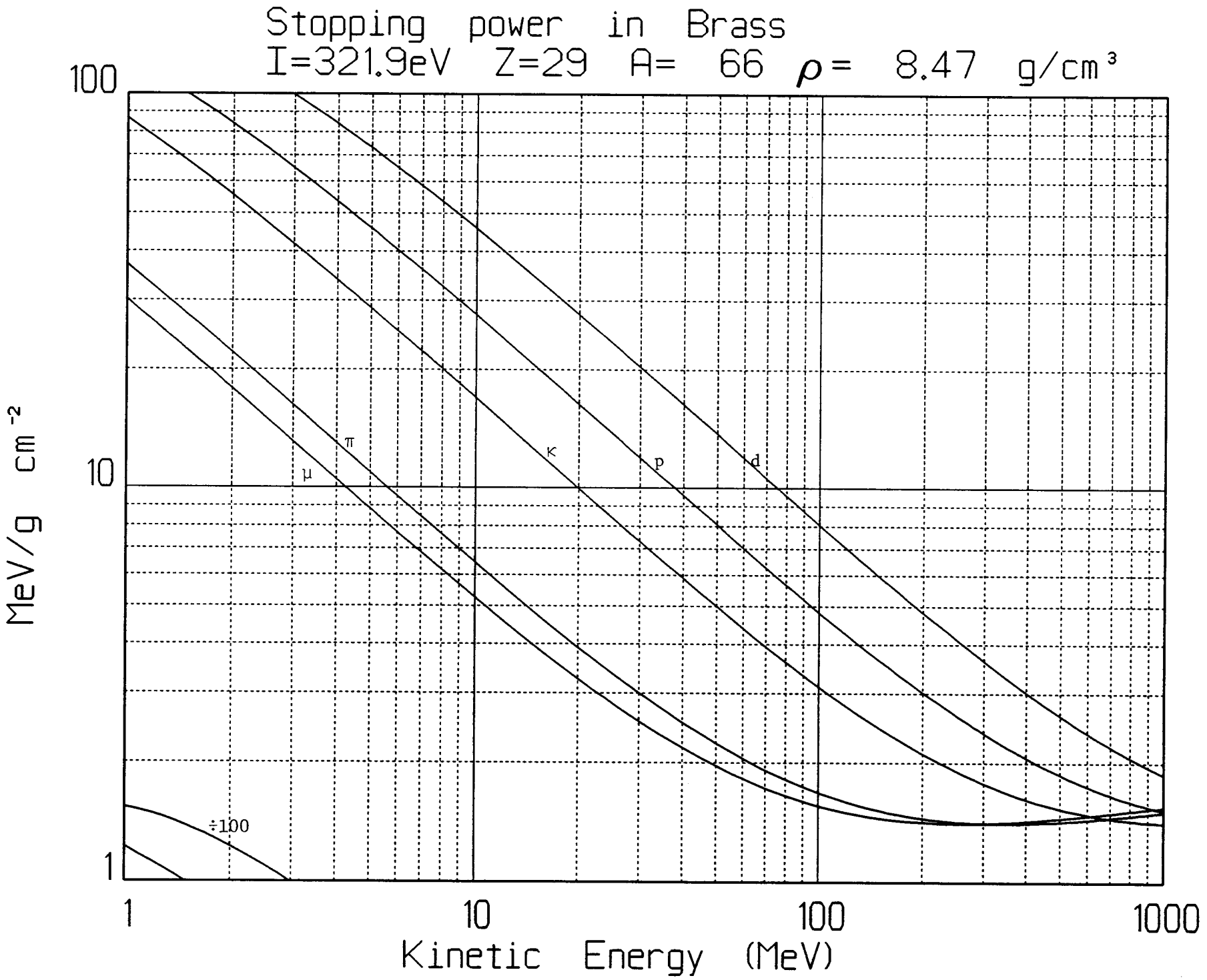

Range in Air
I= 86.1eV Z= 7 A= 14 ρ = 1.290 mg/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

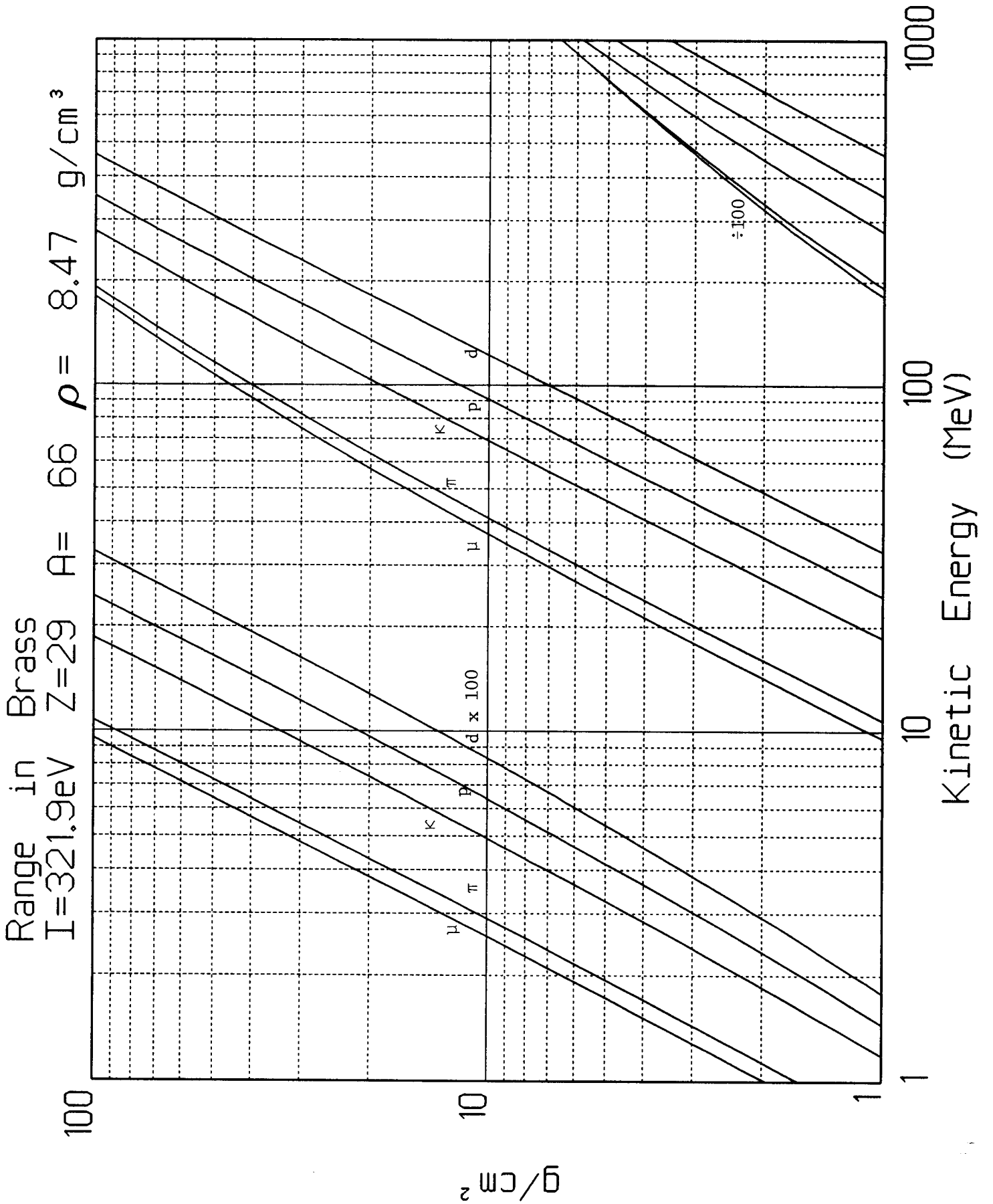

Stopping power in BaF2
I=545.4eV Z=56 A=175 ρ = 4.89 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

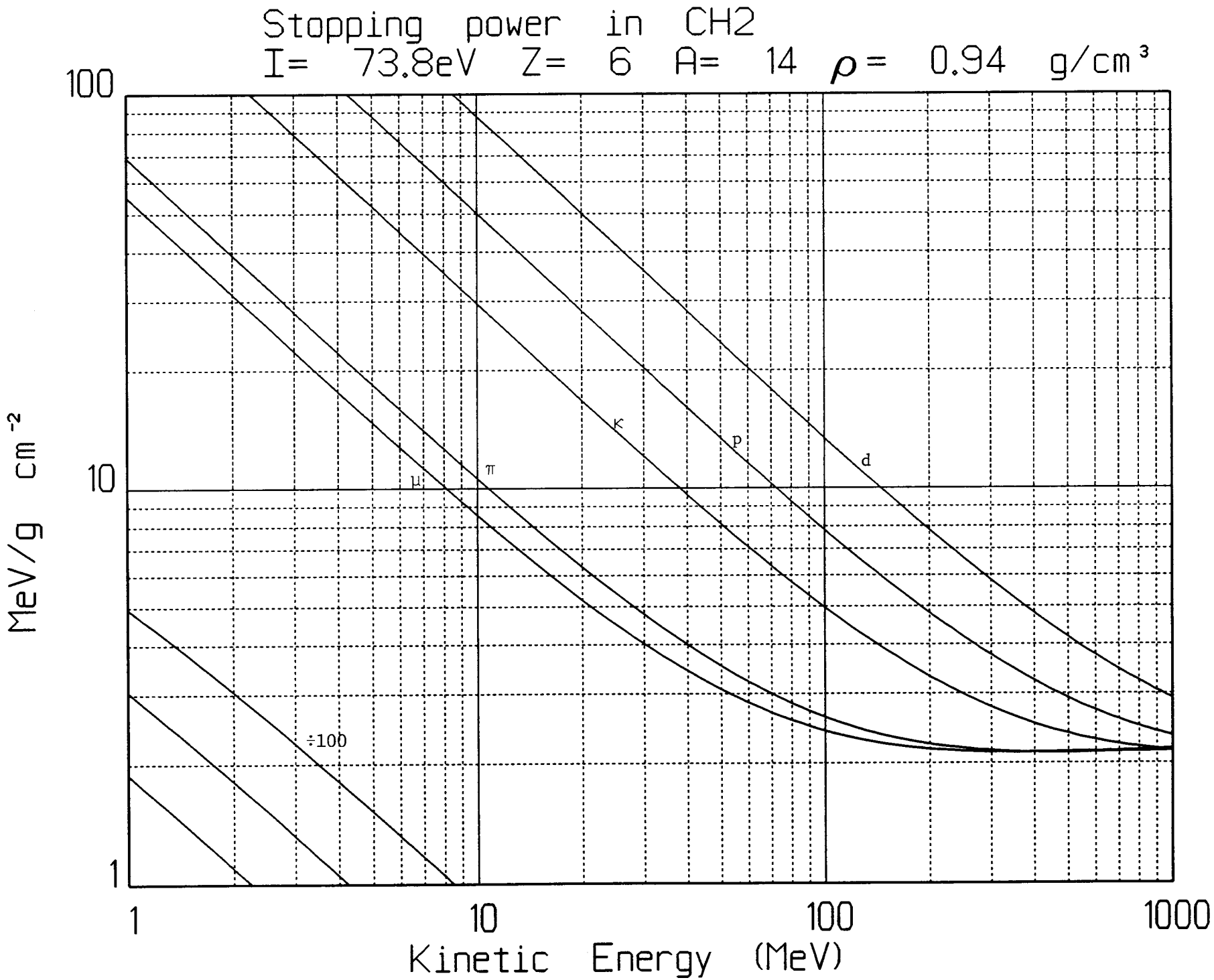

Range in BaF2
I=545.4eV Z=56 A=175 ρ = 4.89 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

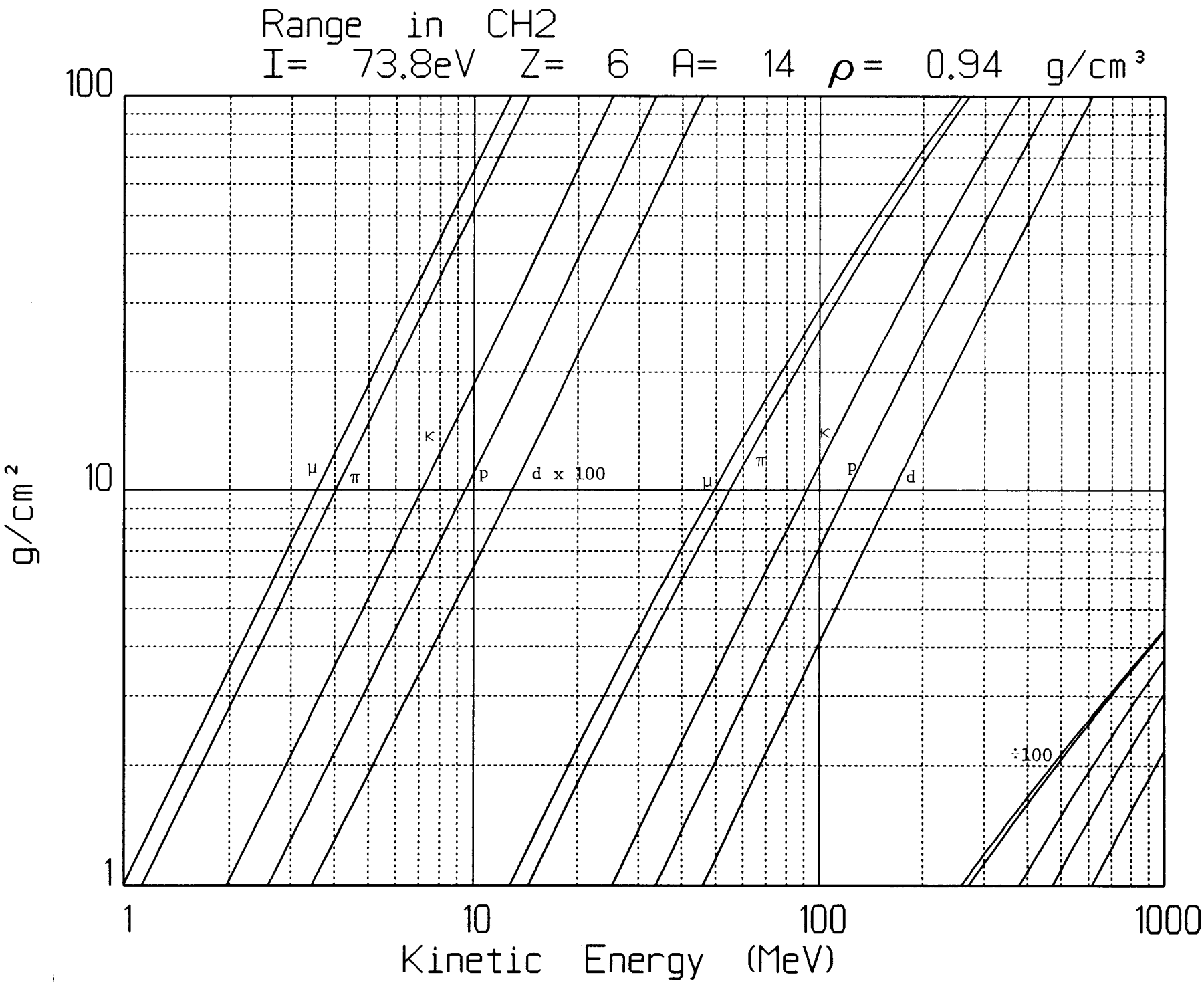

Stopping power in BGO
I=819.2eV Z=83 A=*** ρ = 7.10 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
1
10
100
1000
Kinetic Energy (MeV)

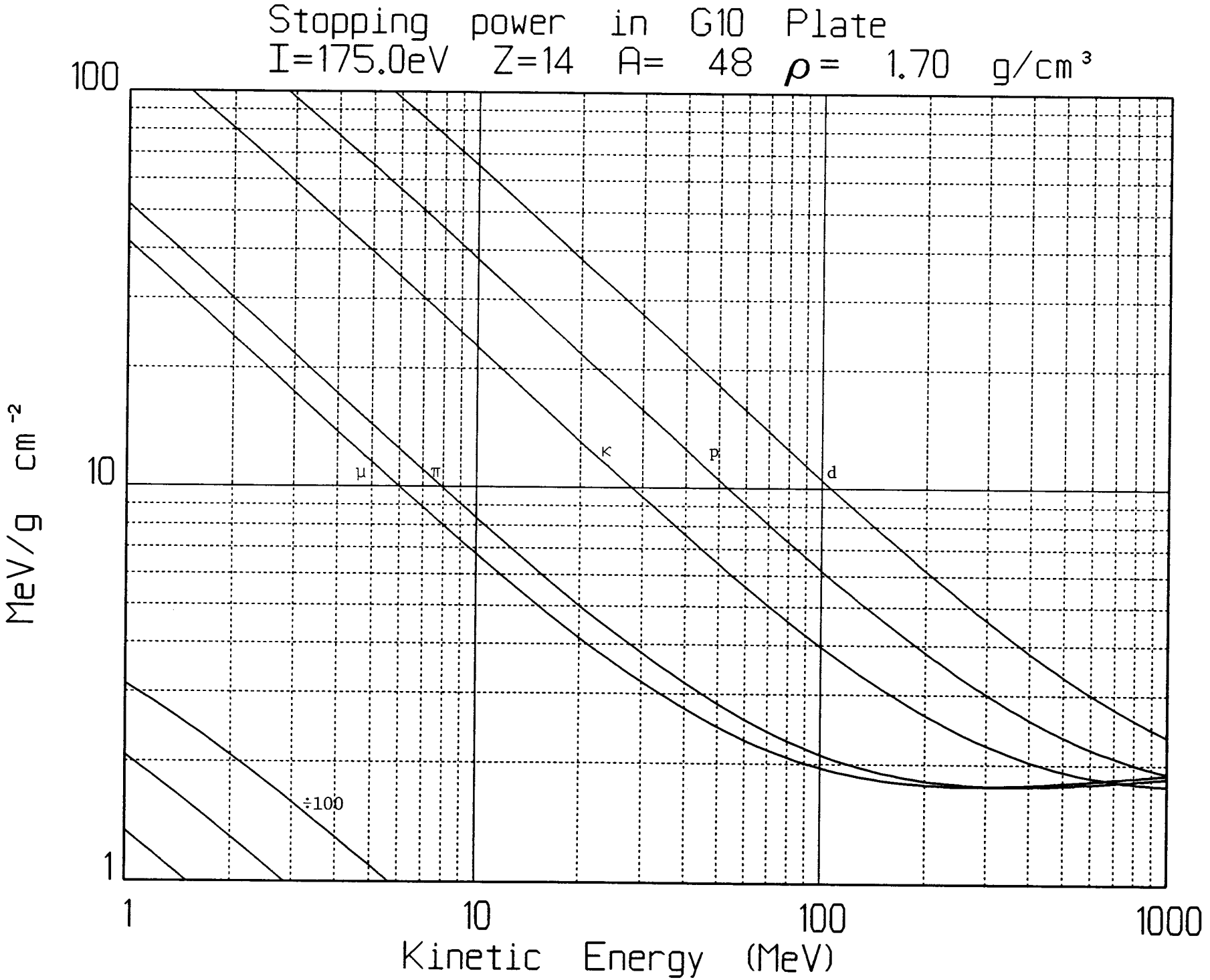

Range in BGO
I=819.2eV Z=83 A=*** ρ = 7.10 g/cm³
100
10
1
g/cm²
μ
π
κ
p
d x 100
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

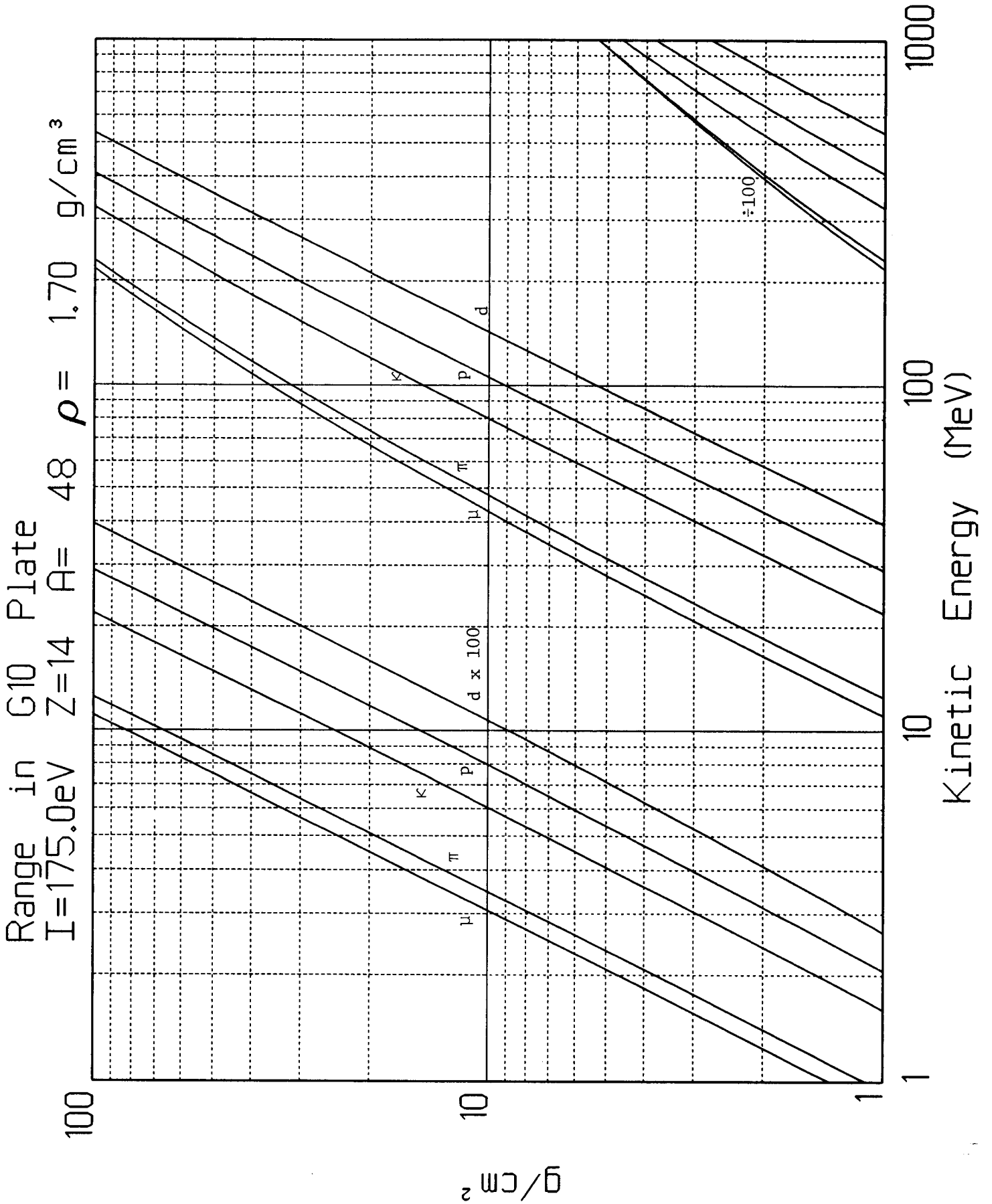

Stopping power in Brass
I=321.9eV Z=29 A= 66 ρ = 8.47 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

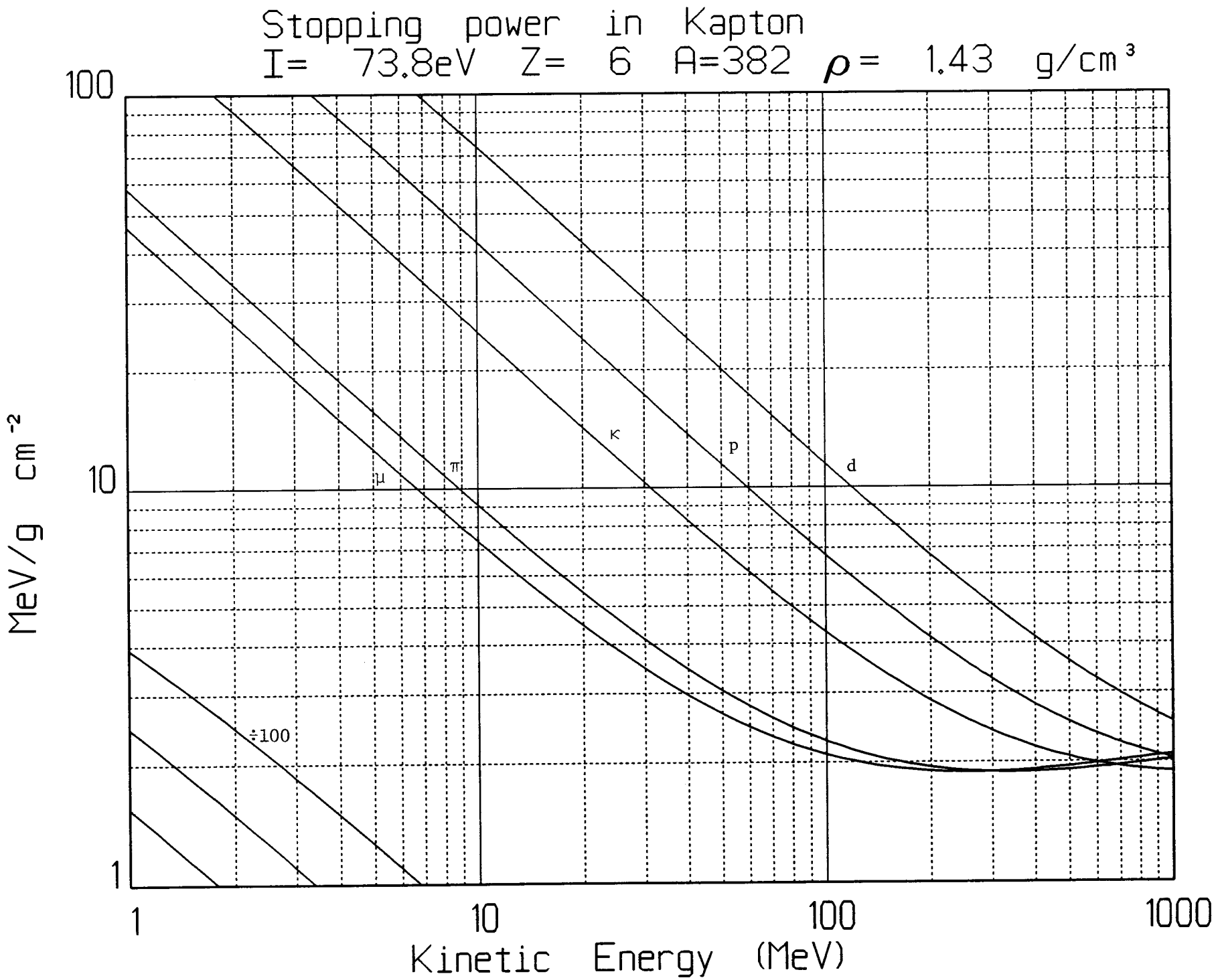

Range in Brass
I=321.9eV Z=29 A= 66 ρ= 8.47 g/cm³
g/cm²
100
10
1
1
10
100
1000
Kinetic Energy (MeV)
÷100
d
p
K
π
μ
d x 100
p
K
π
μ

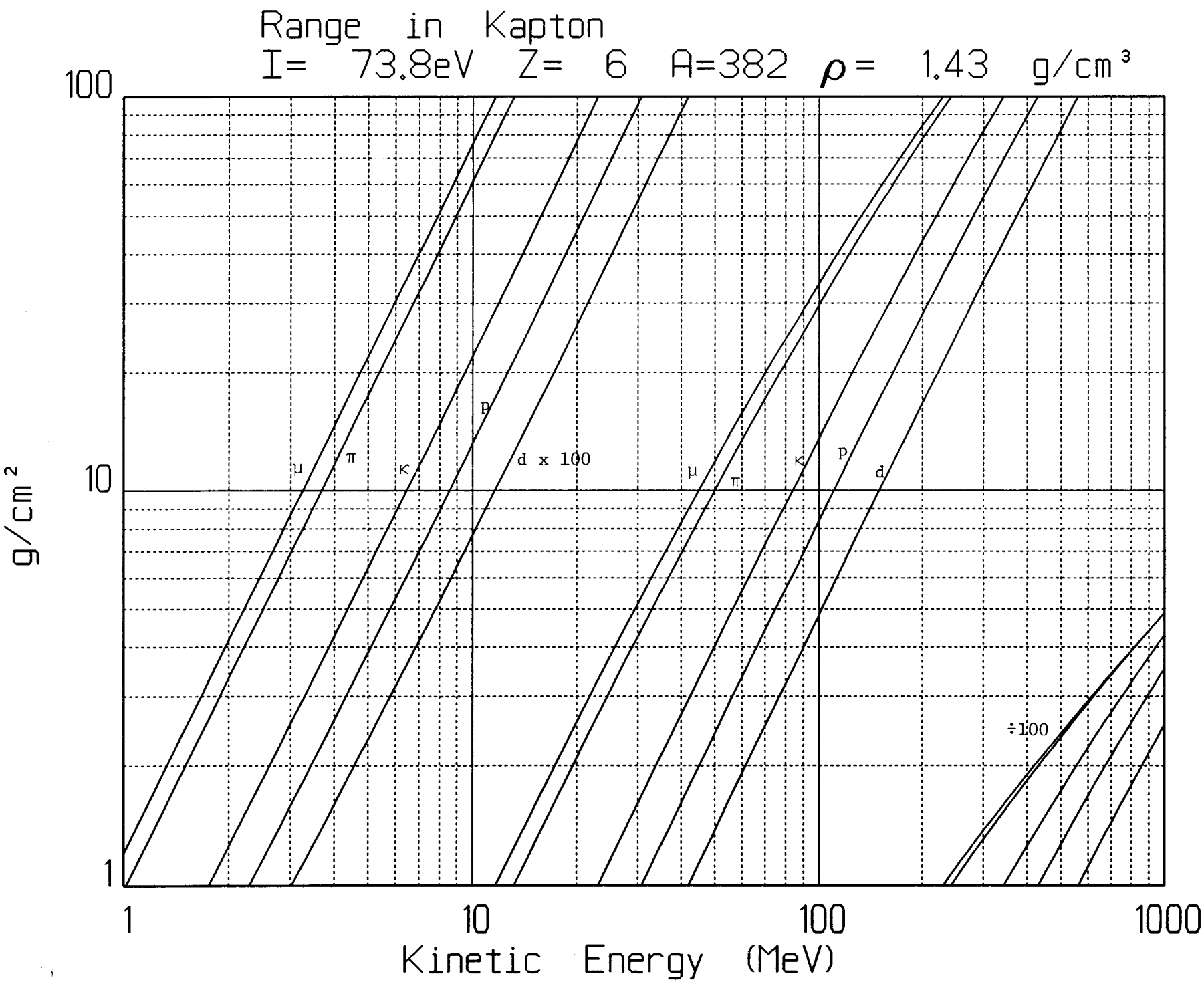

Stopping power in CH2
I= 73.8eV Z= 6 A= 14 ρ = 0.94 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

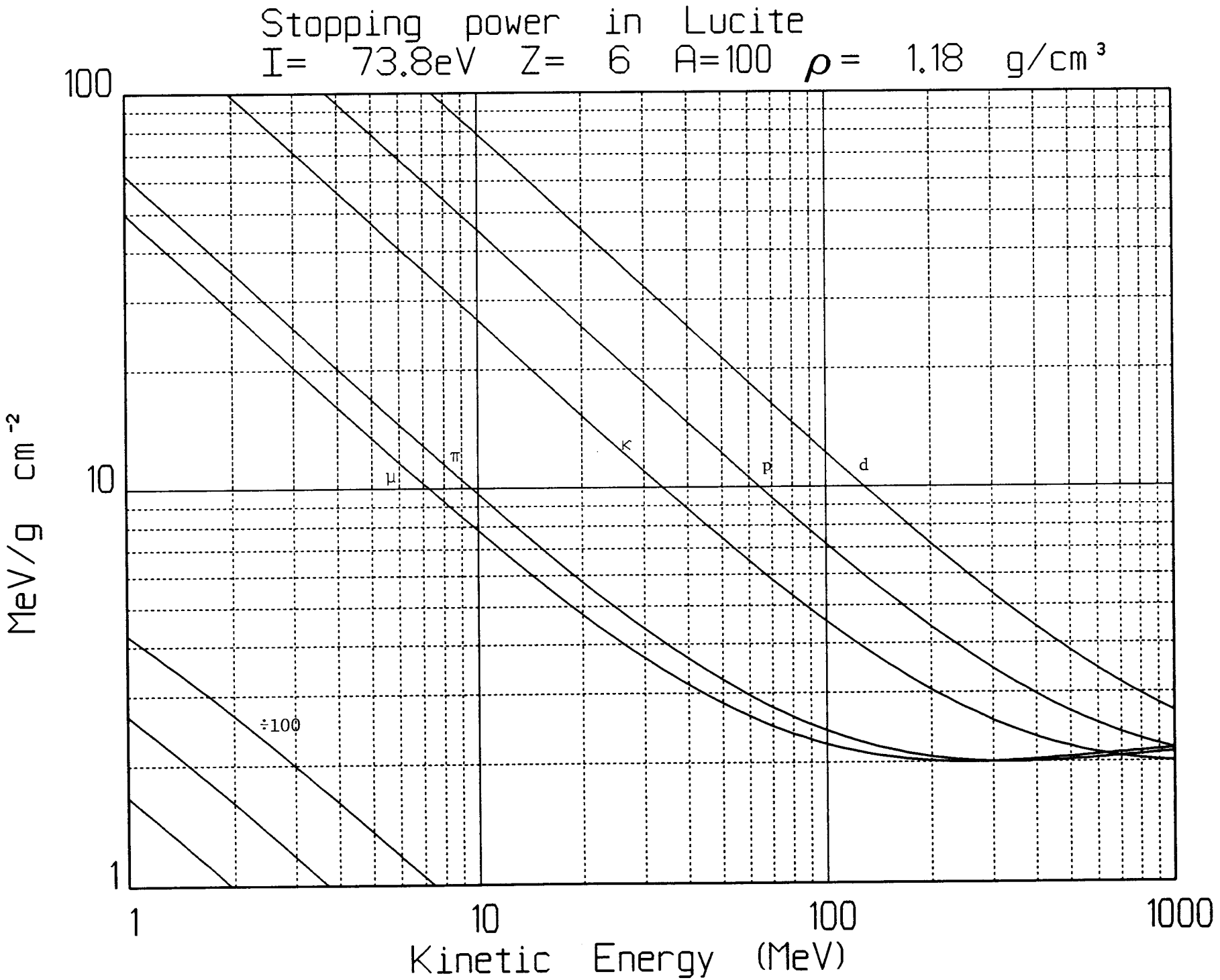

Range in CH2
I= 73.8eV Z= 6 A= 14 ρ= 0.94 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
:100
1
10
100
1000
Kinetic Energy (MeV)

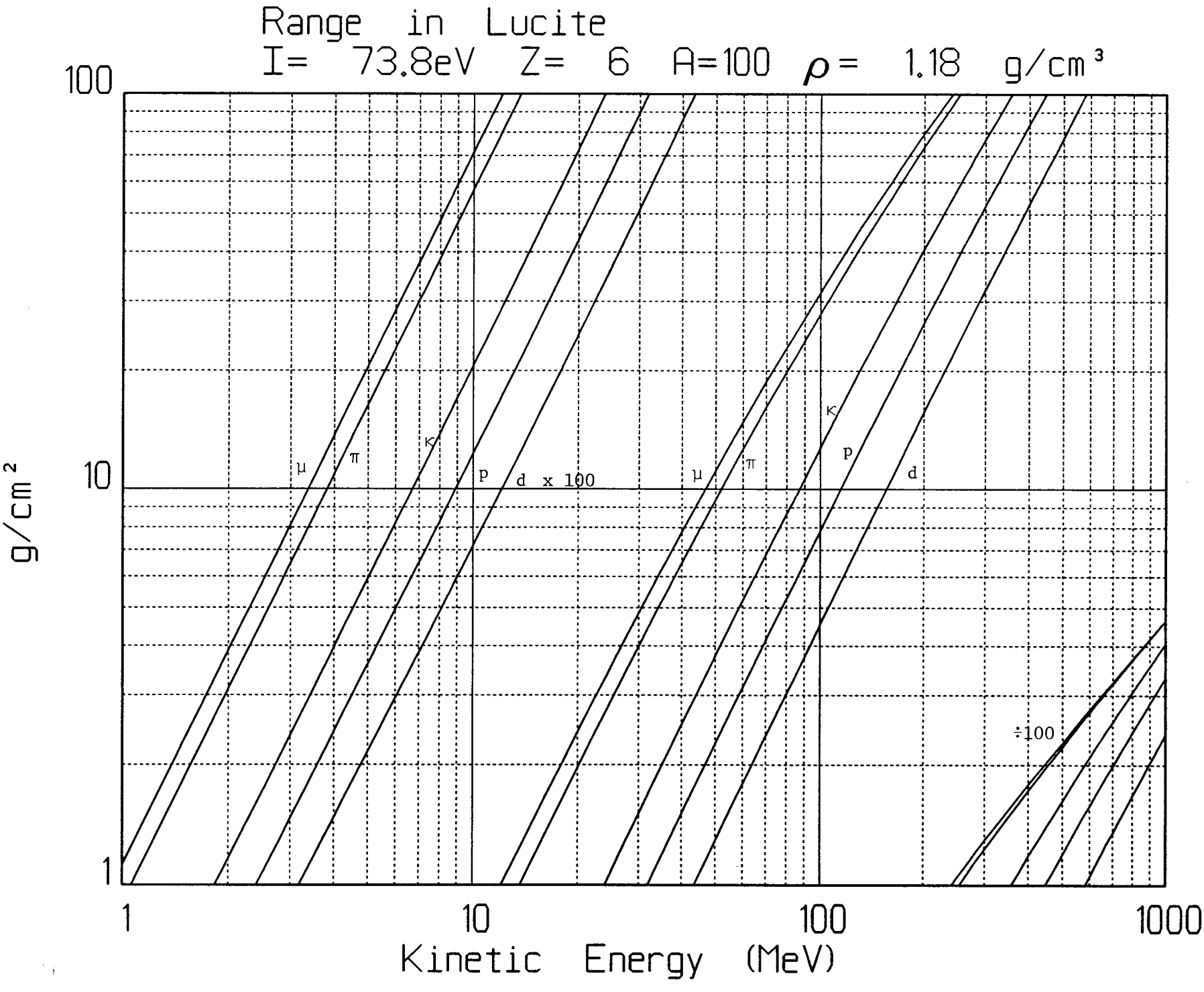

Stopping power in G10 Plate
I=175.0eV Z=14 A= 48 ρ = 1.70 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

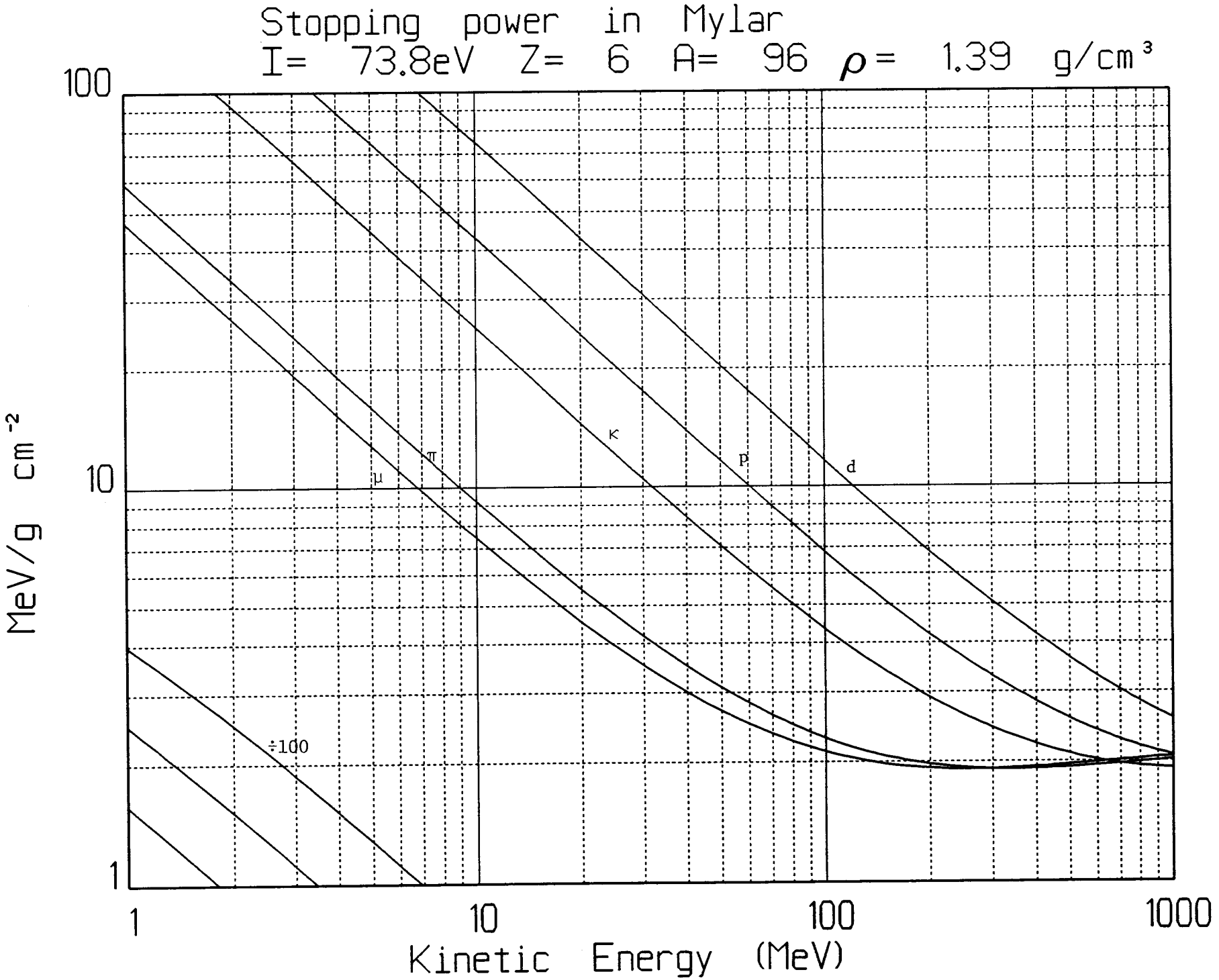

Range in G10 Plate
I=175.0eV Z=14 A= 48 ρ= 1.70 g/cm³
g/cm²
100
10
1
1
10
100
1000
Kinetic Energy (MeV)
μ
π
K
p
d
d x 100
÷100

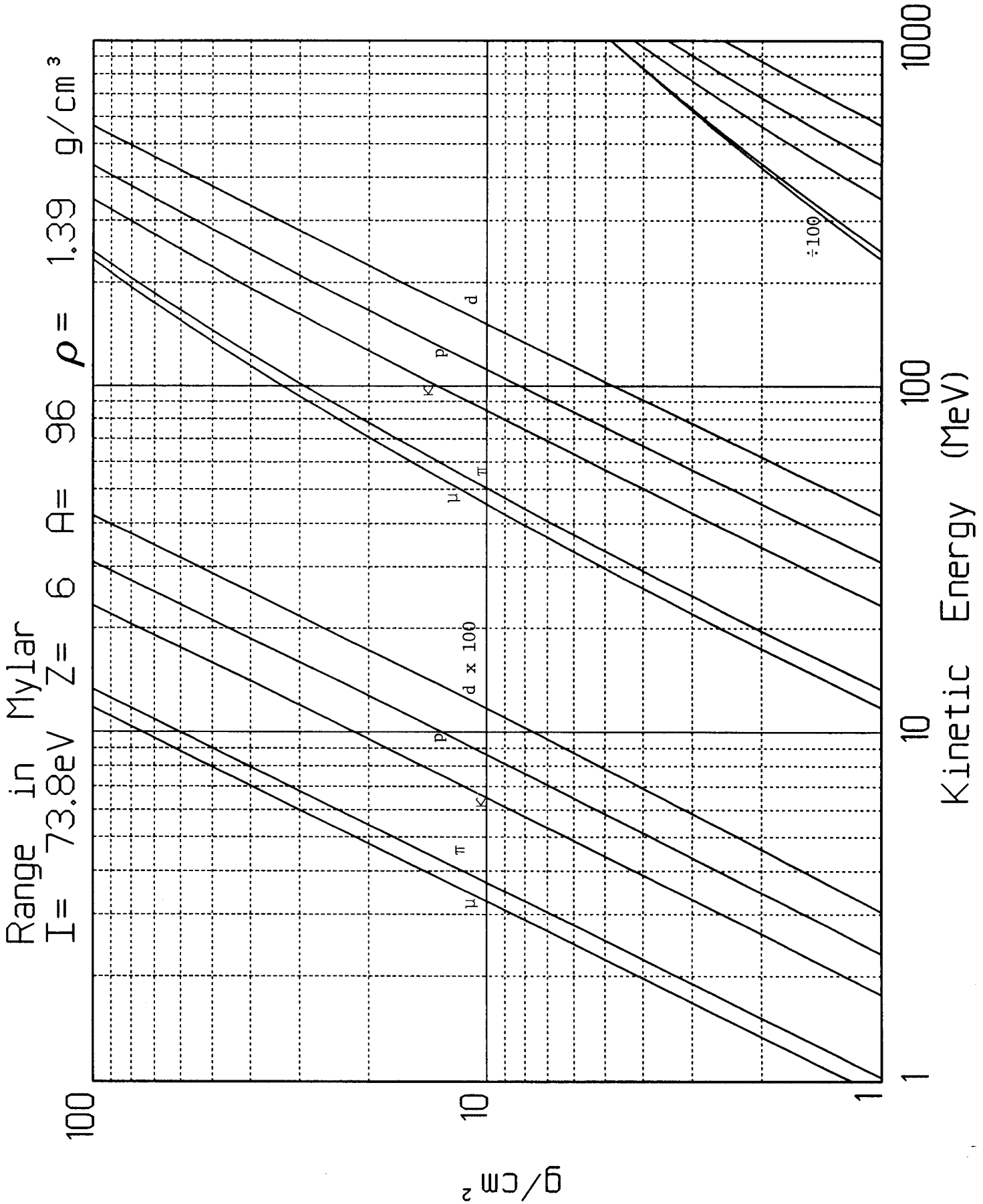

Stopping power in Kapton
I= 73.8eV Z= 6 A=382 ρ = 1.43 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

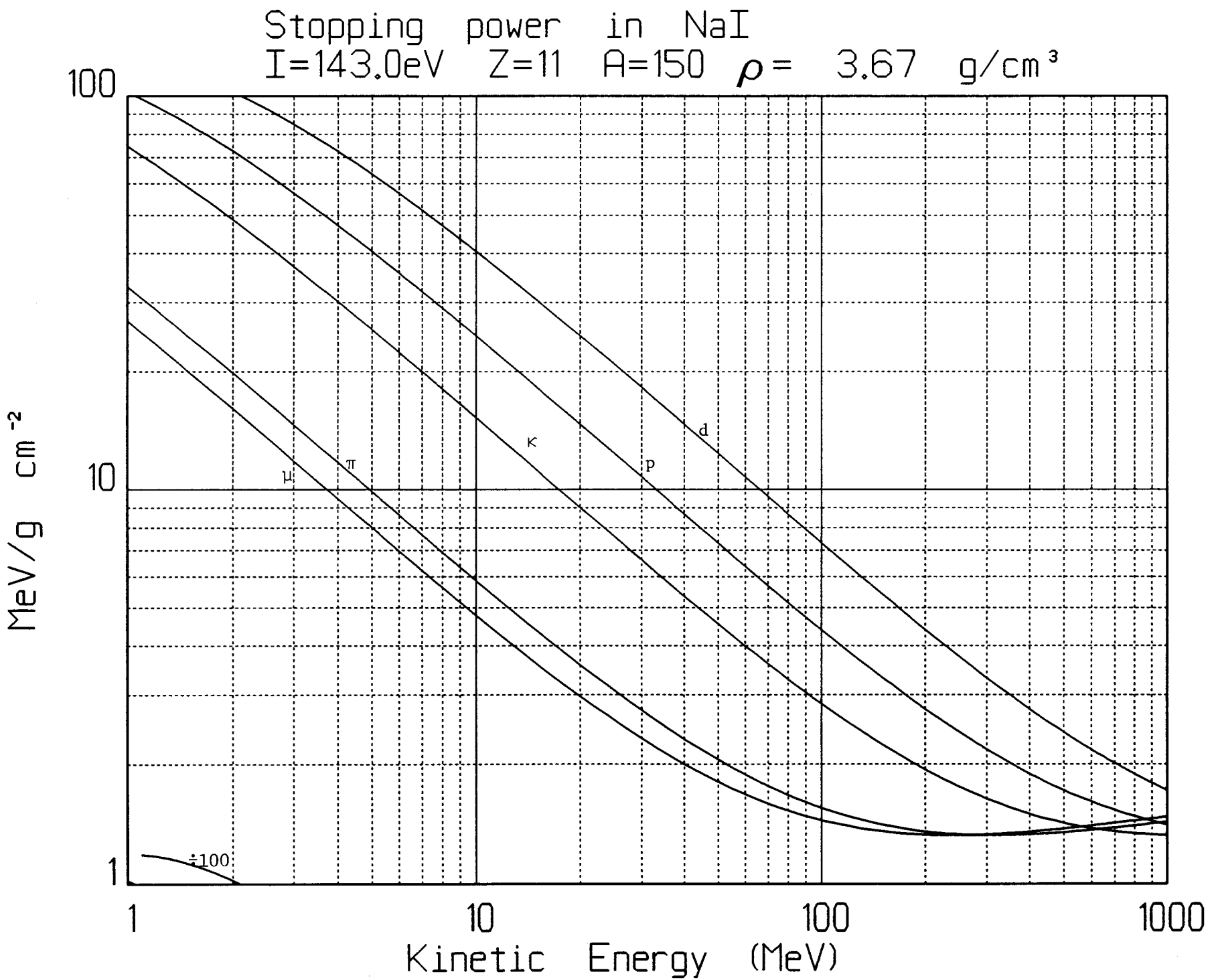

Range in Kapton
I= 73.8eV Z= 6 A=382 ρ = 1.43 g/cm³
100
10
1
g/cm²
μ
π
κ
p
d x 100
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

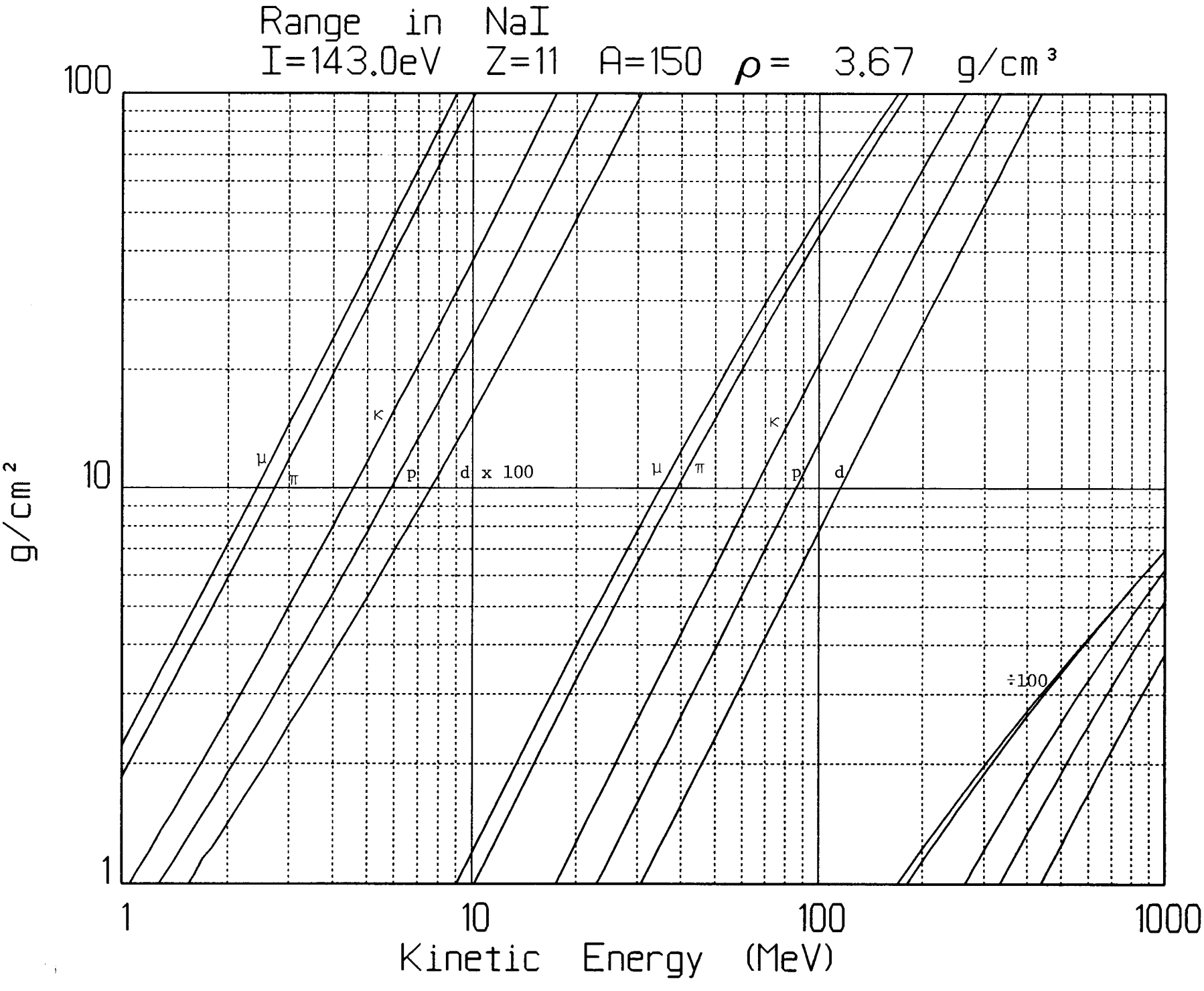

Stopping power in Lucite
I= 73.8eV Z= 6 A=100 ρ = 1.18 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

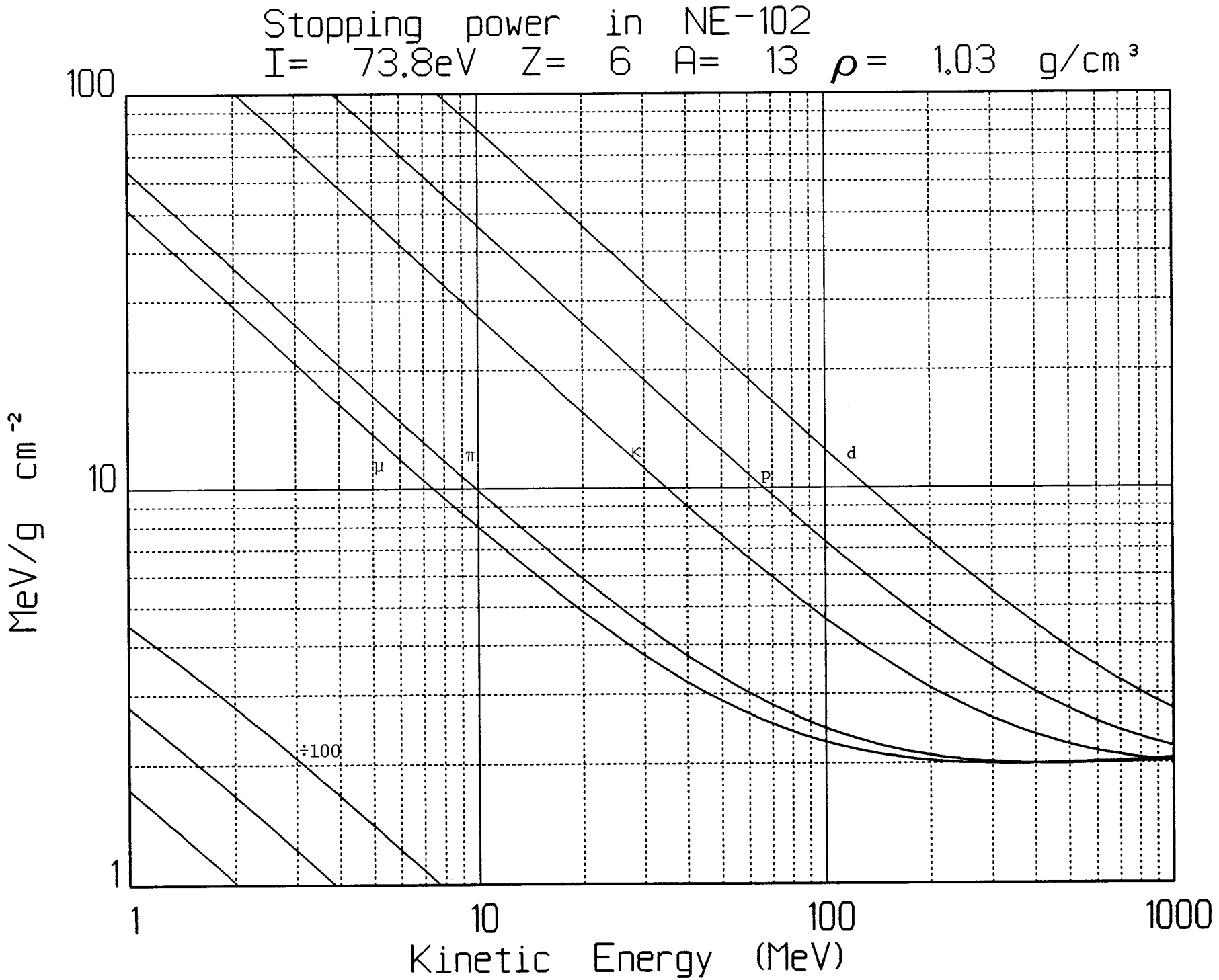

Range in Lucite
I= 73.8eV Z= 6 A=100 ρ = 1.18 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

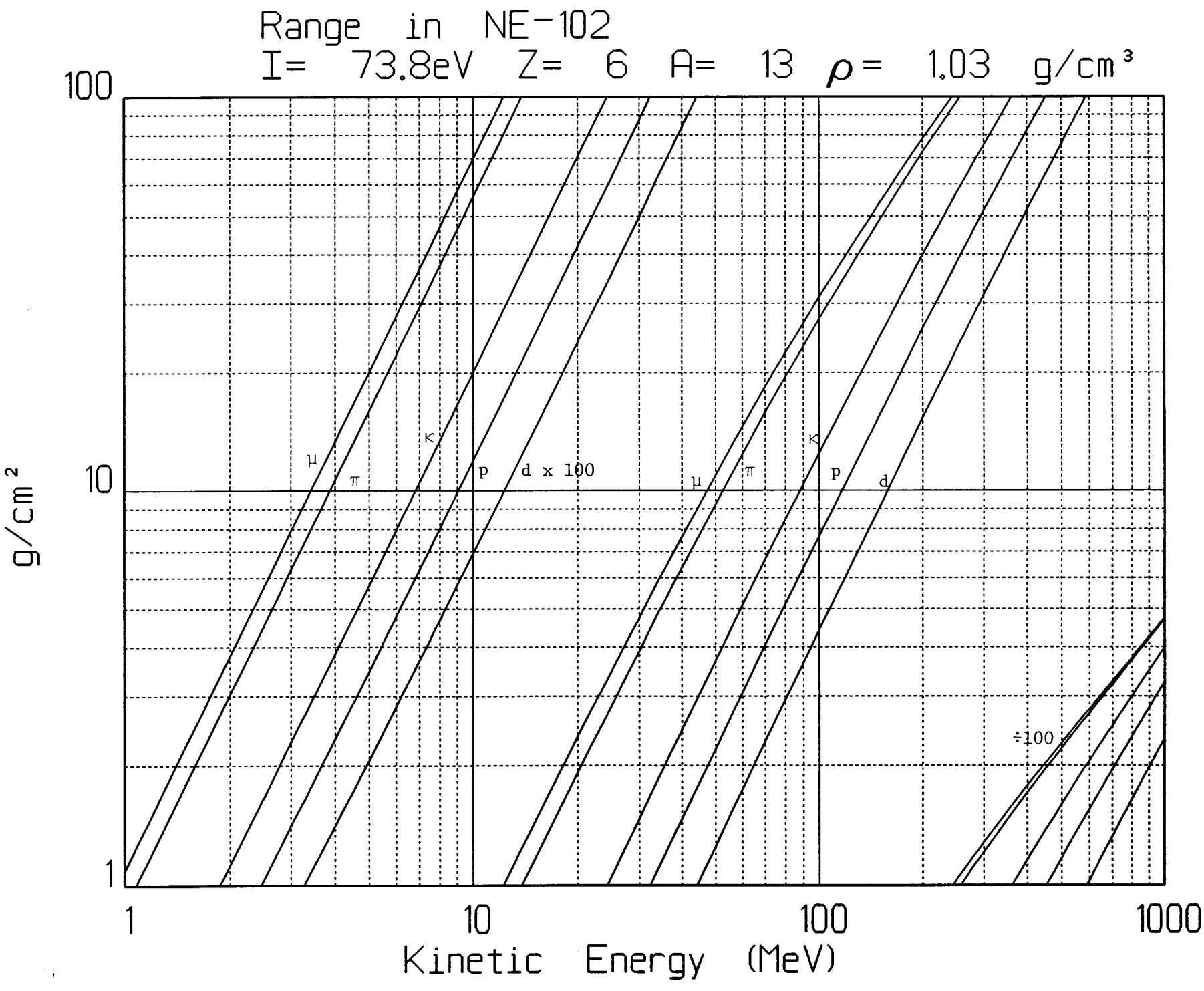

Stopping power in Mylar
I= 73.8eV Z= 6 A= 96 ρ = 1.39 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

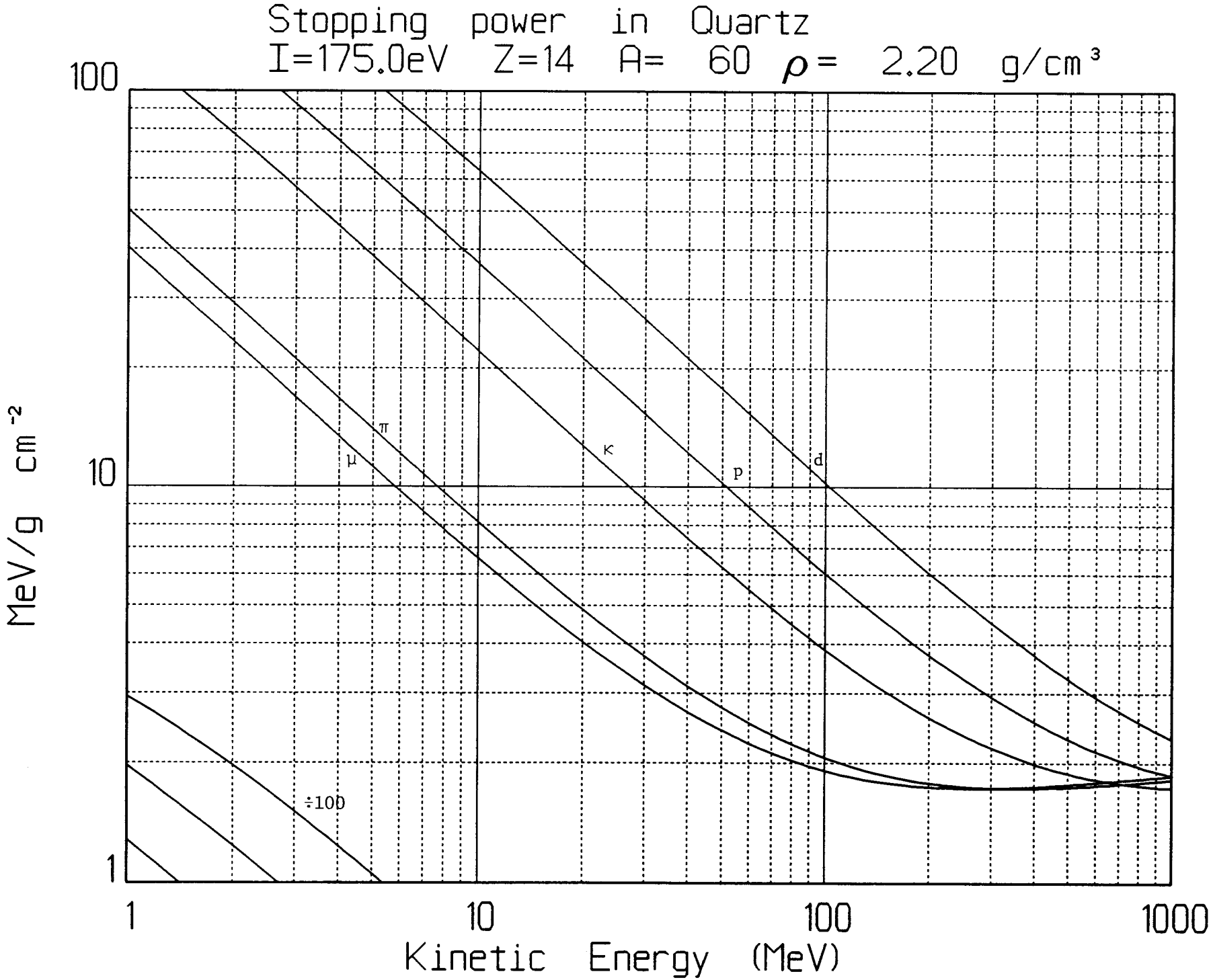

Range in Mylar
I= 73.8eV Z= 6 A= 96 ρ= 1.39 g/cm³
g/cm²
100
10
1
1
10
100
1000
Kinetic Energy (MeV)
μ
π
K
p
d
d x 100
÷100

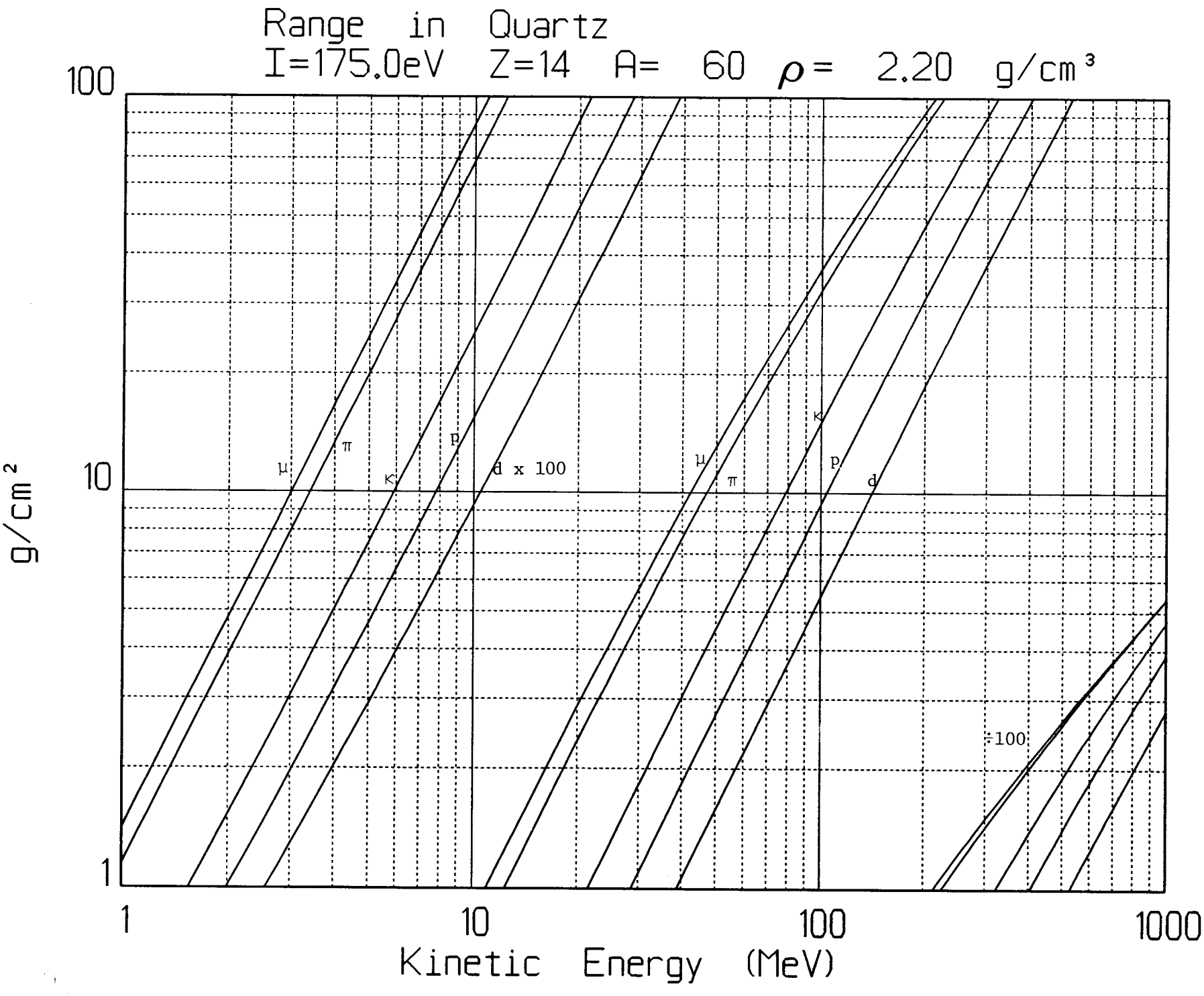

Stopping power in NaI
I=143.0eV Z=11 A=150 ρ = 3.67 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
κ
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

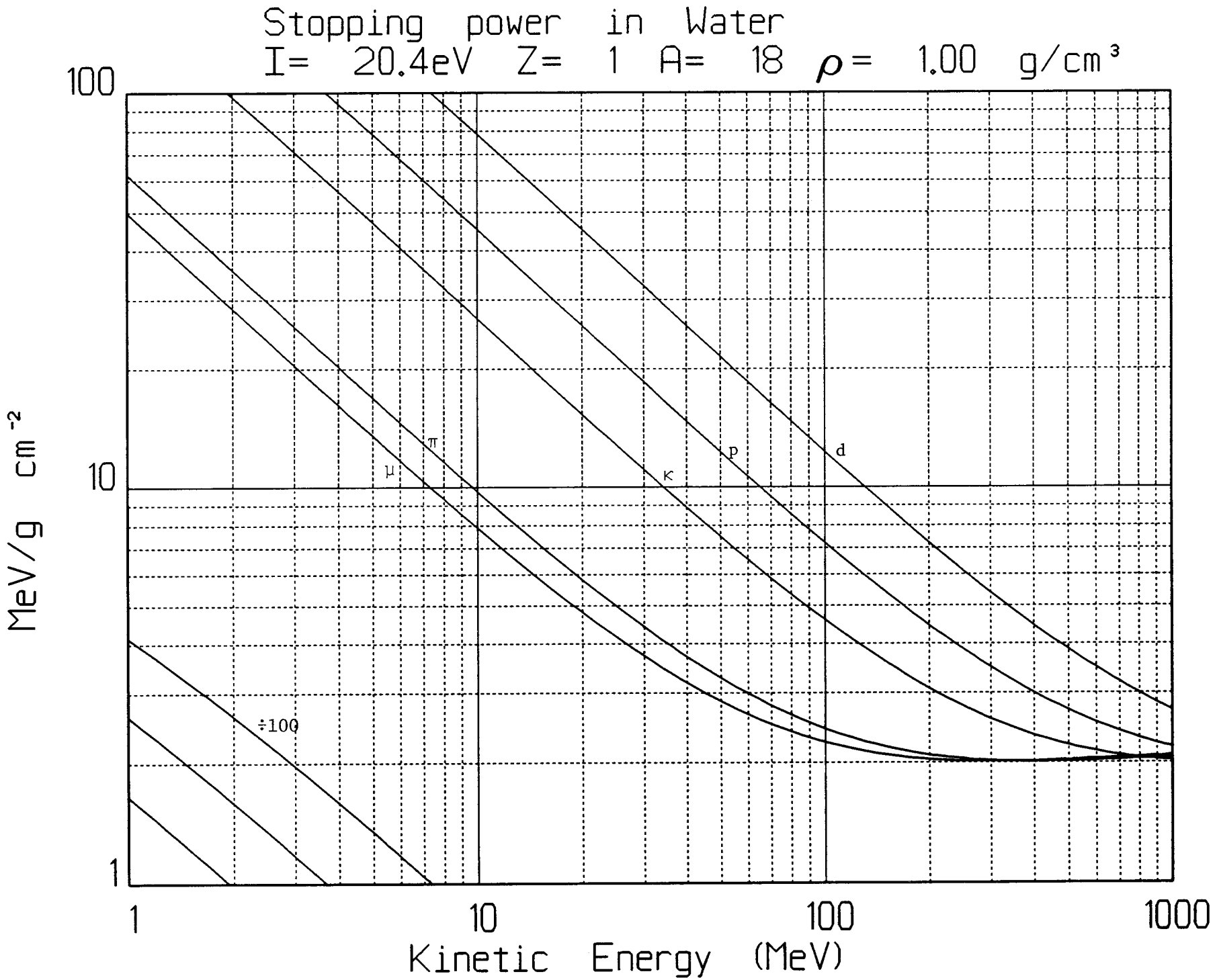

Range in NaI
I=143.0eV Z=11 A=150 ρ = 3.67 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

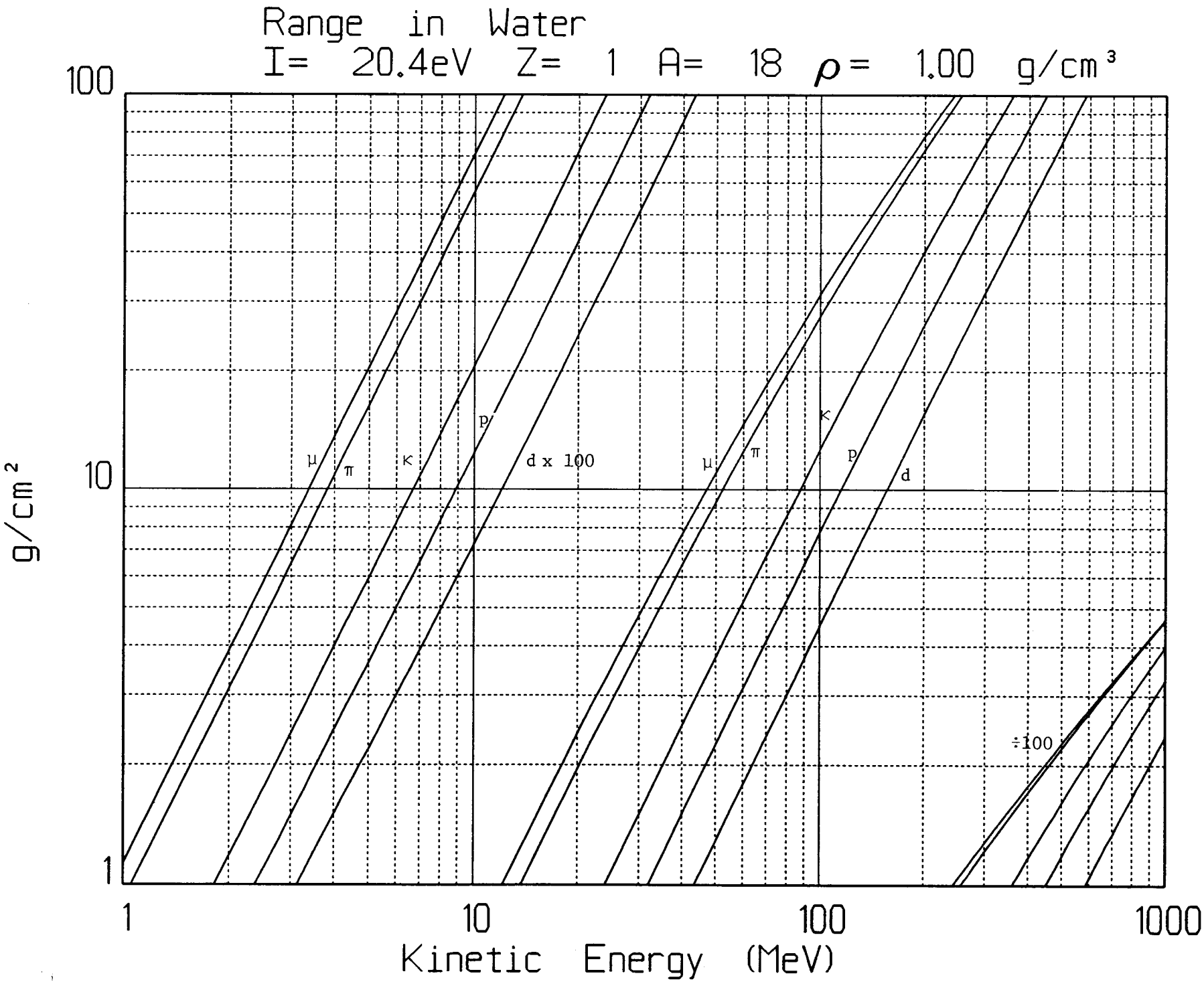

Stopping power in NE-102
I= 73.8eV Z= 6 A= 13 ρ = 1.03 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)


Range in NE-102
I= 73.8eV Z= 6 A= 13 ρ = 1.03 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)


Stopping power in Quartz
I=175.0eV Z=14 A= 60 ρ = 2.20 g/cm³
MeV/g cm⁻²
Kinetic Energy (MeV)
100
10
1
1
10
100
1000
μ
π
K
p
d
÷100

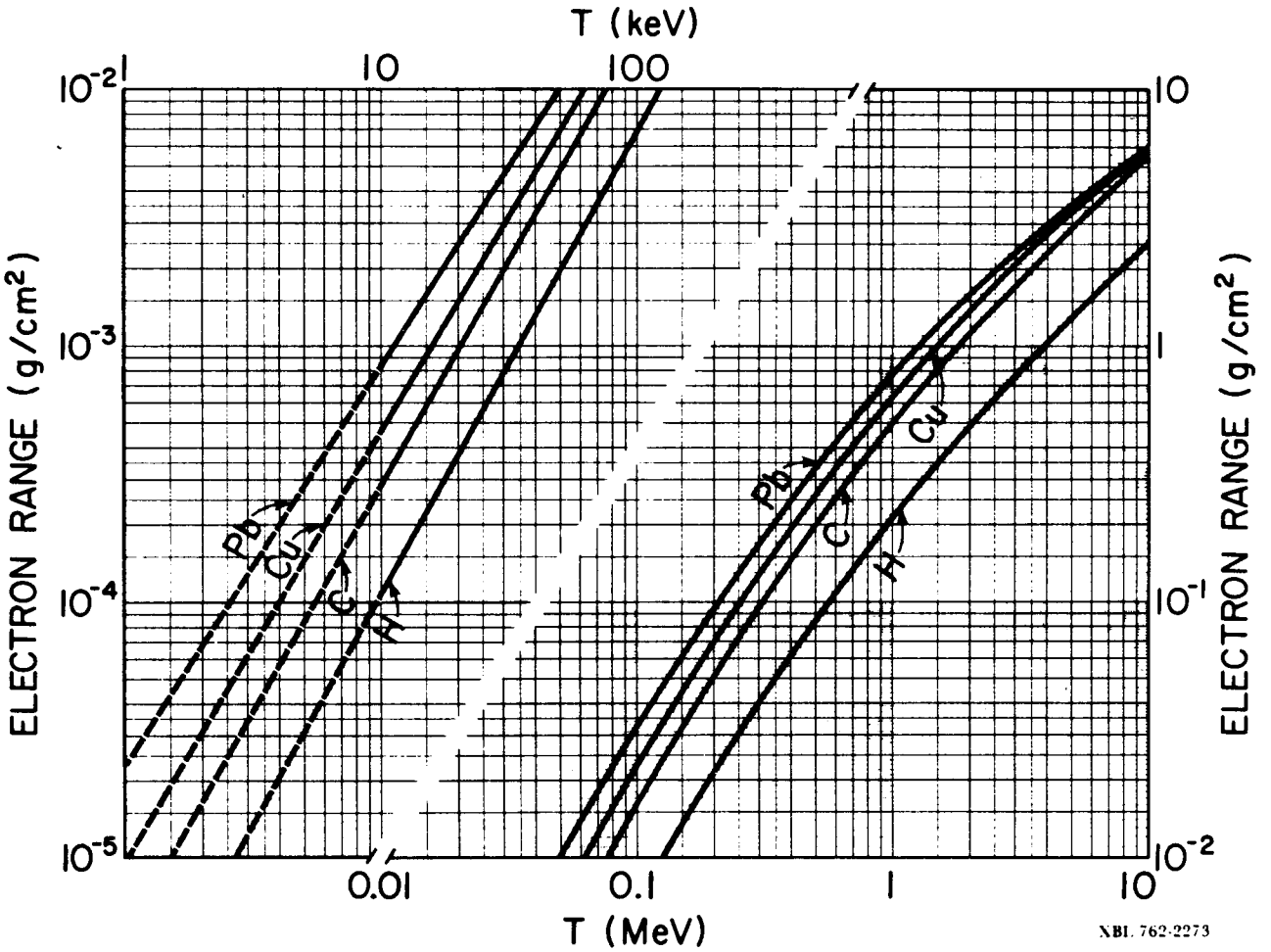

Range in Quartz
I=175.0eV Z=14 A= 60 ρ = 2.20 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)


Stopping power in Water
I= 20.4eV Z= 1 A= 18 ρ = 1.00 g/cm³
100
10
1
MeV/g cm⁻²
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

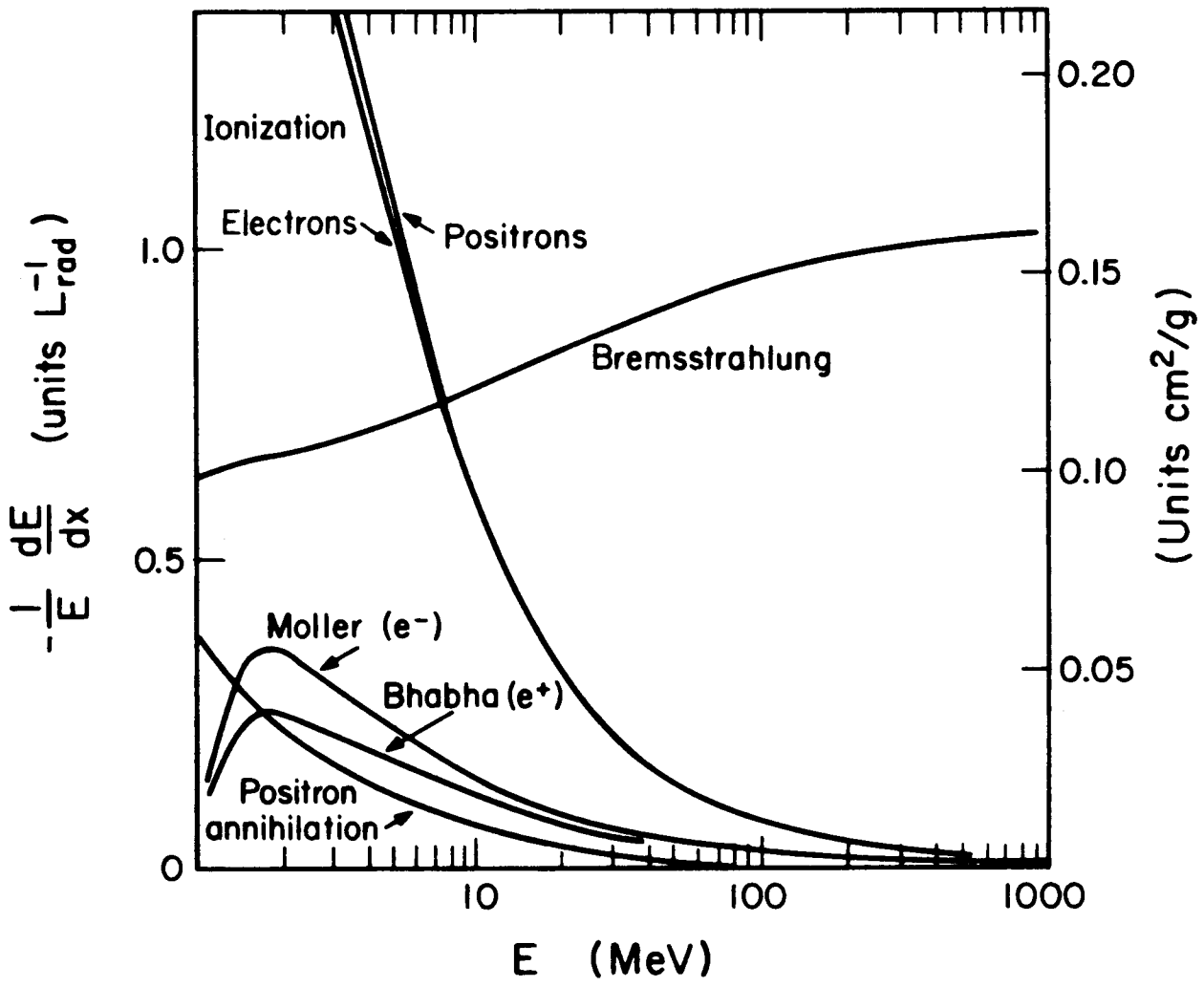

Range in Water
I= 20.4eV Z= 1 A= 18 ρ = 1.00 g/cm³
100
10
1
g/cm²
μ
π
K
p
d x 100
μ
π
K
p
d
÷100
1
10
100
1000
Kinetic Energy (MeV)

Energy Losses and Ranges of Electrons and Positrons

The energy losses and ranges included in this section are extracted from the tabulation be M.J. Berger and Stephen M. Seltzer, **Studies in Penetration of Charged Particles in Matter.**, Nuclear Science Series Report Number 39, Committee on Nuclear Science, 1964, pages 205-268.



Electron range curves in representative materials.



Fractional energy loss per radiation length in lead as a function of electron or positron energy.Scattering is considered as ionization when the energy loss per collision is below 0.255 MeV, and as Moller (Bhabha) scattering when it is above. Figure taken from the Review of Particle Properties.

Comparison of Positron and Electron Energy-loss and Range for Representative Substances

Energy (Mev)	H_2 $\left(\frac{dE}{dx}\right)^+_{col} / \left(\frac{dE}{dx}\right)^-_{col}$	H_2 $\left(\frac{dE}{dx}\right)^+_{tot} / \left(\frac{dE}{dx}\right)^-_{tot}$	H_2 $\frac{r^+}{r^-}$	C $\left(\frac{dE}{dx}\right)^+_{tot} / \left(\frac{dE}{dx}\right)^-_{col}$	C $\left(\frac{dE}{dx}\right)^+_{tot} / \left(\frac{dE}{dx}\right)^-_{tot}$	C $\frac{r^+}{r^-}$	Al $\left(\frac{dE}{dx}\right)^+_{col} / \left(\frac{dE}{dx}\right)^-_{col}$	Al $\left(\frac{dE}{dx}\right)^+_{tot} / \left(\frac{dE}{dx}\right)^-_{tot}$	Al $\frac{r^+}{r^-}$
0.01	1.08			1.10			1.12		
0.02	1.07			1.08			1.10		
0.05	1.05			1.06			1.07		
0.1	1.03			1.04			1.04		
0.2	1.01			1.02			1.02		
0.5	0.992			0.990			0.989		
1.0	0.982			0.979			0.977		
2.0	0.978			0.974			0.972		
5.0	0.977			0.972			0.971		
10.0	0.978			0.972			0.971		
20.0	0.979	0.980	1.02	0.973	0.977	1.03	0.972	0.980	1.03
50.0	0.981	0.983	1.02	0.974	0.982	1.02	0.973	0.986	1.02
100.0	0.981	0.985	1.02	0.974	0.987	1.02	0.974	0.991	1.02
200.0	0.981	0.988	1.02	0.975	0.992	1.02	0.975	0.995	1.01
500.0	0.982	0.992	1.01	0.976	0.996	1.01	0.975	0.998	1.01
1000.0	0.982	0.995	1.01	0.976	0.998	1.01	0.976	0.999	1.01

Energy (Mev)	Cu $\left(\frac{dE}{dx}\right)^+_{col} / \left(\frac{dE}{dx}\right)^-_{col}$	Cu $\left(\frac{dE}{dx}\right)^+_{tot} / \left(\frac{dE}{dx}\right)^-_{tot}$	Cu $\frac{r^+}{r^-}$	Ag $\left(\frac{dE}{dx}\right)^+_{col} / \left(\frac{dE}{dx}\right)^-_{col}$	Ag $\left(\frac{dE}{dx}\right)^+_{tot} / \left(\frac{dE}{dx}\right)^-_{tot}$	Ag $\frac{r^+}{r^-}$	Au $\left(\frac{dE}{dx}\right)^+_{col} / \left(\frac{dE}{dx}\right)^-_{col}$	Au $\left(\frac{dE}{dx}\right)^+_{tot} / \left(\frac{dE}{dx}\right)^-_{tot}$	Au $\frac{r^+}{r^-}$
0.01	1.14	1.14	0.847	1.16	1.16	0.820	1.19	1.19	0.762
0.02	1.11	1.11	0.877	1.12	1.12	0.860	1.14	1.14	0.827
0.05	1.08	1.08	0.910	1.08	1.08	0.900	1.09	1.09	0.884
0.1	1.05	1.05	0.933	1.05	1.05	0.927	1.06	1.05	0.919
0.2	1.02	1.02	0.959	1.02	1.02	0.956	1.02	1.01	0.953
0.5	0.988	0.980	0.993	0.988	0.972	0.996	0.987	0.957	1.00
1.0	0.975	0.963	1.02	0.974	0.950	1.02	0.972	0.929	1.04
2.0	0.970	0.958	1.03	0.969	0.945	1.04	0.967	0.923	1.06
5.0	0.969	0.962	1.04	0.968	0.950	1.05	0.967	0.928	1.07
10.0	0.970	0.969	1.04	0.969	0.960	1.05	0.968	0.944	1.07
20.0	0.971	0.978	1.03	0.970	0.973	1.04	0.969	0.963	1.06
50.0	0.972	0.991	1.03	0.972	0.993	1.03	0.971	0.995	1.05
100.0	0.973	0.995	1.02	0.972	0.996	1.03	0.972	0.997	1.04
200.0	0.973	0.997	1.02	0.973	0.998	1.02	0.973	0.999	1.03
500.0	0.974	0.999	1.01	0.974	0.999	1.02	0.974	0.999	1.02
1000.0	0.975	0.999	1.01	0.975	1.00	1.01	0.974	1.00	1.02

PRINTOUT TABLE I. Energy-loss, range, and radiation yield for electrons in various materials. The order in which each material appears and the values of the mean excitation energy used are given in Tables 10a and 10b.

ELECTRONS IN HYDROGEN

ENERGY	STOPPING POWER			RANGE	RADIATION YIELD
	COLLISION	RADIATION	TOTAL		
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	5.147E 01	1.970E-03	5.147E 01	1.071E-04	2.098E-05
0.015	3.697E 01	1.965E-03	3.697E 01	2.235E-04	2.926E-05
0.020	2.928E 01	1.969E-03	2.928E 01	3.767E-04	3.701E-05
0.025	2.448E 01	1.975E-03	2.448E 01	5.643E-04	4.441E-05
0.030	2.118E 01	1.983E-03	2.118E 01	7.846E-04	5.154E-05
0.035	1.877E 01	1.993E-03	1.877E 01	1.036E-03	5.845E-05
0.040	1.693E 01	2.003E-03	1.693E 01	1.317E-03	6.518E-05
0.045	1.547E 01	2.014E-03	1.547E 01	1.626E-03	7.174E-05
0.050	1.429E 01	2.026E-03	1.429E 01	1.963E-03	7.817E-05
0.055	1.331E 01	2.038E-03	1.331E 01	2.325E-03	8.446E-05
0.060	1.249E 01	2.050E-03	1.249E 01	2.713E-03	9.064E-05
0.065	1.179E 01	2.063E-03	1.179E 01	3.126E-03	9.671E-05
0.070	1.118E 01	2.076E-03	1.118E 01	3.562E-03	1.027E-04
0.075	1.065E 01	2.090E-03	1.065E 01	4.020E-03	1.086E-04
0.080	1.018E 01	2.103E-03	1.018E 01	4.500E-03	1.144E-04
0.085	9.768E 00	2.108E-03	9.770E 00	5.002E-03	1.200E-04
0.090	9.398E 00	2.122E-03	9.400E 00	5.523E-03	1.256E-04
0.095	9.066E 00	2.137E-03	9.068E 00	6.065E-03	1.312E-04
0.100	8.766E 00	2.152E-03	8.768E 00	6.626E-03	1.366E-04
0.150	6.840E 00	2.315E-03	6.842E 00	1.317E-02	1.886E-04
0.200	5.869E 00	2.480E-03	5.871E 00	2.111E-02	2.367E-04
0.250	5.290E 00	2.671E-03	5.293E 00	3.011E-02	2.821E-04
0.300	4.912E 00	2.874E-03	4.915E 00	3.993E-02	3.259E-04
0.350	4.649E 00	3.082E-03	4.652E 00	5.041E-02	3.685E-04
0.400	4.458E 00	3.305E-03	4.461E 00	6.139E-02	4.101E-04
0.450	4.315E 00	3.536E-03	4.318E 00	7.279E-02	4.512E-04
0.500	4.205E 00	3.779E-03	4.209E 00	8.453E-02	4.919E-04
0.550	4.120E 00	4.031E-03	4.124E 00	9.653E-02	5.324E-04
0.600	4.053E 00	4.291E-03	4.057E 00	1.088E-01	5.729E-04
0.650	3.999E 00	4.560E-03	4.004E 00	1.212E-01	6.133E-04
0.700	3.956E 00	4.836E-03	3.961E 00	1.337E-01	6.537E-04
0.750	3.921E 00	5.118E-03	3.926E 00	1.464E-01	6.943E-04
0.800	3.893E 00	5.407E-03	3.899E 00	1.592E-01	7.350E-04
0.850	3.870E 00	5.732E-03	3.876E 00	1.721E-01	7.762E-04
0.900	3.852E 00	6.033E-03	3.858E 00	1.850E-01	8.176E-04
0.950	3.837E 00	6.338E-03	3.844E 00	1.980E-01	8.591E-04
1.000	3.826E 00	6.647E-03	3.832E 00	2.110E-01	9.007E-04
1.100	3.809E 00	7.278E-03	3.816E 00	2.372E-01	9.844E-04
1.200	3.800E 00	7.926E-03	3.808E 00	2.634E-01	1.069E-03
1.300	3.796E 00	8.588E-03	3.804E 00	2.897E-01	1.153E-03

ELECTRONS IN HYDROGEN

ENERGY	STOPPING POWER			RANGE	RADIATION YIELD
	COLLISION	RADIATION	TOTAL		
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	3.795E 00	9.265E-03	3.805E 00	3.160E-01	1.238E-03
1.500	3.798E 00	9.956E-03	3.808E 00	3.422E-01	1.324E-03
1.600	3.802E 00	1.066E-02	3.813E 00	3.685E-01	1.410E-03
1.700	3.808E 00	1.139E-02	3.820E 00	3.947E-01	1.497E-03
1.800	3.816E 00	1.211E-02	3.828E 00	4.208E-01	1.585E-03
1.900	3.824E 00	1.285E-02	3.837E 00	4.469E-01	1.673E-03
2.000	3.833E 00	1.360E-02	3.846E 00	4.730E-01	1.762E-03
2.200	3.852E 00	1.512E-02	3.867E 00	5.248E-01	1.940E-03
2.400	3.872E 00	1.668E-02	3.888E 00	5.764E-01	2.120E-03
2.600	3.892E 00	1.828E-02	3.911E 00	6.277E-01	2.302E-03
2.800	3.913E 00	1.991E-02	3.933E 00	6.787E-01	2.485E-03
3.000	3.933E 00	2.157E-02	3.955E 00	7.294E-01	2.670E-03
3.500	3.982E 00	2.583E-02	4.008E 00	8.550E-01	3.138E-03
4.000	4.029E 00	3.026E-02	4.059E 00	9.789E-01	3.614E-03
4.500	4.072E 00	3.486E-02	4.107E 00	1.101E 00	4.098E-03
5.000	4.112E 00	3.954E-02	4.152E 00	1.222E 00	4.589E-03
5.500	4.149E 00	4.432E-02	4.194E 00	1.342E 00	5.085E-03
6.000	4.184E 00	4.918E-02	4.234E 00	1.461E 00	5.585E-03
6.500	4.217E 00	5.411E-02	4.271E 00	1.579E 00	6.090E-03
7.000	4.248E 00	5.911E-02	4.307E 00	1.695E 00	6.597E-03
7.500	4.277E 00	6.418E-02	4.341E 00	1.811E 00	7.108E-03
8.000	4.304E 00	6.931E-02	4.373E 00	1.925E 00	7.621E-03
8.500	4.330E 00	7.449E-02	4.404E 00	2.039E 00	8.136E-03
9.000	4.354E 00	7.999E-02	4.434E 00	2.153E 00	8.655E-03
9.500	4.377E 00	8.529E-02	4.463E 00	2.265E 00	9.177E-03
10.000	4.400E 00	9.064E-02	4.490E 00	2.377E 00	9.700E-03
20.000	4.707E 00	2.042E-01	4.912E 00	4.498E 00	2.030E-02
30.000	4.890E 00	3.255E-01	5.216E 00	6.471E 00	3.089E-02
40.000	5.013E 00	4.512E-01	5.464E 00	8.343E 00	4.130E-02
50.000	5.089E 00	5.797E-01	5.669E 00	1.014E 01	5.153E-02
60.000	5.141E 00	7.102E-01	5.852E 00	1.187E 01	6.159E-02
80.000	5.211E 00	9.756E-01	6.187E 00	1.520E 01	8.112E-02
100.000	5.258E 00	1.245E 00	6.503E 00	1.835E 01	9.985E-02
200.000	5.377E 00	2.623E 00	8.000E 00	3.218E 01	1.818E-01
300.000	5.440E 00	4.026E 00	9.466E 00	4.365E 01	2.476E-01
400.000	5.484E 00	5.439E 00	1.092E 01	5.348E 01	3.015E-01
500.000	5.518E 00	6.857E 00	1.238E 01	6.207E 01	3.466E-01
600.000	5.546E 00	8.281E 00	1.383E 01	6.972E 01	3.851E-01
800.000	5.590E 00	1.114E 01	1.673E 01	8.285E 01	4.474E-01
1000.000	5.624E 00	1.400E 01	1.962E 01	9.388E 01	4.961E-01

ELECTRONS IN HELIUM

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	2.265E 01	1.551E-03	2.266E 01	2.469E-04	3.849E-05
0.015	1.641E 01	1.536E-03	1.641E 01	5.102E-04	5.273E-05
0.020	1.307E 01	1.532E-03	1.307E 01	8.543E-04	6.593E-05
0.025	1.097E 01	1.532E-03	1.097E 01	1.274E-03	7.846E-05
0.030	9.516E 00	1.535E-03	9.518E 00	1.765E-03	9.047E-05
0.035	8.453E 00	1.539E-03	8.455E 00	2.323E-03	1.021E-04
0.040	7.638E 00	1.545E-03	7.640E 00	2.947E-03	1.133E-04
0.045	6.992E 00	1.551E-03	6.994E 00	3.632E-03	1.243E-04
0.050	6.468E 00	1.558E-03	6.469E 00	4.376E-03	1.350E-04
0.055	6.033E 00	1.566E-03	6.034E 00	5.177E-03	1.455E-04
0.060	5.666E 00	1.575E-03	5.668E 00	6.032E-03	1.558E-04
0.065	5.353E 00	1.584E-03	5.354E 00	6.940E-03	1.658E-04
0.070	5.081E 00	1.593E-03	5.083E 00	7.899E-03	1.758E-04
0.075	4.845E 00	1.602E-03	4.846E 00	8.907E-03	1.855E-04
0.080	4.636E 00	1.612E-03	4.638E 00	9.962E-03	1.951E-04
0.085	4.451E 00	1.602E-03	4.452E 00	1.106E-02	2.043E-04
0.090	4.285E 00	1.613E-03	4.287E 00	1.221E-02	2.134E-04
0.095	4.136E 00	1.624E-03	4.138E 00	1.340E-02	2.224E-04
0.100	4.001E 00	1.637E-03	4.003E 00	1.462E-02	2.313E-04
0.150	3.136E 00	1.785E-03	3.138E 00	2.892E-02	3.173E-04
0.200	2.699E 00	1.954E-03	2.701E 00	4.621E-02	3.996E-04
0.250	2.438E 00	2.139E-03	2.440E 00	6.575E-02	4.797E-04
0.300	2.268E 00	2.332E-03	2.270E 00	8.704E-02	5.585E-04
0.350	2.149E 00	2.534E-03	2.152E 00	1.097E-01	6.362E-04
0.400	2.064E 00	2.737E-03	2.067E 00	1.334E-01	7.131E-04
0.450	2.000E 00	2.944E-03	2.003E 00	1.580E-01	7.891E-04
0.500	1.951E 00	3.155E-03	1.954E 00	1.833E-01	8.644E-04
0.550	1.913E 00	3.371E-03	1.917E 00	2.091E-01	9.392E-04
0.600	1.884E 00	3.590E-03	1.887E 00	2.354E-01	1.013E-03
0.650	1.860E 00	3.813E-03	1.864E 00	2.621E-01	1.087E-03
0.700	1.841E 00	4.040E-03	1.845E 00	2.891E-01	1.161E-03
0.750	1.826E 00	4.270E-03	1.831E 00	3.163E-01	1.234E-03
0.800	1.814E 00	4.502E-03	1.819E 00	3.437E-01	1.307E-03
0.850	1.805E 00	4.743E-03	1.809E 00	3.713E-01	1.380E-03
0.900	1.797E 00	4.982E-03	1.802E 00	3.990E-01	1.453E-03
0.950	1.791E 00	5.223E-03	1.796E 00	4.267E-01	1.526E-03
1.000	1.786E 00	5.467E-03	1.792E 00	4.546E-01	1.599E-03
1.100	1.780E 00	5.962E-03	1.786E 00	5.105E-01	1.744E-03
1.200	1.777E 00	6.467E-03	1.784E 00	5.665E-01	1.889E-03
1.300	1.777E 00	6.980E-03	1.784E 00	6.226E-01	2.033E-03

ELECTRONS IN HELIUM

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.778E 00	7.502E-03	1.785E 00	6.787E-01	2.178E-03
1.500	1.780E 00	8.033E-03	1.788E 00	7.346E-01	2.323E-03
1.600	1.783E 00	8.571E-03	1.792E 00	7.905E-01	2.467E-03
1.700	1.787E 00	9.125E-03	1.796E 00	8.463E-01	2.612E-03
1.800	1.791E 00	9.677E-03	1.801E 00	9.019E-01	2.758E-03
1.900	1.796E 00	1.023E-02	1.806E 00	9.573E-01	2.903E-03
2.000	1.801E 00	1.080E-02	1.811E 00	1.013E 00	3.049E-03
2.200	1.811E 00	1.194E-02	1.823E 00	1.123E 00	3.340E-03
2.400	1.822E 00	1.310E-02	1.835E 00	1.232E 00	3.632E-03
2.600	1.833E 00	1.429E-02	1.847E 00	1.341E 00	3.925E-03
2.800	1.843E 00	1.546E-02	1.859E 00	1.449E 00	4.219E-03
3.000	1.854E 00	1.668E-02	1.871E 00	1.556E 00	4.512E-03
3.500	1.879E 00	1.981E-02	1.899E 00	1.821E 00	5.249E-03
4.000	1.903E 00	2.305E-02	1.926E 00	2.083E 00	5.992E-03
4.500	1.925E 00	2.641E-02	1.952E 00	2.340E 00	6.743E-03
5.000	1.946E 00	2.983E-02	1.976E 00	2.595E 00	7.500E-03
5.500	1.965E 00	3.333E-02	1.998E 00	2.847E 00	8.263E-03
6.000	1.982E 00	3.688E-02	2.019E 00	3.096E 00	9.030E-03
6.500	1.999E 00	4.049E-02	2.039E 00	3.342E 00	9.801E-03
7.000	2.014E 00	4.415E-02	2.059E 00	3.586E 00	1.058E-02
7.500	2.029E 00	4.786E-02	2.077E 00	3.828E 00	1.135E-02
8.000	2.043E 00	5.162E-02	2.094E 00	4.067E 00	1.213E-02
8.500	2.056E 00	5.543E-02	2.111E 00	4.305E 00	1.292E-02
9.000	2.068E 00	5.958E-02	2.128E 00	4.541E 00	1.371E-02
9.500	2.080E 00	6.347E-02	2.144E 00	4.775E 00	1.450E-02
10.000	2.091E 00	6.740E-02	2.159E 00	5.008E 00	1.530E-02
20.000	2.246E 00	1.511E-01	2.398E 00	9.386E 00	3.124E-02
30.000	2.339E 00	2.403E-01	2.579E 00	1.340E 01	4.691E-02
40.000	2.405E 00	3.324E-01	2.737E 00	1.716E 01	6.205E-02
50.000	2.456E 00	4.264E-01	2.882E 00	2.072E 01	7.660E-02
60.000	2.497E 00	5.219E-01	3.019E 00	2.411E 01	9.059E-02
80.000	2.561E 00	7.156E-01	3.277E 00	3.047E 01	1.170E-01
100.000	2.605E 00	9.119E-01	3.517E 00	3.635E 01	1.414E-01
200.000	2.700E 00	1.914E 00	4.614E 00	6.106E 01	2.422E-01
300.000	2.738E 00	2.932E 00	5.670E 00	8.057E 01	3.179E-01
400.000	2.761E 00	3.956E 00	6.717E 00	9.675E 01	3.771E-01
500.000	2.779E 00	4.983E 00	7.762E 00	1.106E 02	4.250E-01
600.000	2.793E 00	6.014E 00	8.807E 00	1.227E 02	4.647E-01
800.000	2.815E 00	8.080E 00	1.089E 01	1.431E 02	5.271E-01
1000.000	2.832E 00	1.015E 01	1.298E 01	1.599E 02	5.743E-01

ELECTRONS IN BERYLLIUM

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.884E 01	2.463E-03	1.885E 01	2.993E-04	7.482E-05
0.015	1.371E 01	2.418E-03	1.371E 01	6.150E-04	1.012E-04
0.020	1.095E 01	2.396E-03	1.095E 01	1.026E-03	1.253E-04
0.025	9.207E 00	2.382E-03	9.209E 00	1.526E-03	1.480E-04
0.030	8.002E 00	2.375E-03	8.005E 00	2.110E-03	1.697E-04
0.035	7.117E 00	2.370E-03	7.119E 00	2.774E-03	1.904E-04
0.040	6.437E 00	2.373E-03	6.440E 00	3.514E-03	2.105E-04
0.045	5.898E 00	2.379E-03	5.900E 00	4.326E-03	2.299E-04
0.050	5.460E 00	2.388E-03	5.462E 00	5.208E-03	2.490E-04
0.055	5.096E 00	2.400E-03	5.098E 00	6.156E-03	2.676E-04
0.060	4.789E 00	2.413E-03	4.791E 00	7.168E-03	2.859E-04
0.065	4.526E 00	2.428E-03	4.529E 00	8.242E-03	3.039E-04
0.070	4.299E 00	2.445E-03	4.301E 00	9.376E-03	3.217E-04
0.075	4.100E 00	2.462E-03	4.103E 00	1.057E-02	3.392E-04
0.080	3.925E 00	2.480E-03	3.928E 00	1.181E-02	3.565E-04
0.085	3.770E 00	2.479E-03	3.772E 00	1.311E-02	3.733E-04
0.090	3.631E 00	2.499E-03	3.633E 00	1.446E-02	3.899E-04
0.095	3.506E 00	2.521E-03	3.508E 00	1.586E-02	4.064E-04
0.100	3.393E 00	2.543E-03	3.395E 00	1.731E-02	4.228E-04
0.150	2.666E 00	2.802E-03	2.669E 00	3.415E-02	5.819E-04
0.200	2.298E 00	3.095E-03	2.301E 00	5.445E-02	7.360E-04
0.250	2.077E 00	3.407E-03	2.080E 00	7.738E-02	8.871E-04
0.300	1.932E 00	3.732E-03	1.935E 00	1.024E-01	1.036E-03
0.350	1.830E 00	4.068E-03	1.834E 00	1.289E-01	1.185E-03
0.400	1.755E 00	4.408E-03	1.760E 00	1.568E-01	1.332E-03
0.450	1.699E 00	4.756E-03	1.704E 00	1.857E-01	1.478E-03
0.500	1.655E 00	5.104E-03	1.660E 00	2.154E-01	1.624E-03
0.550	1.621E 00	5.453E-03	1.626E 00	2.459E-01	1.768E-03
0.600	1.594E 00	5.803E-03	1.599E 00	2.769E-01	1.912E-03
0.650	1.571E 00	6.155E-03	1.578E 00	3.084E-01	2.054E-03
0.700	1.553E 00	6.508E-03	1.560E 00	3.402E-01	2.196E-03
0.750	1.539E 00	6.863E-03	1.545E 00	3.725E-01	2.337E-03
0.800	1.526E 00	7.220E-03	1.533E 00	4.049E-01	2.476E-03
0.850	1.516E 00	6.600E-03	1.523E 00	4.377E-01	2.581E-03
0.900	1.507E 00	6.969E-03	1.514E 00	4.706E-01	2.686E-03
0.950	1.500E 00	7.370E-03	1.508E 00	5.037E-01	2.794E-03
1.000	1.494E 00	7.803E-03	1.502E 00	5.369E-01	2.907E-03
1.100	1.485E 00	8.757E-03	1.494E 00	6.037E-01	3.144E-03
1.200	1.479E 00	9.821E-03	1.489E 00	6.707E-01	3.401E-03
1.300	1.475E 00	1.099E-02	1.486E 00	7.380E-01	3.677E-03

ELECTRONS IN BERYLLIUM

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.472E 00	1.225E-02	1.484E 00	8.054E-01	3.973E-03
1.500	1.470E 00	1.360E-02	1.484E 00	8.728E-01	4.289E-03
1.600	1.469E 00	1.504E-02	1.484E 00	9.401E-01	4.624E-03
1.700	1.469E 00	1.781E-02	1.487E 00	1.007E 00	5.023E-03
1.800	1.469E 00	1.925E-02	1.489E 00	1.075E 00	5.436E-03
1.900	1.470E 00	2.060E-02	1.491E 00	1.142E 00	5.854E-03
2.000	1.471E 00	2.186E-02	1.493E 00	1.209E 00	6.273E-03
2.200	1.474E 00	2.416E-02	1.498E 00	1.343E 00	7.103E-03
2.400	1.477E 00	2.615E-02	1.503E 00	1.476E 00	7.909E-03
2.600	1.481E 00	2.786E-02	1.509E 00	1.609E 00	8.682E-03
2.800	1.484E 00	2.560E-02	1.510E 00	1.741E 00	9.399E-03
3.000	1.488E 00	2.673E-02	1.515E 00	1.873E 00	9.925E-03
3.500	1.498E 00	3.004E-02	1.528E 00	2.202E 00	1.117E-02
4.000	1.507E 00	3.401E-02	1.541E 00	2.528E 00	1.238E-02
4.500	1.515E 00	3.901E-02	1.554E 00	2.851E 00	1.361E-02
5.000	1.522E 00	4.393E-02	1.566E 00	3.172E 00	1.490E-02
5.500	1.530E 00	4.894E-02	1.579E 00	3.489E 00	1.623E-02
6.000	1.536E 00	5.404E-02	1.590E 00	3.805E 00	1.759E-02
6.500	1.542E 00	5.923E-02	1.601E 00	4.118E 00	1.896E-02
7.000	1.548E 00	6.449E-02	1.612E 00	4.430E 00	2.036E-02
7.500	1.553E 00	6.982E-02	1.623E 00	4.739E 00	2.177E-02
8.000	1.558E 00	7.522E-02	1.633E 00	5.046E 00	2.319E-02
8.500	1.563E 00	8.069E-02	1.643E 00	5.351E 00	2.463E-02
9.000	1.567E 00	8.675E-02	1.654E 00	5.654E 00	2.608E-02
9.500	1.571E 00	9.235E-02	1.663E 00	5.956E 00	2.755E-02
10.000	1.575E 00	9.800E-02	1.673E 00	6.255E 00	2.902E-02
20.000	1.626E 00	2.184E-01	1.844E 00	1.194E 01	5.888E-02
30.000	1.654E 00	3.464E-01	2.001E 00	1.714E 01	8.801E-02
40.000	1.674E 00	4.783E-01	2.152E 00	2.196E 01	1.155E-01
50.000	1.690E 00	6.129E-01	2.302E 00	2.645E 01	1.414E-01
60.000	1.702E 00	7.492E-01	2.451E 00	3.066E 01	1.655E-01
80.000	1.722E 00	1.026E 00	2.748E 00	3.836E 01	2.093E-01
100.000	1.737E 00	1.305E 00	3.042E 00	4.528E 01	2.478E-01
200.000	1.785E 00	2.729E 00	4.513E 00	7.208E 01	3.877E-01
300.000	1.812E 00	4.172E 00	5.984E 00	9.126E 01	4.768E-01
400.000	1.832E 00	5.623E 00	7.455E 00	1.062E 02	5.395E-01
500.000	1.847E 00	7.078E 00	8.925E 00	1.184E 02	5.866E-01
600.000	1.860E 00	8.536E 00	1.040E 01	1.288E 02	6.234E-01
800.000	1.879E 00	1.146E 01	1.334E 01	1.458E 02	6.780E-01
1000.000	1.895E 00	1.438E 01	1.628E 01	1.593E 02	7.168E-01

ELECTRONS IN CARBON

ENERGY	STOPPING POWER			RANGE	RADIATION YIELD
	COLLISION	RADIATION	TOTAL		
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	2.015E 01	4.089E-03	2.016E 01	2.819E-04	1.168E-04
0.015	1.472E 01	4.002E-03	1.472E 01	5.764E-04	1.572E-04
0.020	1.178E 01	3.952E-03	1.178E 01	9.589E-04	1.939E-04
0.025	9.921E 00	3.917E-03	9.925E 00	1.423E-03	2.282E-04
0.030	8.634E 00	3.893E-03	8.638E 00	1.965E-03	2.606E-04
0.035	7.686E 00	3.872E-03	7.690E 00	2.580E-03	2.916E-04
0.040	6.958E 00	3.869E-03	6.962E 00	3.264E-03	3.214E-04
0.045	6.380E 00	3.873E-03	6.383E 00	4.015E-03	3.502E-04
0.050	5.909E 00	3.885E-03	5.913E 00	4.830E-03	3.784E-04
0.055	5.518E 00	3.901E-03	5.522E 00	5.706E-03	4.060E-04
0.060	5.188E 00	3.921E-03	5.192E 00	6.640E-03	4.331E-04
0.065	4.906E 00	3.945E-03	4.910E 00	7.631E-03	4.597E-04
0.070	4.661E 00	3.971E-03	4.665E 00	8.676E-03	4.860E-04
0.075	4.447E 00	3.999E-03	4.451E 00	9.774E-03	5.119E-04
0.080	4.259E 00	4.029E-03	4.263E 00	1.092E-02	5.375E-04
0.085	4.091E 00	4.039E-03	4.095E 00	1.212E-02	5.626E-04
0.090	3.941E 00	4.073E-03	3.945E 00	1.336E-02	5.874E-04
0.095	3.807E 00	4.109E-03	3.811E 00	1.465E-02	6.121E-04
0.100	3.685E 00	4.145E-03	3.689E 00	1.599E-02	6.365E-04
0.150	2.900E 00	4.568E-03	2.904E 00	3.147E-02	8.741E-04
0.200	2.493E 00	5.042E-03	2.498E 00	5.015E-02	1.105E-03
0.250	2.254E 00	5.549E-03	2.260E 00	7.126E-02	1.331E-03
0.300	2.097E 00	6.078E-03	2.103E 00	9.425E-02	1.555E-03
0.350	1.987E 00	6.627E-03	1.994E 00	1.187E-01	1.777E-03
0.400	1.907E 00	7.177E-03	1.914E 00	1.443E-01	1.997E-03
0.450	1.847E 00	7.736E-03	1.855E 00	1.709E-01	2.215E-03
0.500	1.801E 00	8.295E-03	1.809E 00	1.982E-01	2.431E-03
0.550	1.764E 00	8.855E-03	1.773E 00	2.261E-01	2.646E-03
0.600	1.735E 00	9.418E-03	1.745E 00	2.545E-01	2.858E-03
0.650	1.712E 00	9.983E-03	1.722E 00	2.834E-01	3.069E-03
0.700	1.693E 00	1.055E-02	1.704E 00	3.126E-01	3.278E-03
0.750	1.678E 00	1.112E-02	1.689E 00	3.421E-01	3.485E-03
0.800	1.665E 00	1.169E-02	1.677E 00	3.718E-01	3.691E-03
0.850	1.655E 00	1.227E-02	1.667E 00	4.017E-01	3.896E-03
0.900	1.646E 00	1.285E-02	1.659E 00	4.317E-01	4.099E-03
0.950	1.639E 00	1.343E-02	1.653E 00	4.619E-01	4.301E-03
1.000	1.634E 00	1.402E-02	1.648E 00	4.922E-01	4.502E-03
1.100	1.625E 00	1.519E-02	1.640E 00	5.531E-01	4.900E-03
1.200	1.619E 00	1.638E-02	1.636E 00	6.141E-01	5.295E-03
1.300	1.616E 00	1.757E-02	1.633E 00	6.753E-01	5.686E-03

ELECTRONS IN CARBON

ENERGY	STOPPING POWER			RANGE	RADIATION YIELD
	COLLISION	RADIATION	TOTAL		
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.614E 00	1.877E-02	1.633E 00	7.366E-01	6.075E-03
1.500	1.613E 00	1.999E-02	1.633E 00	7.978E-01	6.461E-03
1.600	1.613E 00	2.121E-02	1.635E 00	8.590E-01	6.845E-03
1.700	1.614E 00	2.241E-02	1.637E 00	9.202E-01	7.227E-03
1.800	1.615E 00	2.365E-02	1.639E 00	9.812E-01	7.606E-03
1.900	1.617E 00	2.491E-02	1.642E 00	1.042E 00	7.985E-03
2.000	1.619E 00	2.617E-02	1.645E 00	1.103E 00	8.362E-03
2.200	1.624E 00	2.874E-02	1.653E 00	1.224E 00	9.116E-03
2.400	1.629E 00	3.135E-02	1.660E 00	1.345E 00	9.868E-03
2.600	1.634E 00	3.400E-02	1.668E 00	1.465E 00	1.062E-02
2.800	1.640E 00	3.659E-02	1.676E 00	1.585E 00	1.137E-02
3.000	1.645E 00	3.931E-02	1.684E 00	1.704E 00	1.212E-02
3.500	1.658E 00	4.631E-02	1.704E 00	1.999E 00	1.399E-02
4.000	1.670E 00	5.357E-02	1.724E 00	2.291E 00	1.588E-02
4.500	1.682E 00	6.111E-02	1.743E 00	2.579E 00	1.779E-02
5.000	1.692E 00	6.878E-02	1.761E 00	2.864E 00	1.972E-02
5.500	1.701E 00	7.659E-02	1.778E 00	3.147E 00	2.166E-02
6.000	1.710E 00	8.454E-02	1.795E 00	3.427E 00	2.361E-02
6.500	1.718E 00	9.260E-02	1.811E 00	3.704E 00	2.557E-02
7.000	1.726E 00	1.008E-01	1.826E 00	3.979E 00	2.754E-02
7.500	1.733E 00	1.091E-01	1.842E 00	4.252E 00	2.952E-02
8.000	1.739E 00	1.174E-01	1.856E 00	4.522E 00	3.150E-02
8.500	1.745E 00	1.259E-01	1.871E 00	4.791E 00	3.349E-02
9.000	1.751E 00	1.351E-01	1.886E 00	5.057E 00	3.549E-02
9.500	1.756E 00	1.438E-01	1.900E 00	5.321E 00	3.750E-02
10.000	1.761E 00	1.526E-01	1.914E 00	5.583E 00	3.951E-02
20.000	1.825E 00	3.388E-01	2.164E 00	1.049E 01	7.913E-02
30.000	1.859E 00	5.367E-01	2.396E 00	1.488E 01	1.165E-01
40.000	1.882E 00	7.402E-01	2.622E 00	1.887E 01	1.508E-01
50.000	1.899E 00	9.475E-01	2.847E 00	2.252E 01	1.823E-01
60.000	1.914E 00	1.158E 00	3.071E 00	2.591E 01	2.111E-01
80.000	1.936E 00	1.583E 00	3.519E 00	3.198E 01	2.621E-01
100.000	1.953E 00	2.013E 00	3.966E 00	3.734E 01	3.056E-01
200.000	2.007E 00	4.200E 00	6.206E 00	5.732E 01	4.548E-01
300.000	2.038E 00	6.414E 00	8.452E 00	7.108E 01	5.438E-01
400.000	2.060E 00	8.639E 00	1.070E 01	8.157E 01	6.041E-01
500.000	2.077E 00	1.087E 01	1.295E 01	9.005E 01	6.482E-01
600.000	2.091E 00	1.311E 01	1.520E 01	9.718E 01	6.821E-01
800.000	2.113E 00	1.758E 01	1.970E 01	1.087E 02	7.313E-01
1000.000	2.130E 00	2.206E 01	2.419E 01	1.178E 02	7.656E-01

ELECTRONS IN OXYGEN

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.964E 01	5.460E-03	1.964E 01	2.904E-04	1.598E-04
0.015	1.437E 01	5.348E-03	1.437E 01	5.923E-04	2.152E-04
0.020	1.152E 01	5.274E-03	1.152E 01	9.837E-04	2.652E-04
0.025	9.708E 00	5.221E-03	9.713E 00	1.458E-03	3.118E-04
0.030	8.454E 00	5.183E-03	8.459E 00	2.012E-03	3.558E-04
0.035	7.530E 00	5.145E-03	7.535E 00	2.639E-03	3.975E-04
0.040	6.819E 00	5.139E-03	6.825E 00	3.338E-03	4.375E-04
0.045	6.255E 00	5.146E-03	6.260E 00	4.104E-03	4.764E-04
0.050	5.795E 00	5.163E-03	5.801E 00	4.934E-03	5.144E-04
0.055	5.414E 00	5.188E-03	5.419E 00	5.827E-03	5.516E-04
0.060	5.091E 00	5.218E-03	5.096E 00	6.779E-03	5.882E-04
0.065	4.815E 00	5.253E-03	4.820E 00	7.788E-03	6.243E-04
0.070	4.576E 00	5.291E-03	4.581E 00	8.853E-03	6.598E-04
0.075	4.367E 00	5.333E-03	4.372E 00	9.970E-03	6.950E-04
0.080	4.182E 00	5.377E-03	4.188E 00	1.114E-02	7.298E-04
0.085	4.019E 00	5.414E-03	4.024E 00	1.236E-02	7.642E-04
0.090	3.872E 00	5.463E-03	3.877E 00	1.362E-02	7.982E-04
0.095	3.740E 00	5.514E-03	3.745E 00	1.494E-02	8.320E-04
0.100	3.621E 00	5.566E-03	3.626E 00	1.629E-02	8.656E-04
0.150	2.852E 00	6.144E-03	2.858E 00	3.203E-02	1.192E-03
0.200	2.462E 00	6.765E-03	2.469E 00	5.097E-02	1.505E-03
0.250	2.230E 00	7.443E-03	2.237E 00	7.231E-02	1.811E-03
0.300	2.078E 00	8.152E-03	2.086E 00	9.550E-02	2.112E-03
0.350	1.973E 00	8.893E-03	1.982E 00	1.201E-01	2.410E-03
0.400	1.897E 00	9.629E-03	1.907E 00	1.459E-01	2.705E-03
0.450	1.841E 00	1.038E-02	1.851E 00	1.725E-01	2.997E-03
0.500	1.798E 00	1.112E-02	1.809E 00	1.998E-01	3.285E-03
0.550	1.764E 00	1.187E-02	1.776E 00	2.277E-01	3.569E-03
0.600	1.739E 00	1.261E-02	1.751E 00	2.561E-01	3.850E-03
0.650	1.718E 00	1.335E-02	1.732E 00	2.848E-01	4.128E-03
0.700	1.702E 00	1.410E-02	1.716E 00	3.138E-01	4.402E-03
0.750	1.690E 00	1.485E-02	1.704E 00	3.431E-01	4.672E-03
0.800	1.680E 00	1.559E-02	1.695E 00	3.725E-01	4.940E-03
0.850	1.672E 00	1.634E-02	1.688E 00	4.020E-01	5.205E-03
0.900	1.666E 00	1.709E-02	1.683E 00	4.317E-01	5.467E-03
0.950	1.661E 00	1.785E-02	1.679E 00	4.615E-01	5.726E-03
1.000	1.658E 00	1.860E-02	1.676E 00	4.913E-01	5.983E-03
1.100	1.653E 00	2.012E-02	1.674E 00	5.510E-01	6.490E-03
1.200	1.652E 00	2.165E-02	1.674E 00	6.107E-01	6.990E-03
1.300	1.653E 00	2.319E-02	1.676E 00	6.705E-01	7.482E-03

ELECTRONS IN OXYGEN

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.655E 00	2.474E-02	1.679E 00	7.301E-01	7.968E-03
1.500	1.658E 00	2.629E-02	1.684E 00	7.895E-01	8.448E-03
1.600	1.662E 00	2.786E-02	1.690E 00	8.488E-01	8.923E-03
1.700	1.666E 00	2.937E-02	1.696E 00	9.079E-01	9.392E-03
1.800	1.671E 00	3.096E-02	1.702E 00	9.668E-01	9.857E-03
1.900	1.676E 00	3.256E-02	1.709E 00	1.025E 00	1.032E-02
2.000	1.682E 00	3.417E-02	1.716E 00	1.084E 00	1.078E-02
2.200	1.693E 00	3.744E-02	1.730E 00	1.200E 00	1.169E-02
2.400	1.704E 00	4.076E-02	1.745E 00	1.315E 00	1.259E-02
2.600	1.715E 00	4.412E-02	1.760E 00	1.429E 00	1.348E-02
2.800	1.727E 00	4.739E-02	1.774E 00	1.542E 00	1.437E-02
3.000	1.738E 00	5.085E-02	1.788E 00	1.655E 00	1.525E-02
3.500	1.764E 00	5.972E-02	1.823E 00	1.931E 00	1.744E-02
4.000	1.788E 00	6.890E-02	1.857E 00	2.203E 00	1.963E-02
4.500	1.810E 00	7.844E-02	1.889E 00	2.470E 00	2.181E-02
5.000	1.831E 00	8.814E-02	1.919E 00	2.733E 00	2.401E-02
5.500	1.850E 00	9.803E-02	1.948E 00	2.991E 00	2.620E-02
6.000	1.868E 00	1.081E-01	1.976E 00	3.246E 00	2.839E-02
6.500	1.884E 00	1.183E-01	2.003E 00	3.498E 00	3.058E-02
7.000	1.900E 00	1.286E-01	2.029E 00	3.746E 00	3.277E-02
7.500	1.915E 00	1.391E-01	2.054E 00	3.991E 00	3.496E-02
8.000	1.929E 00	1.498E-01	2.078E 00	4.233E 00	3.714E-02
8.500	1.942E 00	1.605E-01	2.102E 00	4.472E 00	3.932E-02
9.000	1.954E 00	1.724E-01	2.127E 00	4.708E 00	4.151E-02
9.500	1.966E 00	1.834E-01	2.149E 00	4.942E 00	4.370E-02
10.000	1.977E 00	1.945E-01	2.172E 00	5.174E 00	4.589E-02
20.000	2.133E 00	4.308E-01	2.564E 00	9.395E 00	8.781E-02
30.000	2.225E 00	6.817E-01	2.907E 00	1.305E 01	1.260E-01
40.000	2.288E 00	9.395E-01	3.227E 00	1.631E 01	1.603E-01
50.000	2.324E 00	1.202E 00	3.526E 00	1.928E 01	1.916E-01
60.000	2.352E 00	1.468E 00	3.820E 00	2.200E 01	2.201E-01
80.000	2.394E 00	2.005E 00	4.400E 00	2.687E 01	2.705E-01
100.000	2.425E 00	2.549E 00	4.974E 00	3.115E 01	3.134E-01
200.000	2.512E 00	5.311E 00	7.823E 00	4.703E 01	4.604E-01
300.000	2.557E 00	8.105E 00	1.066E 01	5.794E 01	5.481E-01
400.000	2.587E 00	1.091E 01	1.350E 01	6.626E 01	6.076E-01
500.000	2.609E 00	1.372E 01	1.633E 01	7.298E 01	6.511E-01
600.000	2.626E 00	1.654E 01	1.917E 01	7.863E 01	6.846E-01
800.000	2.652E 00	2.219E 01	2.484E 01	8.777E 01	7.333E-01
1000.000	2.672E 00	2.784E 01	3.051E 01	9.502E 01	7.673E-01

ELECTRONS IN NEON

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.791E 01	6.784E-03	1.792E 01	3.226E-04	2.190E-04
0.015	1.319E 01	6.661E-03	1.320E 01	6.523E-04	2.936E-04
0.020	1.061E 01	6.571E-03	1.062E 01	1.078E-03	3.608E-04
0.025	8.974E 00	6.506E-03	8.981E 00	1.592E-03	4.231E-04
0.030	7.832E 00	6.457E-03	7.838E 00	2.190E-03	4.817E-04
0.035	6.988E 00	6.408E-03	6.994E 00	2.866E-03	5.372E-04
0.040	6.337E 00	6.400E-03	6.344E 00	3.618E-03	5.904E-04
0.045	5.820E 00	6.409E-03	5.826E 00	4.442E-03	6.419E-04
0.050	5.397E 00	6.430E-03	5.404E 00	5.334E-03	6.923E-04
0.055	5.046E 00	6.461E-03	5.053E 00	6.291E-03	7.415E-04
0.060	4.749E 00	6.499E-03	4.756E 00	7.312E-03	7.900E-04
0.065	4.495E 00	6.542E-03	4.502E 00	8.393E-03	8.377E-04
0.070	4.275E 00	6.590E-03	4.281E 00	9.533E-03	8.847E-04
0.075	4.082E 00	6.643E-03	4.088E 00	1.073E-02	9.312E-04
0.080	3.911E 00	6.698E-03	3.918E 00	1.198E-02	9.772E-04
0.085	3.760E 00	6.753E-03	3.767E 00	1.328E-02	1.023E-03
0.090	3.624E 00	6.814E-03	3.631E 00	1.463E-02	1.068E-03
0.095	3.502E 00	6.876E-03	3.509E 00	1.603E-02	1.113E-03
0.100	3.392E 00	6.941E-03	3.399E 00	1.748E-02	1.157E-03
0.150	2.680E 00	7.653E-03	2.688E 00	3.424E-02	1.587E-03
0.200	2.318E 00	8.409E-03	2.327E 00	5.436E-02	1.999E-03
0.250	2.103E 00	9.238E-03	2.112E 00	7.699E-02	2.398E-03
0.300	1.962E 00	1.010E-02	1.972E 00	1.015E-01	2.790E-03
0.350	1.864E 00	1.102E-02	1.875E 00	1.276E-01	3.177E-03
0.400	1.794E 00	1.191E-02	1.806E 00	1.548E-01	3.560E-03
0.450	1.742E 00	1.281E-02	1.755E 00	1.829E-01	3.936E-03
0.500	1.702E 00	1.371E-02	1.716E 00	2.117E-01	4.307E-03
0.550	1.672E 00	1.461E-02	1.686E 00	2.411E-01	4.673E-03
0.600	1.648E 00	1.551E-02	1.664E 00	2.710E-01	5.033E-03
0.650	1.630E 00	1.641E-02	1.646E 00	3.012E-01	5.387E-03
0.700	1.615E 00	1.732E-02	1.633E 00	3.317E-01	5.738E-03
0.750	1.604E 00	1.822E-02	1.622E 00	3.624E-01	6.083E-03
0.800	1.595E 00	1.914E-02	1.614E 00	3.933E-01	6.425E-03
0.850	1.588E 00	2.011E-02	1.608E 00	4.244E-01	6.764E-03
0.900	1.583E 00	2.102E-02	1.604E 00	4.555E-01	7.100E-03
0.950	1.579E 00	2.194E-02	1.601E 00	4.867E-01	7.432E-03
1.000	1.576E 00	2.286E-02	1.599E 00	5.179E-01	7.760E-03
1.100	1.573E 00	2.470E-02	1.598E 00	5.805E-01	8.408E-03
1.200	1.572E 00	2.655E-02	1.599E 00	6.431E-01	9.043E-03
1.300	1.574E 00	2.840E-02	1.602E 00	7.056E-01	9.668E-03

ELECTRONS IN NEON

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.576E 00	3.026E-02	1.607E 00	7.679E-01	1.028E-02
1.500	1.580E 00	3.213E-02	1.612E 00	8.301E-01	1.089E-02
1.600	1.584E 00	3.400E-02	1.618E 00	8.920E-01	1.149E-02
1.700	1.589E 00	3.579E-02	1.625E 00	9.536E-01	1.208E-02
1.800	1.594E 00	3.769E-02	1.632E 00	1.015E 00	1.266E-02
1.900	1.599E 00	3.960E-02	1.639E 00	1.076E 00	1.324E-02
2.000	1.605E 00	4.153E-02	1.647E 00	1.137E 00	1.381E-02
2.200	1.616E 00	4.544E-02	1.662E 00	1.258E 00	1.494E-02
2.400	1.628E 00	4.940E-02	1.677E 00	1.378E 00	1.607E-02
2.600	1.639E 00	5.343E-02	1.693E 00	1.496E 00	1.718E-02
2.800	1.651E 00	5.726E-02	1.708E 00	1.614E 00	1.828E-02
3.000	1.662E 00	6.139E-02	1.723E 00	1.731E 00	1.936E-02
3.500	1.688E 00	7.203E-02	1.760E 00	2.018E 00	2.207E-02
4.000	1.712E 00	8.308E-02	1.795E 00	2.299E 00	2.476E-02
4.500	1.734E 00	9.464E-02	1.829E 00	2.575E 00	2.745E-02
5.000	1.755E 00	1.064E-01	1.861E 00	2.846E 00	3.015E-02
5.500	1.774E 00	1.183E-01	1.892E 00	3.112E 00	3.285E-02
6.000	1.792E 00	1.304E-01	1.922E 00	3.375E 00	3.554E-02
6.500	1.808E 00	1.427E-01	1.951E 00	3.633E 00	3.823E-02
7.000	1.824E 00	1.552E-01	1.979E 00	3.887E 00	4.092E-02
7.500	1.838E 00	1.678E-01	2.006E 00	4.138E 00	4.359E-02
8.000	1.852E 00	1.806E-01	2.033E 00	4.386E 00	4.626E-02
8.500	1.865E 00	1.935E-01	2.059E 00	4.630E 00	4.892E-02
9.000	1.877E 00	2.074E-01	2.085E 00	4.871E 00	5.157E-02
9.500	1.889E 00	2.206E-01	2.110E 00	5.110E 00	5.423E-02
10.000	1.900E 00	2.339E-01	2.134E 00	5.345E 00	5.687E-02
20.000	2.055E 00	5.167E-01	2.571E 00	9.597E 00	1.068E-01
30.000	2.146E 00	8.167E-01	2.963E 00	1.321E 01	1.510E-01
40.000	2.211E 00	1.125E 00	3.336E 00	1.639E 01	1.901E-01
50.000	2.262E 00	1.439E 00	3.701E 00	1.924E 01	2.248E-01
60.000	2.304E 00	1.756E 00	4.060E 00	2.182E 01	2.559E-01
80.000	2.364E 00	2.399E 00	4.762E 00	2.636E 01	3.093E-01
100.000	2.401E 00	3.047E 00	5.448E 00	3.028E 01	3.540E-01
200.000	2.504E 00	6.341E 00	8.845E 00	4.454E 01	5.019E-01
300.000	2.555E 00	9.672E 00	1.223E 01	5.411E 01	5.872E-01
400.000	2.588E 00	1.302E 01	1.560E 01	6.133E 01	6.439E-01
500.000	2.612E 00	1.637E 01	1.898E 01	6.714E 01	6.850E-01
600.000	2.631E 00	1.973E 01	2.236E 01	7.198E 01	7.163E-01
800.000	2.658E 00	2.645E 01	2.911E 01	7.980E 01	7.614E-01
1000.000	2.679E 00	3.318E 01	3.586E 01	8.598E 01	7.926E-01

ELECTRONS IN ALUMINUM

ENERGY	STOPPING POWER			RANGE	RADIATION YIELD
	COLLISION	RADIATION	TOTAL		
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.657E 01	8.600E-03	1.658E 01	3.519E-04	3.002E-04
0.015	1.225E 01	8.482E-03	1.226E 01	7.074E-04	4.025E-04
0.020	9.885E 00	8.373E-03	9.893E 00	1.165E-03	4.944E-04
0.025	8.372E 00	8.313E-03	8.380E 00	1.716E-03	5.795E-04
0.030	7.316E 00	8.276E-03	7.325E 00	2.356E-03	6.598E-04
0.035	6.535E 00	8.241E-03	6.543E 00	3.080E-03	7.362E-04
0.040	5.932E 00	8.252E-03	5.940E 00	3.883E-03	8.098E-04
0.045	5.451E 00	8.285E-03	5.459E 00	4.762E-03	8.813E-04
0.050	5.059E 00	8.329E-03	5.067E 00	5.714E-03	9.512E-04
0.055	4.733E 00	8.384E-03	4.741E 00	6.735E-03	1.020E-03
0.060	4.456E 00	8.446E-03	4.465E 00	7.822E-03	1.087E-03
0.065	4.220E 00	8.515E-03	4.228E 00	8.974E-03	1.154E-03
0.070	4.014E 00	8.588E-03	4.023E 00	1.019E-02	1.220E-03
0.075	3.834E 00	8.666E-03	3.843E 00	1.146E-02	1.285E-03
0.080	3.676E 00	8.746E-03	3.684E 00	1.279E-02	1.349E-03
0.085	3.534E 00	8.843E-03	3.543E 00	1.417E-02	1.413E-03
0.090	3.408E 00	8.928E-03	3.417E 00	1.561E-02	1.476E-03
0.095	3.294E 00	9.016E-03	3.303E 00	1.710E-02	1.539E-03
0.100	3.191E 00	9.105E-03	3.200E 00	1.864E-02	1.602E-03
0.150	2.526E 00	1.005E-02	2.536E 00	3.641E-02	2.204E-03
0.200	2.188E 00	1.100E-02	2.199E 00	5.772E-02	2.775E-03
0.250	1.986E 00	1.206E-02	1.998E 00	8.165E-02	3.324E-03
0.300	1.848E 00	1.317E-02	1.861E 00	1.077E-01	3.864E-03
0.350	1.757E 00	1.434E-02	1.771E 00	1.353E-01	4.397E-03
0.400	1.691E 00	1.549E-02	1.706E 00	1.640E-01	4.921E-03
0.450	1.641E 00	1.666E-02	1.658E 00	1.938E-01	5.437E-03
0.500	1.603E 00	1.782E-02	1.621E 00	2.243E-01	5.946E-03
0.550	1.574E 00	1.897E-02	1.593E 00	2.554E-01	6.446E-03
0.600	1.551E 00	2.011E-02	1.571E 00	2.871E-01	6.939E-03
0.650	1.532E 00	2.126E-02	1.553E 00	3.191E-01	7.424E-03
0.700	1.517E 00	2.240E-02	1.540E 00	3.514E-01	7.902E-03
0.750	1.505E 00	2.354E-02	1.529E 00	3.840E-01	8.374E-03
0.800	1.496E 00	2.469E-02	1.521E 00	4.168E-01	8.839E-03
0.850	1.488E 00	2.590E-02	1.514E 00	4.498E-01	9.301E-03
0.900	1.482E 00	2.704E-02	1.509E 00	4.828E-01	9.757E-03
0.950	1.477E 00	2.819E-02	1.505E 00	5.160E-01	1.021E-02
1.000	1.473E 00	2.933E-02	1.502E 00	5.493E-01	1.065E-02
1.100	1.468E 00	3.161E-02	1.499E 00	6.159E-01	1.153E-02
1.200	1.465E 00	3.388E-02	1.498E 00	6.826E-01	1.239E-02
1.300	1.463E 00	3.616E-02	1.499E 00	7.493E-01	1.324E-02

ELECTRONS IN ALUMINUM

ENERGY	STOPPING POWER			RANGE	RADIATION YIELD
	COLLISION	RADIATION	TOTAL		
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.463E 00	3.843E-02	1.502E 00	8.160E-01	1.407E-02
1.500	1.464E 00	4.071E-02	1.505E 00	8.825E-01	1.488E-02
1.600	1.466E 00	4.298E-02	1.509E 00	9.489E-01	1.569E-02
1.700	1.468E 00	4.509E-02	1.513E 00	1.015E 00	1.648E-02
1.800	1.470E 00	4.738E-02	1.518E 00	1.081E 00	1.726E-02
1.900	1.473E 00	4.970E-02	1.523E 00	1.147E 00	1.803E-02
2.000	1.476E 00	5.204E-02	1.528E 00	1.212E 00	1.879E-02
2.200	1.482E 00	5.677E-02	1.539E 00	1.343E 00	2.031E-02
2.400	1.489E 00	6.158E-02	1.550E 00	1.472E 00	2.181E-02
2.600	1.495E 00	6.647E-02	1.562E 00	1.601E 00	2.330E-02
2.800	1.502E 00	7.111E-02	1.573E 00	1.728E 00	2.477E-02
3.000	1.508E 00	7.612E-02	1.584E 00	1.855E 00	2.623E-02
3.500	1.523E 00	8.907E-02	1.612E 00	2.168E 00	2.986E-02
4.000	1.537E 00	1.025E-01	1.639E 00	2.476E 00	3.349E-02
4.500	1.549E 00	1.167E-01	1.666E 00	2.778E 00	3.713E-02
5.000	1.561E 00	1.310E-01	1.692E 00	3.076E 00	4.079E-02
5.500	1.571E 00	1.456E-01	1.717E 00	3.369E 00	4.446E-02
6.000	1.581E 00	1.604E-01	1.741E 00	3.658E 00	4.813E-02
6.500	1.590E 00	1.755E-01	1.765E 00	3.944E 00	5.179E-02
7.000	1.598E 00	1.907E-01	1.789E 00	4.225E 00	5.545E-02
7.500	1.606E 00	2.061E-01	1.812E 00	4.503E 00	5.910E-02
8.000	1.613E 00	2.217E-01	1.835E 00	4.777E 00	6.273E-02
8.500	1.620E 00	2.375E-01	1.857E 00	5.048E 00	6.636E-02
9.000	1.626E 00	2.545E-01	1.880E 00	5.315E 00	6.998E-02
9.500	1.632E 00	2.706E-01	1.902E 00	5.580E 00	7.360E-02
10.000	1.637E 00	2.869E-01	1.924E 00	5.841E 00	7.721E-02
20.000	1.709E 00	6.317E-01	2.341E 00	1.054E 01	1.445E-01
30.000	1.747E 00	9.973E-01	2.745E 00	1.448E 01	2.026E-01
40.000	1.773E 00	1.373E 00	3.146E 00	1.788E 01	2.522E-01
50.000	1.792E 00	1.755E 00	3.547E 00	2.087E 01	2.951E-01
60.000	1.808E 00	2.141E 00	3.949E 00	2.355E 01	3.325E-01
80.000	1.831E 00	2.923E 00	4.754E 00	2.816E 01	3.945E-01
100.000	1.849E 00	3.710E 00	5.559E 00	3.204E 01	4.441E-01
200.000	1.902E 00	7.712E 00	9.614E 00	4.555E 01	5.953E-01
300.000	1.933E 00	1.176E 01	1.369E 01	5.423E 01	6.747E-01
400.000	1.954E 00	1.581E 01	1.777E 01	6.062E 01	7.250E-01
500.000	1.971E 00	1.988E 01	2.185E 01	6.569E 01	7.601E-01
600.000	1.984E 00	2.396E 01	2.594E 01	6.988E 01	7.863E-01
800.000	2.005E 00	3.212E 01	3.412E 01	7.658E 01	8.230E-01
1000.000	2.022E 00	4.028E 01	4.230E 01	8.184E 01	8.478E-01

ELECTRONS IN ARGON

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.457E 01	1.112E-02	1.458E 01	4.050E-04	4.425E-04
0.015	1.084E 01	1.104E-02	1.085E 01	8.078E-04	5.924E-04
0.020	8.770E 00	1.091E-02	8.781E 00	1.324E-03	7.273E-04
0.025	7.445E 00	1.090E-02	7.456E 00	1.944E-03	8.524E-04
0.030	6.517E 00	1.093E-02	6.528E 00	2.663E-03	9.718E-04
0.035	5.829E 00	1.100E-02	5.840E 00	3.474E-03	1.087E-03
0.040	5.297E 00	1.107E-02	5.308E 00	4.374E-03	1.199E-03
0.045	4.872E 00	1.116E-02	4.884E 00	5.357E-03	1.309E-03
0.050	4.525E 00	1.125E-02	4.537E 00	6.420E-03	1.416E-03
0.055	4.236E 00	1.135E-02	4.248E 00	7.560E-03	1.522E-03
0.060	3.992E 00	1.145E-02	4.003E 00	8.773E-03	1.626E-03
0.065	3.782E 00	1.156E-02	3.793E 00	1.006E-02	1.728E-03
0.070	3.599E 00	1.167E-02	3.611E 00	1.141E-02	1.829E-03
0.075	3.440E 00	1.178E-02	3.451E 00	1.283E-02	1.928E-03
0.080	3.299E 00	1.189E-02	3.311E 00	1.431E-02	2.027E-03
0.085	3.173E 00	1.199E-02	3.185E 00	1.585E-02	2.124E-03
0.090	3.061E 00	1.211E-02	3.073E 00	1.744E-02	2.220E-03
0.095	2.959E 00	1.222E-02	2.972E 00	1.910E-02	2.315E-03
0.100	2.868E 00	1.234E-02	2.880E 00	2.081E-02	2.409E-03
0.150	2.275E 00	1.357E-02	2.289E 00	4.053E-02	3.312E-03
0.200	1.973E 00	1.477E-02	1.988E 00	6.411E-02	4.157E-03
0.250	1.793E 00	1.615E-02	1.810E 00	9.056E-02	4.962E-03
0.300	1.676E 00	1.759E-02	1.694E 00	1.192E-01	5.744E-03
0.350	1.595E 00	1.913E-02	1.614E 00	1.495E-01	6.513E-03
0.400	1.536E 00	2.062E-02	1.557E 00	1.810E-01	7.268E-03
0.450	1.493E 00	2.212E-02	1.515E 00	2.136E-01	8.007E-03
0.500	1.461E 00	2.361E-02	1.484E 00	2.470E-01	8.732E-03
0.550	1.436E 00	2.509E-02	1.461E 00	2.809E-01	9.442E-03
0.600	1.416E 00	2.656E-02	1.443E 00	3.154E-01	1.014E-02
0.650	1.401E 00	2.802E-02	1.429E 00	3.502E-01	1.082E-02
0.700	1.390E 00	2.948E-02	1.419E 00	3.853E-01	1.149E-02
0.750	1.381E 00	3.094E-02	1.412E 00	4.207E-01	1.215E-02
0.800	1.374E 00	3.240E-02	1.406E 00	4.562E-01	1.279E-02
0.850	1.368E 00	3.394E-02	1.402E 00	4.918E-01	1.343E-02
0.900	1.364E 00	3.539E-02	1.400E 00	5.275E-01	1.406E-02
0.950	1.362E 00	3.684E-02	1.398E 00	5.632E-01	1.468E-02
1.000	1.360E 00	3.829E-02	1.398E 00	5.990E-01	1.529E-02
1.100	1.358E 00	4.117E-02	1.399E 00	6.705E-01	1.648E-02
1.200	1.358E 00	4.404E-02	1.402E 00	7.419E-01	1.764E-02
1.300	1.360E 00	4.691E-02	1.407E 00	8.130E-01	1.878E-02

ELECTRONS IN ARGON

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.363E 00	4.977E-02	1.413E 00	8.840E-01	1.988E-02
1.500	1.367E 00	5.262E-02	1.420E 00	9.546E-01	2.097E-02
1.600	1.371E 00	5.547E-02	1.427E 00	1.025E 00	2.203E-02
1.700	1.376E 00	5.808E-02	1.434E 00	1.095E 00	2.306E-02
1.800	1.381E 00	6.094E-02	1.442E 00	1.164E 00	2.408E-02
1.900	1.386E 00	6.384E-02	1.450E 00	1.233E 00	2.508E-02
2.000	1.392E 00	6.676E-02	1.458E 00	1.302E 00	2.608E-02
2.200	1.402E 00	7.267E-02	1.475E 00	1.439E 00	2.803E-02
2.400	1.413E 00	7.867E-02	1.492E 00	1.573E 00	2.994E-02
2.600	1.424E 00	8.476E-02	1.509E 00	1.707E 00	3.183E-02
2.800	1.434E 00	9.054E-02	1.525E 00	1.838E 00	3.369E-02
3.000	1.445E 00	9.679E-02	1.541E 00	1.969E 00	3.551E-02
3.500	1.469E 00	1.129E-01	1.582E 00	2.289E 00	4.002E-02
4.000	1.491E 00	1.297E-01	1.621E 00	2.601E 00	4.448E-02
4.500	1.511E 00	1.472E-01	1.659E 00	2.906E 00	4.891E-02
5.000	1.530E 00	1.650E-01	1.695E 00	3.205E 00	5.332E-02
5.500	1.548E 00	1.831E-01	1.731E 00	3.496E 00	5.771E-02
6.000	1.564E 00	2.016E-01	1.765E 00	3.783E 00	6.207E-02
6.500	1.579E 00	2.203E-01	1.799E 00	4.063E 00	6.640E-02
7.000	1.593E 00	2.393E-01	1.832E 00	4.338E 00	7.069E-02
7.500	1.606E 00	2.585E-01	1.865E 00	4.609E 00	7.495E-02
8.000	1.619E 00	2.779E-01	1.897E 00	4.875E 00	7.918E-02
8.500	1.631E 00	2.976E-01	1.928E 00	5.136E 00	8.337E-02
9.000	1.642E 00	3.204E-01	1.962E 00	5.393E 00	8.755E-02
9.500	1.653E 00	3.405E-01	1.993E 00	5.646E 00	9.174E-02
10.000	1.663E 00	3.609E-01	2.024E 00	5.895E 00	9.588E-02
20.000	1.803E 00	7.888E-01	2.592E 00	1.024E 01	1.703E-01
30.000	1.887E 00	1.242E 00	3.128E 00	1.375E 01	2.311E-01
40.000	1.946E 00	1.708E 00	3.654E 00	1.670E 01	2.818E-01
50.000	1.992E 00	2.182E 00	4.174E 00	1.926E 01	3.247E-01
60.000	2.026E 00	2.661E 00	4.687E 00	2.152E 01	3.615E-01
80.000	2.077E 00	3.630E 00	5.707E 00	2.538E 01	4.221E-01
100.000	2.114E 00	4.606E 00	6.720E 00	2.860E 01	4.701E-01
200.000	2.215E 00	9.559E 00	1.177E 01	3.970E 01	6.148E-01
300.000	2.265E 00	1.456E 01	1.683E 01	4.677E 01	6.904E-01
400.000	2.298E 00	1.958E 01	2.188E 01	5.196E 01	7.382E-01
500.000	2.321E 00	2.460E 01	2.692E 01	5.608E 01	7.715E-01
600.000	2.340E 00	2.964E 01	3.198E 01	5.948E 01	7.964E-01
800.000	2.367E 00	3.972E 01	4.208E 01	6.491E 01	8.313E-01
1000.000	2.388E 00	4.980E 01	5.219E 01	6.917E 01	8.549E-01

ELECTRONS IN IRON

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.407E 01	1.645E-02	1.408E 01	4.259E-04	6.843E-04
0.015	1.053E 01	1.642E-02	1.054E 01	8.415E-04	9.116E-04
0.020	8.553E 00	1.630E-02	8.569E 00	1.371E-03	1.117E-03
0.025	7.279E 00	1.638E-02	7.296E 00	2.006E-03	1.308E-03
0.030	6.385E 00	1.652E-02	6.401E 00	2.740E-03	1.493E-03
0.035	5.719E 00	1.673E-02	5.736E 00	3.566E-03	1.672E-03
0.040	5.204E 00	1.691E-02	5.221E 00	4.481E-03	1.848E-03
0.045	4.792E 00	1.710E-02	4.809E 00	5.480E-03	2.020E-03
0.050	4.455E 00	1.729E-02	4.472E 00	6.560E-03	2.189E-03
0.055	4.174E 00	1.747E-02	4.191E 00	7.715E-03	2.355E-03
0.060	3.935E 00	1.766E-02	3.953E 00	8.945E-03	2.519E-03
0.065	3.730E 00	1.784E-02	3.748E 00	1.024E-02	2.680E-03
0.070	3.553E 00	1.802E-02	3.571E 00	1.161E-02	2.839E-03
0.075	3.397E 00	1.820E-02	3.415E 00	1.304E-02	2.996E-03
0.080	3.259E 00	1.839E-02	3.278E 00	1.454E-02	3.150E-03
0.085	3.136E 00	1.852E-02	3.155E 00	1.609E-02	3.302E-03
0.090	3.027E 00	1.870E-02	3.045E 00	1.771E-02	3.452E-03
0.095	2.927E 00	1.888E-02	2.946E 00	1.938E-02	3.601E-03
0.100	2.838E 00	1.907E-02	2.857E 00	2.110E-02	3.748E-03
0.150	2.257E 00	2.094E-02	2.278E 00	4.095E-02	5.149E-03
0.200	1.961E 00	2.270E-02	1.984E 00	6.461E-02	6.446E-03
0.250	1.783E 00	2.474E-02	1.808E 00	9.110E-02	7.670E-03
0.300	1.667E 00	2.689E-02	1.694E 00	1.197E-01	8.855E-03
0.350	1.584E 00	2.918E-02	1.613E 00	1.500E-01	1.002E-02
0.400	1.526E 00	3.139E-02	1.557E 00	1.816E-01	1.116E-02
0.450	1.482E 00	3.360E-02	1.516E 00	2.142E-01	1.227E-02
0.500	1.449E 00	3.578E-02	1.485E 00	2.475E-01	1.336E-02
0.550	1.424E 00	3.795E-02	1.461E 00	2.814E-01	1.442E-02
0.600	1.403E 00	4.011E-02	1.443E 00	3.159E-01	1.546E-02
0.650	1.387E 00	4.226E-02	1.430E 00	3.507E-01	1.647E-02
0.700	1.375E 00	4.441E-02	1.419E 00	3.858E-01	1.747E-02
0.750	1.364E 00	4.655E-02	1.411E 00	4.211E-01	1.845E-02
0.800	1.356E 00	4.868E-02	1.405E 00	4.567E-01	1.941E-02
0.850	1.350E 00	5.055E-02	1.400E 00	4.923E-01	2.034E-02
0.900	1.345E 00	5.268E-02	1.397E 00	5.281E-01	2.126E-02
0.950	1.341E 00	5.482E-02	1.395E 00	5.639E-01	2.217E-02
1.000	1.337E 00	5.696E-02	1.394E 00	5.997E-01	2.307E-02
1.100	1.333E 00	6.127E-02	1.395E 00	6.714E-01	2.482E-02
1.200	1.331E 00	6.561E-02	1.397E 00	7.431E-01	2.654E-02
1.300	1.331E 00	6.997E-02	1.401E 00	8.146E-01	2.823E-02

ELECTRONS IN IRON

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.331E 00	7.436E-02	1.406E 00	8.858E-01	2.989E-02
1.500	1.333E 00	7.876E-02	1.411E 00	9.568E-01	3.152E-02
1.600	1.335E 00	8.319E-02	1.418E 00	1.028E 00	3.312E-02
1.700	1.337E 00	8.748E-02	1.425E 00	1.098E 00	3.471E-02
1.800	1.340E 00	9.197E-02	1.432E 00	1.168E 00	3.627E-02
1.900	1.343E 00	9.650E-02	1.439E 00	1.238E 00	3.781E-02
2.000	1.346E 00	1.011E-01	1.447E 00	1.307E 00	3.935E-02
2.200	1.352E 00	1.103E-01	1.462E 00	1.444E 00	4.237E-02
2.400	1.359E 00	1.197E-01	1.478E 00	1.580E 00	4.536E-02
2.600	1.365E 00	1.292E-01	1.494E 00	1.715E 00	4.831E-02
2.800	1.372E 00	1.394E-01	1.511E 00	1.848E 00	5.123E-02
3.000	1.378E 00	1.492E-01	1.527E 00	1.980E 00	5.415E-02
3.500	1.393E 00	1.739E-01	1.567E 00	2.303E 00	6.132E-02
4.000	1.406E 00	1.990E-01	1.605E 00	2.618E 00	6.835E-02
4.500	1.419E 00	2.243E-01	1.643E 00	2.926E 00	7.523E-02
5.000	1.430E 00	2.500E-01	1.680E 00	3.227E 00	8.197E-02
5.500	1.440E 00	2.762E-01	1.717E 00	3.521E 00	8.860E-02
6.000	1.450E 00	3.027E-01	1.752E 00	3.810E 00	9.512E-02
6.500	1.459E 00	3.295E-01	1.788E 00	4.092E 00	1.015E-01
7.000	1.467E 00	3.566E-01	1.823E 00	4.369E 00	1.078E-01
7.500	1.474E 00	3.841E-01	1.858E 00	4.641E 00	1.141E-01
8.000	1.481E 00	4.118E-01	1.893E 00	4.907E 00	1.202E-01
8.500	1.488E 00	4.398E-01	1.927E 00	5.169E 00	1.262E-01
9.000	1.494E 00	4.706E-01	1.964E 00	5.426E 00	1.322E-01
9.500	1.499E 00	4.992E-01	1.999E 00	5.678E 00	1.381E-01
10.000	1.505E 00	5.279E-01	2.033E 00	5.926E 00	1.440E-01
20.000	1.575E 00	1.133E 00	2.708E 00	1.017E 01	2.444E-01
30.000	1.612E 00	1.776E 00	3.388E 00	1.347E 01	3.211E-01
40.000	1.637E 00	2.443E 00	4.080E 00	1.615E 01	3.817E-01
50.000	1.656E 00	3.118E 00	4.774E 00	1.842E 01	4.308E-01
60.000	1.671E 00	3.801E 00	5.472E 00	2.037E 01	4.715E-01
80.000	1.694E 00	5.180E 00	6.874E 00	2.363E 01	5.352E-01
100.000	1.711E 00	6.570E 00	8.281E 00	2.628E 01	5.830E-01
200.000	1.763E 00	1.361E 01	1.537E 01	3.500E 01	7.157E-01
300.000	1.792E 00	2.072E 01	2.251E 01	4.034E 01	7.788E-01
400.000	1.813E 00	2.785E 01	2.966E 01	4.420E 01	8.167E-01
500.000	1.829E 00	3.498E 01	3.681E 01	4.722E 01	8.424E-01
600.000	1.842E 00	4.212E 01	4.397E 01	4.970E 01	8.610E-01
800.000	1.863E 00	5.643E 01	5.829E 01	5.364E 01	8.867E-01
1000.000	1.879E 00	7.074E 01	7.262E 01	5.671E 01	9.036E-01

ELECTRONS IN COPPER

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.328E 01	1.793E-02	1.329E 01	4.556E-04	7.967E-04
0.015	9.973E 00	1.792E-02	9.991E 00	8.949E-04	1.056E-03
0.020	8.120E 00	1.773E-02	8.137E 00	1.453E-03	1.290E-03
0.025	6.921E 00	1.790E-02	6.939E 00	2.121E-03	1.508E-03
0.030	6.078E 00	1.818E-02	6.096E 00	2.892E-03	1.720E-03
0.035	5.449E 00	1.857E-02	5.468E 00	3.760E-03	1.930E-03
0.040	4.962E 00	1.886E-02	4.981E 00	4.719E-03	2.138E-03
0.045	4.572E 00	1.914E-02	4.591E 00	5.766E-03	2.342E-03
0.050	4.252E 00	1.940E-02	4.272E 00	6.896E-03	2.544E-03
0.055	3.986E 00	1.964E-02	4.005E 00	8.106E-03	2.742E-03
0.060	3.759E 00	1.988E-02	3.779E 00	9.392E-03	2.937E-03
0.065	3.565E 00	2.011E-02	3.585E 00	1.075E-02	3.129E-03
0.070	3.396E 00	2.033E-02	3.417E 00	1.218E-02	3.318E-03
0.075	3.248E 00	2.054E-02	3.269E 00	1.368E-02	3.505E-03
0.080	3.118E 00	2.076E-02	3.138E 00	1.524E-02	3.689E-03
0.085	3.001E 00	2.084E-02	3.022E 00	1.686E-02	3.868E-03
0.090	2.896E 00	2.105E-02	2.917E 00	1.855E-02	4.046E-03
0.095	2.802E 00	2.126E-02	2.823E 00	2.029E-02	4.221E-03
0.100	2.717E 00	2.147E-02	2.738E 00	2.209E-02	4.394E-03
0.150	2.164E 00	2.359E-02	2.188E 00	4.277E-02	6.041E-03
0.200	1.882E 00	2.557E-02	1.908E 00	6.739E-02	7.560E-03
0.250	1.713E 00	2.784E-02	1.741E 00	9.492E-02	8.989E-03
0.300	1.603E 00	3.022E-02	1.634E 00	1.246E-01	1.037E-02
0.350	1.527E 00	3.275E-02	1.560E 00	1.560E-01	1.171E-02
0.400	1.473E 00	3.519E-02	1.508E 00	1.886E-01	1.302E-02
0.450	1.427E 00	3.767E-02	1.465E 00	2.222E-01	1.429E-02
0.500	1.396E 00	4.010E-02	1.436E 00	2.567E-01	1.554E-02
0.550	1.372E 00	4.251E-02	1.414E 00	2.918E-01	1.677E-02
0.600	1.353E 00	4.489E-02	1.398E 00	3.274E-01	1.796E-02
0.650	1.338E 00	4.726E-02	1.386E 00	3.633E-01	1.913E-02
0.700	1.327E 00	4.961E-02	1.376E 00	3.995E-01	2.027E-02
0.750	1.317E 00	5.195E-02	1.369E 00	4.360E-01	2.138E-02
0.800	1.310E 00	5.428E-02	1.364E 00	4.725E-01	2.247E-02
0.850	1.304E 00	5.605E-02	1.360E 00	5.093E-01	2.353E-02
0.900	1.299E 00	5.837E-02	1.358E 00	5.461E-01	2.456E-02
0.950	1.296E 00	6.070E-02	1.357E 00	5.829E-01	2.557E-02
1.000	1.293E 00	6.304E-02	1.356E 00	6.198E-01	2.658E-02
1.100	1.290E 00	6.774E-02	1.358E 00	6.935E-01	2.854E-02
1.200	1.288E 00	7.248E-02	1.361E 00	7.670E-01	3.046E-02
1.300	1.288E 00	7.725E-02	1.366E 00	8.404E-01	3.234E-02

ELECTRONS IN COPPER

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.289E 00	8.206E-02	1.371E 00	9.135E-01	3.419E-02
1.500	1.291E 00	8.689E-02	1.378E 00	9.862E-01	3.601E-02
1.600	1.293E 00	9.176E-02	1.385E 00	1.059E 00	3.780E-02
1.700	1.296E 00	9.659E-02	1.392E 00	1.131E 00	3.956E-02
1.800	1.299E 00	1.015E-01	1.400E 00	1.202E 00	4.131E-02
1.900	1.302E 00	1.065E-01	1.408E 00	1.273E 00	4.303E-02
2.000	1.305E 00	1.115E-01	1.417E 00	1.344E 00	4.474E-02
2.200	1.312E 00	1.216E-01	1.433E 00	1.485E 00	4.810E-02
2.400	1.319E 00	1.318E-01	1.450E 00	1.623E 00	5.141E-02
2.600	1.325E 00	1.421E-01	1.467E 00	1.760E 00	5.468E-02
2.800	1.332E 00	1.529E-01	1.485E 00	1.896E 00	5.791E-02
3.000	1.338E 00	1.635E-01	1.502E 00	2.030E 00	6.111E-02
3.500	1.353E 00	1.902E-01	1.544E 00	2.358E 00	6.896E-02
4.000	1.367E 00	2.173E-01	1.584E 00	2.678E 00	7.662E-02
4.500	1.380E 00	2.446E-01	1.624E 00	2.990E 00	8.409E-02
5.000	1.391E 00	2.724E-01	1.663E 00	3.294E 00	9.141E-02
5.500	1.401E 00	3.007E-01	1.702E 00	3.591E 00	9.857E-02
6.000	1.411E 00	3.292E-01	1.740E 00	3.881E 00	1.056E-01
6.500	1.419E 00	3.582E-01	1.778E 00	4.166E 00	1.125E-01
7.000	1.428E 00	3.875E-01	1.815E 00	4.444E 00	1.193E-01
7.500	1.435E 00	4.171E-01	1.852E 00	4.717E 00	1.260E-01
8.000	1.442E 00	4.470E-01	1.889E 00	4.984E 00	1.325E-01
8.500	1.449E 00	4.771E-01	1.926E 00	5.246E 00	1.390E-01
9.000	1.455E 00	5.104E-01	1.965E 00	5.503E 00	1.454E-01
9.500	1.460E 00	5.412E-01	2.002E 00	5.755E 00	1.517E-01
10.000	1.466E 00	5.722E-01	2.038E 00	6.003E 00	1.579E-01
20.000	1.535E 00	1.224E 00	2.759E 00	1.020E 01	2.632E-01
30.000	1.573E 00	1.917E 00	3.490E 00	1.342E 01	3.421E-01
40.000	1.597E 00	2.637E 00	4.234E 00	1.602E 01	4.037E-01
50.000	1.616E 00	3.365E 00	4.981E 00	1.819E 01	4.530E-01
60.000	1.631E 00	4.101E 00	5.732E 00	2.006E 01	4.936E-01
80.000	1.653E 00	5.588E 00	7.242E 00	2.316E 01	5.566E-01
100.000	1.670E 00	7.086E 00	8.756E 00	2.567E 01	6.036E-01
200.000	1.721E 00	1.468E 01	1.640E 01	3.388E 01	7.321E-01
300.000	1.750E 00	2.234E 01	2.409E 01	3.888E 01	7.925E-01
400.000	1.770E 00	3.002E 01	3.179E 01	4.249E 01	8.285E-01
500.000	1.786E 00	3.770E 01	3.949E 01	4.530E 01	8.528E-01
600.000	1.799E 00	4.540E 01	4.720E 01	4.762E 01	8.704E-01
800.000	1.819E 00	6.081E 01	6.263E 01	5.128E 01	8.945E-01
1000.000	1.835E 00	7.623E 01	7.807E 01	5.414E 01	9.104E-01

ELECTRONS IN TIN

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.056E 01	2.815E-02	1.059E 01	6.000E-04	1.633E-03
0.015	8.061E 00	2.819E-02	8.089E 00	1.146E-03	2.115E-03
0.020	6.624E 00	2.769E-02	6.652E 00	1.832E-03	2.545E-03
0.025	5.683E 00	2.826E-02	5.711E 00	2.646E-03	2.946E-03
0.030	5.013E 00	2.914E-02	5.042E 00	3.581E-03	3.348E-03
0.035	4.511E 00	3.039E-02	4.542E 00	4.627E-03	3.762E-03
0.040	4.120E 00	3.122E-02	4.151E 00	5.780E-03	4.180E-03
0.045	3.806E 00	3.195E-02	3.838E 00	7.035E-03	4.596E-03
0.050	3.547E 00	3.260E-02	3.580E 00	8.385E-03	5.008E-03
0.055	3.331E 00	3.318E-02	3.364E 00	9.827E-03	5.415E-03
0.060	3.147E 00	3.372E-02	3.181E 00	1.136E-02	5.817E-03
0.065	2.989E 00	3.422E-02	3.023E 00	1.297E-02	6.213E-03
0.070	2.851E 00	3.469E-02	2.886E 00	1.466E-02	6.603E-03
0.075	2.730E 00	3.513E-02	2.765E 00	1.643E-02	6.987E-03
0.080	2.623E 00	3.555E-02	2.658E 00	1.828E-02	7.365E-03
0.085	2.527E 00	3.559E-02	2.563E 00	2.020E-02	7.731E-03
0.090	2.441E 00	3.598E-02	2.477E 00	2.218E-02	8.090E-03
0.095	2.364E 00	3.638E-02	2.400E 00	2.423E-02	8.446E-03
0.100	2.294E 00	3.677E-02	2.330E 00	2.635E-02	8.797E-03
0.150	1.837E 00	4.054E-02	1.878E 00	5.053E-02	1.211E-02
0.200	1.604E 00	4.391E-02	1.648E 00	7.911E-02	1.513E-02
0.250	1.465E 00	4.774E-02	1.512E 00	1.109E-01	1.793E-02
0.300	1.374E 00	5.173E-02	1.425E 00	1.450E-01	2.060E-02
0.350	1.311E 00	5.599E-02	1.367E 00	1.809E-01	2.318E-02
0.400	1.266E 00	5.996E-02	1.326E 00	2.180E-01	2.567E-02
0.450	1.233E 00	6.388E-02	1.296E 00	2.562E-01	2.806E-02
0.500	1.208E 00	6.773E-02	1.276E 00	2.951E-01	3.038E-02
0.550	1.189E 00	7.152E-02	1.261E 00	3.345E-01	3.261E-02
0.600	1.175E 00	7.528E-02	1.250E 00	3.743E-01	3.476E-02
0.650	1.164E 00	7.900E-02	1.243E 00	4.144E-01	3.685E-02
0.700	1.155E 00	8.269E-02	1.238E 00	4.547E-01	3.887E-02
0.750	1.149E 00	8.636E-02	1.235E 00	4.952E-01	4.084E-02
0.800	1.144E 00	8.999E-02	1.234E 00	5.357E-01	4.275E-02
0.850	1.140E 00	9.230E-02	1.232E 00	5.763E-01	4.456E-02
0.900	1.137E 00	9.591E-02	1.233E 00	6.168E-01	4.633E-02
0.950	1.135E 00	9.954E-02	1.235E 00	6.573E-01	4.806E-02
1.000	1.134E 00	1.032E-01	1.237E 00	6.978E-01	4.975E-02
1.100	1.133E 00	1.106E-01	1.244E 00	7.784E-01	5.306E-02
1.200	1.134E 00	1.180E-01	1.252E 00	8.586E-01	5.628E-02
1.300	1.135E 00	1.255E-01	1.261E 00	9.382E-01	5.940E-02

ELECTRONS IN TIN

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.138E 00	1.331E-01	1.271E 00	1.017E 00	6.245E-02
1.500	1.141E 00	1.407E-01	1.281E 00	1.096E 00	6.544E-02
1.600	1.144E 00	1.484E-01	1.292E 00	1.173E 00	6.837E-02
1.700	1.148E 00	1.563E-01	1.304E 00	1.250E 00	7.126E-02
1.800	1.151E 00	1.641E-01	1.316E 00	1.327E 00	7.410E-02
1.900	1.155E 00	1.720E-01	1.327E 00	1.402E 00	7.689E-02
2.000	1.159E 00	1.799E-01	1.339E 00	1.477E 00	7.964E-02
2.200	1.167E 00	1.957E-01	1.363E 00	1.625E 00	8.504E-02
2.400	1.175E 00	2.117E-01	1.387E 00	1.771E 00	9.029E-02
2.600	1.183E 00	2.278E-01	1.410E 00	1.914E 00	9.543E-02
2.800	1.190E 00	2.443E-01	1.434E 00	2.054E 00	1.005E-01
3.000	1.197E 00	2.606E-01	1.458E 00	2.193E 00	1.054E-01
3.500	1.214E 00	3.018E-01	1.516E 00	2.529E 00	1.173E-01
4.000	1.229E 00	3.434E-01	1.572E 00	2.853E 00	1.288E-01
4.500	1.243E 00	3.853E-01	1.628E 00	3.165E 00	1.398E-01
5.000	1.255E 00	4.277E-01	1.683E 00	3.467E 00	1.503E-01
5.500	1.266E 00	4.706E-01	1.737E 00	3.760E 00	1.605E-01
6.000	1.277E 00	5.139E-01	1.790E 00	4.043E 00	1.704E-01
6.500	1.286E 00	5.575E-01	1.844E 00	4.319E 00	1.800E-01
7.000	1.295E 00	6.015E-01	1.896E 00	4.586E 00	1.893E-01
7.500	1.303E 00	6.459E-01	1.949E 00	4.846E 00	1.983E-01
8.000	1.310E 00	6.905E-01	2.001E 00	5.099E 00	2.070E-01
8.500	1.318E 00	7.355E-01	2.053E 00	5.346E 00	2.155E-01
9.000	1.324E 00	7.836E-01	2.108E 00	5.586E 00	2.238E-01
9.500	1.330E 00	8.292E-01	2.160E 00	5.821E 00	2.319E-01
10.000	1.336E 00	8.751E-01	2.211E 00	6.050E 00	2.398E-01
20.000	1.412E 00	1.821E 00	3.233E 00	9.764E 00	3.642E-01
30.000	1.452E 00	2.830E 00	4.282E 00	1.245E 01	4.481E-01
40.000	1.479E 00	3.895E 00	5.374E 00	1.453E 01	5.099E-01
50.000	1.498E 00	4.969E 00	6.468E 00	1.622E 01	5.575E-01
60.000	1.514E 00	6.054E 00	7.568E 00	1.765E 01	5.954E-01
80.000	1.537E 00	8.243E 00	9.780E 00	1.997E 01	6.523E-01
100.000	1.555E 00	1.044E 01	1.200E 01	2.181E 01	6.934E-01
200.000	1.605E 00	2.160E 01	2.320E 01	2.770E 01	8.001E-01
300.000	1.633E 00	3.283E 01	3.447E 01	3.121E 01	8.478E-01
400.000	1.652E 00	4.409E 01	4.574E 01	3.372E 01	8.755E-01
500.000	1.666E 00	5.537E 01	5.703E 01	3.568E 01	8.940E-01
600.000	1.678E 00	6.666E 01	6.834E 01	3.728E 01	9.072E-01
800.000	1.697E 00	8.926E 01	9.096E 01	3.980E 01	9.250E-01
1000.000	1.711E 00	1.119E 02	1.136E 02	4.177E 01	9.367E-01

ELECTRONS IN GOLD

ENERGY	STOPPING POWER			RANGE	RADIATION YIELD
	COLLISION	RADIATION	TOTAL		
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	8.647E 00	4.383E-02	8.691E 00	7.944E-04	3.182E-03
0.015	6.722E 00	4.477E-02	6.766E 00	1.453E-03	4.069E-03
0.020	5.582E 00	4.490E-02	5.627E 00	2.268E-03	4.880E-03
0.025	4.822E 00	4.578E-02	4.868E 00	3.226E-03	5.642E-03
0.030	4.276E 00	4.686E-02	4.323E 00	4.319E-03	6.389E-03
0.035	3.863E 00	4.815E-02	3.911E 00	5.537E-03	7.130E-03
0.040	3.540E 00	4.916E-02	3.589E 00	6.873E-03	7.865E-03
0.045	3.278E 00	5.010E-02	3.328E 00	8.322E-03	8.589E-03
0.050	3.063E 00	5.096E-02	3.113E 00	9.876E-03	9.301E-03
0.055	2.881E 00	5.178E-02	2.933E 00	1.153E-02	1.000E-02
0.060	2.727E 00	5.256E-02	2.780E 00	1.328E-02	1.069E-02
0.065	2.594E 00	5.330E-02	2.647E 00	1.513E-02	1.137E-02
0.070	2.478E 00	5.402E-02	2.532E 00	1.706E-02	1.204E-02
0.075	2.375E 00	5.471E-02	2.430E 00	1.908E-02	1.270E-02
0.080	2.285E 00	5.538E-02	2.340E 00	2.117E-02	1.335E-02
0.085	2.204E 00	5.586E-02	2.259E 00	2.335E-02	1.399E-02
0.090	2.131E 00	5.651E-02	2.187E 00	2.560E-02	1.461E-02
0.095	2.065E 00	5.715E-02	2.122E 00	2.792E-02	1.523E-02
0.100	2.005E 00	5.778E-02	2.063E 00	3.031E-02	1.584E-02
0.150	1.616E 00	6.388E-02	1.680E 00	5.748E-02	2.160E-02
0.200	1.416E 00	6.944E-02	1.486E 00	8.929E-02	2.682E-02
0.250	1.297E 00	7.543E-02	1.372E 00	1.244E-01	3.164E-02
0.300	1.219E 00	8.155E-02	1.301E 00	1.619E-01	3.618E-02
0.350	1.166E 00	8.790E-02	1.253E 00	2.011E-01	4.050E-02
0.400	1.127E 00	9.403E-02	1.221E 00	2.416E-01	4.464E-02
0.450	1.100E 00	1.002E-01	1.200E 00	2.829E-01	4.859E-02
0.500	1.079E 00	1.062E-01	1.185E 00	3.248E-01	5.239E-02
0.550	1.062E 00	1.120E-01	1.174E 00	3.672E-01	5.604E-02
0.600	1.050E 00	1.178E-01	1.168E 00	4.099E-01	5.955E-02
0.650	1.041E 00	1.235E-01	1.164E 00	4.528E-01	6.293E-02
0.700	1.034E 00	1.291E-01	1.163E 00	4.958E-01	6.619E-02
0.750	1.028E 00	1.346E-01	1.163E 00	5.388E-01	6.934E-02
0.800	1.024E 00	1.401E-01	1.165E 00	5.818E-01	7.238E-02
0.850	1.022E 00	1.427E-01	1.164E 00	6.247E-01	7.522E-02
0.900	1.020E 00	1.481E-01	1.168E 00	6.676E-01	7.797E-02
0.950	1.018E 00	1.535E-01	1.172E 00	7.104E-01	8.065E-02
1.000	1.018E 00	1.590E-01	1.177E 00	7.529E-01	8.327E-02
1.100	1.018E 00	1.700E-01	1.187E 00	8.376E-01	8.835E-02
1.200	1.019E 00	1.811E-01	1.200E 00	9.213E-01	9.324E-02
1.300	1.021E 00	1.923E-01	1.213E 00	1.004E 00	9.797E-02

ELECTRONS IN GOLD

ENERGY	STOPPING POWER			RANGE	RADIATION YIELD
	COLLISION	RADIATION	TOTAL		
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.024E 00	2.036E-01	1.227E 00	1.086E 00	1.026E-01
1.500	1.027E 00	2.150E-01	1.242E 00	1.167E 00	1.070E-01
1.600	1.030E 00	2.265E-01	1.257E 00	1.247E 00	1.114E-01
1.700	1.034E 00	2.385E-01	1.273E 00	1.326E 00	1.156E-01
1.800	1.038E 00	2.502E-01	1.288E 00	1.404E 00	1.198E-01
1.900	1.042E 00	2.618E-01	1.303E 00	1.482E 00	1.239E-01
2.000	1.046E 00	2.735E-01	1.319E 00	1.558E 00	1.279E-01
2.200	1.053E 00	2.970E-01	1.350E 00	1.708E 00	1.357E-01
2.400	1.061E 00	3.206E-01	1.382E 00	1.854E 00	1.433E-01
2.600	1.068E 00	3.442E-01	1.413E 00	1.997E 00	1.505E-01
2.800	1.076E 00	3.684E-01	1.444E 00	2.137E 00	1.576E-01
3.000	1.082E 00	3.923E-01	1.475E 00	2.274E 00	1.645E-01
3.500	1.099E 00	4.520E-01	1.551E 00	2.605E 00	1.808E-01
4.000	1.113E 00	5.120E-01	1.625E 00	2.920E 00	1.961E-01
4.500	1.126E 00	5.719E-01	1.698E 00	3.221E 00	2.106E-01
5.000	1.138E 00	6.322E-01	1.770E 00	3.509E 00	2.242E-01
5.500	1.148E 00	6.930E-01	1.841E 00	3.786E 00	2.372E-01
6.000	1.158E 00	7.541E-01	1.912E 00	4.053E 00	2.496E-01
6.500	1.167E 00	8.155E-01	1.983E 00	4.310E 00	2.614E-01
7.000	1.175E 00	8.773E-01	2.053E 00	4.557E 00	2.727E-01
7.500	1.183E 00	9.393E-01	2.122E 00	4.797E 00	2.835E-01
8.000	1.190E 00	1.002E 00	2.192E 00	5.029E 00	2.939E-01
8.500	1.197E 00	1.064E 00	2.261E 00	5.253E 00	3.039E-01
9.000	1.203E 00	1.128E 00	2.331E 00	5.471E 00	3.135E-01
9.500	1.209E 00	1.191E 00	2.400E 00	5.682E 00	3.228E-01
10.000	1.215E 00	1.254E 00	2.469E 00	5.888E 00	3.318E-01
20.000	1.286E 00	2.553E 00	3.839E 00	9.108E 00	4.642E-01
30.000	1.324E 00	3.918E 00	5.242E 00	1.133E 01	5.461E-01
40.000	1.350E 00	5.345E 00	6.694E 00	1.302E 01	6.033E-01
50.000	1.368E 00	6.822E 00	8.190E 00	1.436E 01	6.460E-01
60.000	1.383E 00	8.310E 00	9.693E 00	1.548E 01	6.793E-01
80.000	1.405E 00	1.132E 01	1.272E 01	1.728E 01	7.281E-01
100.000	1.422E 00	1.434E 01	1.576E 01	1.869E 01	7.626E-01
200.000	1.470E 00	2.963E 01	3.111E 01	2.312E 01	8.492E-01
300.000	1.497E 00	4.504E 01	4.653E 01	2.574E 01	8.866E-01
400.000	1.515E 00	6.046E 01	6.197E 01	2.759E 01	9.079E-01
500.000	1.529E 00	7.591E 01	7.744E 01	2.903E 01	9.220E-01
600.000	1.541E 00	9.138E 01	9.292E 01	3.021E 01	9.320E-01
800.000	1.558E 00	1.223E 02	1.239E 02	3.207E 01	9.454E-01
1000.000	1.572E 00	1.533E 02	1.549E 02	3.351E 01	9.540E-01

ELECTRONS IN LEAD

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	8.419E 00	4.513E-02	8.464E 00	8.251E-04	3.372E-03
0.015	6.556E 00	4.614E-02	6.602E 00	1.501E-03	4.306E-03
0.020	5.450E 00	4.620E-02	5.496E 00	2.335E-03	5.158E-03
0.025	4.711E 00	4.713E-02	4.758E 00	3.316E-03	5.958E-03
0.030	4.179E 00	4.827E-02	4.228E 00	4.434E-03	6.742E-03
0.035	3.777E 00	4.967E-02	3.827E 00	5.679E-03	7.522E-03
0.040	3.462E 00	5.074E-02	3.513E 00	7.044E-03	8.296E-03
0.045	3.207E 00	5.172E-02	3.259E 00	8.524E-03	9.059E-03
0.050	2.997E 00	5.262E-02	3.049E 00	1.011E-02	9.810E-03
0.055	2.820E 00	5.346E-02	2.873E 00	1.180E-02	1.055E-02
0.060	2.669E 00	5.426E-02	2.724E 00	1.359E-02	1.127E-02
0.065	2.539E 00	5.503E-02	2.594E 00	1.547E-02	1.199E-02
0.070	2.426E 00	5.576E-02	2.481E 00	1.744E-02	1.269E-02
0.075	2.326E 00	5.647E-02	2.382E 00	1.950E-02	1.339E-02
0.080	2.237E 00	5.716E-02	2.294E 00	2.164E-02	1.407E-02
0.085	2.158E 00	5.745E-02	2.216E 00	2.386E-02	1.473E-02
0.090	2.087E 00	5.812E-02	2.145E 00	2.615E-02	1.539E-02
0.095	2.023E 00	5.878E-02	2.082E 00	2.852E-02	1.603E-02
0.100	1.964E 00	5.944E-02	2.024E 00	3.096E-02	1.667E-02
0.150	1.584E 00	6.593E-02	1.650E 00	5.863E-02	2.270E-02
0.200	1.389E 00	7.251E-02	1.461E 00	9.100E-02	2.824E-02
0.250	1.272E 00	7.864E-02	1.350E 00	1.267E-01	3.339E-02
0.300	1.196E 00	8.460E-02	1.280E 00	1.648E-01	3.820E-02
0.350	1.143E 00	9.041E-02	1.234E 00	2.046E-01	4.270E-02
0.400	1.106E 00	9.623E-02	1.203E 00	2.457E-01	4.695E-02
0.450	1.079E 00	1.020E-01	1.181E 00	2.877E-01	5.098E-02
0.500	1.059E 00	1.078E-01	1.167E 00	3.303E-01	5.482E-02
0.550	1.044E 00	1.136E-01	1.158E 00	3.733E-01	5.850E-02
0.600	1.033E 00	1.194E-01	1.152E 00	4.166E-01	6.204E-02
0.650	1.024E 00	1.252E-01	1.149E 00	4.601E-01	6.544E-02
0.700	1.018E 00	1.310E-01	1.149E 00	5.036E-01	6.873E-02
0.750	1.013E 00	1.367E-01	1.150E 00	5.471E-01	7.191E-02
0.800	1.010E 00	1.425E-01	1.153E 00	5.906E-01	7.500E-02
0.850	1.008E 00	1.487E-01	1.157E 00	6.339E-01	7.801E-02
0.900	1.003E 00	1.545E-01	1.157E 00	6.771E-01	8.096E-02
0.950	1.002E 00	1.603E-01	1.162E 00	7.202E-01	8.384E-02
1.000	1.002E 00	1.661E-01	1.168E 00	7.631E-01	8.666E-02
1.100	1.003E 00	1.776E-01	1.180E 00	8.483E-01	9.208E-02
1.200	1.005E 00	1.891E-01	1.194E 00	9.326E-01	9.728E-02
1.300	1.008E 00	2.005E-01	1.208E 00	1.016E 00	1.023E-01

ELECTRONS IN LEAD

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.011E 00	2.120E-01	1.223E 00	1.098E 00	1.071E-01
1.500	1.015E 00	2.234E-01	1.238E 00	1.179E 00	1.117E-01
1.600	1.019E 00	2.348E-01	1.254E 00	1.260E 00	1.163E-01
1.700	1.023E 00	2.457E-01	1.269E 00	1.339E 00	1.206E-01
1.800	1.027E 00	2.571E-01	1.284E 00	1.417E 00	1.249E-01
1.900	1.032E 00	2.686E-01	1.300E 00	1.495E 00	1.290E-01
2.000	1.036E 00	2.802E-01	1.316E 00	1.571E 00	1.330E-01
2.200	1.044E 00	3.035E-01	1.348E 00	1.721E 00	1.409E-01
2.400	1.053E 00	3.270E-01	1.380E 00	1.868E 00	1.484E-01
2.600	1.061E 00	3.508E-01	1.412E 00	2.011E 00	1.556E-01
2.800	1.069E 00	3.758E-01	1.444E 00	2.151E 00	1.627E-01
3.000	1.076E 00	3.999E-01	1.476E 00	2.288E 00	1.695E-01
3.500	1.093E 00	4.603E-01	1.554E 00	2.618E 00	1.858E-01
4.000	1.109E 00	5.212E-01	1.630E 00	2.933E 00	2.011E-01
4.500	1.123E 00	5.822E-01	1.705E 00	3.232E 00	2.155E-01
5.000	1.135E 00	6.437E-01	1.779E 00	3.519E 00	2.292E-01
5.500	1.147E 00	7.056E-01	1.852E 00	3.795E 00	2.421E-01
6.000	1.157E 00	7.678E-01	1.925E 00	4.060E 00	2.544E-01
6.500	1.167E 00	8.304E-01	1.997E 00	4.315E 00	2.662E-01
7.000	1.176E 00	8.933E-01	2.069E 00	4.561E 00	2.775E-01
7.500	1.184E 00	9.565E-01	2.140E 00	4.798E 00	2.882E-01
8.000	1.191E 00	1.020E 00	2.211E 00	5.028E 00	2.986E-01
8.500	1.199E 00	1.084E 00	2.282E 00	5.251E 00	3.086E-01
9.000	1.205E 00	1.146E 00	2.352E 00	5.466E 00	3.182E-01
9.500	1.212E 00	1.211E 00	2.422E 00	5.676E 00	3.274E-01
10.000	1.217E 00	1.275E 00	2.493E 00	5.879E 00	3.363E-01
20.000	1.293E 00	2.614E 00	3.907E 00	9.060E 00	4.682E-01
30.000	1.334E 00	4.003E 00	5.337E 00	1.124E 01	5.499E-01
40.000	1.360E 00	5.422E 00	6.783E 00	1.290E 01	6.065E-01
50.000	1.380E 00	6.923E 00	8.303E 00	1.423E 01	6.487E-01
60.000	1.396E 00	8.434E 00	9.829E 00	1.534E 01	6.817E-01
80.000	1.419E 00	1.148E 01	1.290E 01	1.711E 01	7.301E-01
100.000	1.436E 00	1.455E 01	1.599E 01	1.850E 01	7.642E-01
200.000	1.485E 00	3.008E 01	3.156E 01	2.287E 01	8.502E-01
300.000	1.511E 00	4.571E 01	4.722E 01	2.544E 01	8.873E-01
400.000	1.529E 00	6.136E 01	6.289E 01	2.727E 01	9.085E-01
500.000	1.543E 00	7.704E 01	7.858E 01	2.869E 01	9.225E-01
600.000	1.554E 00	9.274E 01	9.430E 01	2.985E 01	9.324E-01
800.000	1.571E 00	1.242E 02	1.257E 02	3.168E 01	9.457E-01
1000.000	1.585E 00	1.556E 02	1.572E 02	3.310E 01	9.543E-01

ELECTRONS IN WATER

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	2.320E 01	5.069E-03	2.321E 01	2.436E-04	1.245E-04
0.015	1.690E 01	4.969E-03	1.691E 01	4.998E-04	1.686E-04
0.020	1.350E 01	4.904E-03	1.351E 01	8.331E-04	2.087E-04
0.025	1.136E 01	4.858E-03	1.137E 01	1.238E-03	2.460E-04
0.030	9.879E 00	4.825E-03	9.884E 00	1.712E-03	2.814E-04
0.035	8.789E 00	4.792E-03	8.794E 00	2.249E-03	3.150E-04
0.040	7.951E 00	4.788E-03	7.956E 00	2.848E-03	3.473E-04
0.045	7.287E 00	4.796E-03	7.292E 00	3.505E-03	3.787E-04
0.050	6.747E 00	4.812E-03	6.751E 00	4.218E-03	4.093E-04
0.055	6.298E 00	4.835E-03	6.303E 00	4.986E-03	4.394E-04
0.060	5.919E 00	4.863E-03	5.924E 00	5.804E-03	4.689E-04
0.065	5.596E 00	4.896E-03	5.600E 00	6.673E-03	4.981E-04
0.070	5.315E 00	4.932E-03	5.320E 00	7.589E-03	5.268E-04
0.075	5.070E 00	4.970E-03	5.075E 00	8.552E-03	5.552E-04
0.080	4.854E 00	5.011E-03	4.859E 00	9.559E-03	5.834E-04
0.085	4.662E 00	5.044E-03	4.667E 00	1.061E-02	6.111E-04
0.090	4.491E 00	5.089E-03	4.496E 00	1.170E-02	6.386E-04
0.095	4.336E 00	5.136E-03	4.341E 00	1.283E-02	6.660E-04
0.100	4.197E 00	5.184E-03	4.202E 00	1.400E-02	6.931E-04
0.150	3.299E 00	5.716E-03	3.304E 00	2.760E-02	9.565E-04
0.200	2.844E 00	6.286E-03	2.850E 00	4.400E-02	1.210E-03
0.250	2.573E 00	6.909E-03	2.580E 00	6.250E-02	1.456E-03
0.300	2.394E 00	7.561E-03	2.401E 00	8.263E-02	1.699E-03
0.350	2.271E 00	8.243E-03	2.280E 00	1.040E-01	1.940E-03
0.400	2.181E 00	8.921E-03	2.190E 00	1.264E-01	2.178E-03
0.450	2.113E 00	9.613E-03	2.123E 00	1.496E-01	2.414E-03
0.500	2.061E 00	1.030E-02	2.071E 00	1.735E-01	2.647E-03
0.550	2.021E 00	1.099E-02	2.032E 00	1.979E-01	2.879E-03
0.600	1.989E 00	1.168E-02	2.000E 00	2.227E-01	3.107E-03
0.650	1.963E 00	1.237E-02	1.975E 00	2.478E-01	3.334E-03
0.700	1.942E 00	1.306E-02	1.955E 00	2.733E-01	3.558E-03
0.750	1.925E 00	1.376E-02	1.939E 00	2.990E-01	3.780E-03
0.800	1.911E 00	1.445E-02	1.926E 00	3.248E-01	4.000E-03
0.850	1.900E 00	1.515E-02	1.915E 00	3.509E-01	4.218E-03
0.900	1.890E 00	1.586E-02	1.906E 00	3.771E-01	4.435E-03
0.950	1.882E 00	1.656E-02	1.899E 00	4.033E-01	4.650E-03
1.000	1.876E 00	1.727E-02	1.893E 00	4.297E-01	4.863E-03
1.100	1.866E 00	1.869E-02	1.885E 00	4.827E-01	5.287E-03
1.200	1.860E 00	2.012E-02	1.880E 00	5.358E-01	5.705E-03
1.300	1.856E 00	2.156E-02	1.877E 00	5.890E-01	6.120E-03

ELECTRONS IN WATER

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.853E 00	2.301E-02	1.876E 00	6.423E-01	6.531E-03
1.500	1.852E 00	2.447E-02	1.877E 00	6.956E-01	6.939E-03
1.600	1.852E 00	2.593E-02	1.878E 00	7.489E-01	7.344E-03
1.700	1.853E 00	2.736E-02	1.880E 00	8.021E-01	7.745E-03
1.800	1.854E 00	2.885E-02	1.883E 00	8.553E-01	8.145E-03
1.900	1.856E 00	3.035E-02	1.886E 00	9.083E-01	8.543E-03
2.000	1.858E 00	3.187E-02	1.889E 00	9.613E-01	8.940E-03
2.200	1.862E 00	3.494E-02	1.897E 00	1.067E 00	9.731E-03
2.400	1.867E 00	3.806E-02	1.905E 00	1.172E 00	1.052E-02
2.600	1.873E 00	4.123E-02	1.914E 00	1.277E 00	1.131E-02
2.800	1.878E 00	4.432E-02	1.922E 00	1.381E 00	1.209E-02
3.000	1.884E 00	4.757E-02	1.931E 00	1.485E 00	1.288E-02
3.500	1.897E 00	5.593E-02	1.953E 00	1.742E 00	1.484E-02
4.000	1.909E 00	6.458E-02	1.974E 00	1.997E 00	1.682E-02
4.500	1.920E 00	7.356E-02	1.994E 00	2.249E 00	1.882E-02
5.000	1.931E 00	8.270E-02	2.014E 00	2.499E 00	2.083E-02
5.500	1.940E 00	9.202E-02	2.032E 00	2.746E 00	2.287E-02
6.000	1.949E 00	1.015E-01	2.051E 00	2.991E 00	2.491E-02
6.500	1.957E 00	1.111E-01	2.068E 00	3.234E 00	2.696E-02.
7.000	1.964E 00	1.209E-01	2.085E 00	3.474E 00	2.902E-02
7.500	1.971E 00	1.307E-01	2.102E 00	3.713E 00	3.109E-02
8.000	1.978E 00	1.408E-01	2.119E 00	3.950E 00	3.317E-02
8.500	1.984E 00	1.509E-01	2.135E 00	4.185E 00	3.525E-02
9.000	1.989E 00	1.621E-01	2.152E 00	4.418E 00	3.735E-02
9.500	1.995E 00	1.724E-01	2.167E 00	4.650E 00	3.946E-02
10.000	2.000E 00	1.829E-01	2.183E 00	4.880E 00	4.157E-02
20.000	2.064E 00	4.055E-01	2.470E 00	9.180E 00	8.311E-02
30.000	2.100E 00	6.419E-01	2.742E 00	1.302E 01	1.221E-01
40.000	2.125E 00	8.849E-01	3.010E 00	1.650E 01	1.578E-01
50.000	2.144E 00	1.132E 00	3.276E 00	1.968E 01	1.903E-01
60.000	2.160E 00	1.383E 00	3.543E 00	2.262E 01	2.200E-01
80.000	2.185E 00	1.890E 00	4.075E 00	2.788E 01	2.722E-01
100.000	2.204E 00	2.403E 00	4.607E 00	3.249E 01	3.165E-01
200.000	2.263E 00	5.010E 00	7.273E 00	4.962E 01	4.669E-01
300.000	2.298E 00	7.648E 00	9.946E 00	6.133E 01	5.556E-01
400.000	2.322E 00	1.030E 01	1.262E 01	7.023E 01	6.152E-01
500.000	2.341E 00	1.296E 01	1.530E 01	7.742E 01	6.587E-01
600.000	2.357E 00	1.562E 01	1.798E 01	8.344E 01	6.920E-01
800.000	2.382E 00	2.095E 01	2.333E 01	9.318E 01	7.401E-01
1000.000	2.401E 00	2.629E 01	2.869E 01	1.009E 02	7.737E-01

ELECTRONS IN SODIUM IODIDE

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.131E 01	2.643E-02	1.134E 01	5.494E-04	1.398E-03
0.015	8.579E 00	2.683E-02	8.606E 00	1.062E-03	1.842E-03
0.020	7.025E 00	2.711E-02	7.053E 00	1.707E-03	2.253E-03
0.025	6.012E 00	2.761E-02	6.040E 00	2.476E-03	2.644E-03
0.030	5.295E 00	2.816E-02	5.323E 00	3.361E-03	3.025E-03
0.035	4.758E 00	2.878E-02	4.787E 00	4.353E-03	3.400E-03
0.040	4.340E 00	2.931E-02	4.370E 00	5.448E-03	3.771E-03
0.045	4.005E 00	2.980E-02	4.035E 00	6.640E-03	4.135E-03
0.050	3.730E 00	3.027E-02	3.761E 00	7.925E-03	4.493E-03
0.055	3.500E 00	3.072E-02	3.531E 00	9.298E-03	4.846E-03
0.060	3.305E 00	3.114E-02	3.336E 00	1.076E-02	5.194E-03
0.065	3.137E 00	3.155E-02	3.169E 00	1.229E-02	5.536E-03
0.070	2.991E 00	3.195E-02	3.023E 00	1.391E-02	5.874E-03
0.075	2.863E 00	3.234E-02	2.895E 00	1.560E-02	6.207E-03
0.080	2.749E 00	3.272E-02	2.782E 00	1.736E-02	6.536E-03
0.085	2.648E 00	3.301E-02	2.681E 00	1.919E-02	6.859E-03
0.090	2.557E 00	3.338E-02	2.591E 00	2.109E-02	7.178E-03
0.095	2.475E 00	3.375E-02	2.509E 00	2.305E-02	7.493E-03
0.100	2.401E 00	3.411E-02	2.435E 00	2.508E-02	7.805E-03
0.150	1.920E 00	3.762E-02	1.957E 00	4.826E-02	1.076E-02
0.200	1.673E 00	4.078E-02	1.714E 00	7.571E-02	1.346E-02
0.250	1.526E 00	4.433E-02	1.571E 00	1.063E-01	1.597E-02
0.300	1.430E 00	4.801E-02	1.478E 00	1.391E-01	1.837E-02
0.350	1.364E 00	5.189E-02	1.416E 00	1.737E-01	2.068E-02
0.400	1.317E 00	5.559E-02	1.373E 00	2.096E-01	2.292E-02
0.450	1.282E 00	5.930E-02	1.342E 00	2.465E-01	2.508E-02
0.500	1.256E 00	6.293E-02	1.319E 00	2.841E-01	2.717E-02
0.550	1.237E 00	6.649E-02	1.303E 00	3.223E-01	2.919E-02
0.600	1.221E 00	7.002E-02	1.291E 00	3.608E-01	3.114E-02
0.650	1.210E 00	7.350E-02	1.283E 00	3.997E-01	3.304E-02
0.700	1.201E 00	7.694E-02	1.278E 00	4.387E-01	3.487E-02
0.750	1.195E 00	8.036E-02	1.275E 00	4.779E-01	3.666E-02
0.800	1.190E 00	8.375E-02	1.273E 00	5.171E-01	3.839E-02
0.850	1.186E 00	8.578E-02	1.272E 00	5.564E-01	4.003E-02
0.900	1.183E 00	8.913E-02	1.272E 00	5.957E-01	4.162E-02
0.950	1.181E 00	9.250E-02	1.274E 00	6.350E-01	4.319E-02
1.000	1.180E 00	9.589E-02	1.276E 00	6.742E-01	4.472E-02
1.100	1.179E 00	1.027E-01	1.281E 00	7.525E-01	4.772E-02
1.200	1.179E 00	1.096E-01	1.289E 00	8.303E-01	5.063E-02
1.300	1.181E 00	1.166E-01	1.297E 00	9.076E-01	5.346E-02

ELECTRONS IN SODIUM IODIDE

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.183E 00	1.237E-01	1.307E 00	9.844E-01	5.623E-02
1.500	1.186E 00	1.308E-01	1.317E 00	1.061E 00	5.895E-02
1.600	1.190E 00	1.379E-01	1.328E 00	1.136E 00	6.161E-02
1.700	1.193E 00	1.452E-01	1.339E 00	1.211E 00	6.424E-02
1.800	1.197E 00	1.525E-01	1.350E 00	1.286E 00	6.682E-02
1.900	1.201E 00	1.598E-01	1.361E 00	1.359E 00	6.937E-02
2.000	1.205E 00	1.671E-01	1.372E 00	1.433E 00	7.188E-02
2.200	1.213E 00	1.818E-01	1.395E 00	1.577E 00	7.680E-02
2.400	1.222E 00	1.967E-01	1.418E 00	1.719E 00	8.161E-02
2.600	1.229E 00	2.117E-01	1.441E 00	1.859E 00	8.632E-02
2.800	1.237E 00	2.272E-01	1.464E 00	1.997E 00	9.093E-02
3.000	1.245E 00	2.424E-01	1.487E 00	2.132E 00	9.548E-02
3.500	1.262E 00	2.807E-01	1.543E 00	2.463E 00	1.065E-01
4.000	1.278E 00	3.194E-01	1.597E 00	2.781E 00	1.171E-01
4.500	1.292E 00	3.581E-01	1.650E 00	3.089E 00	1.272E-01
5.000	1.305E 00	3.974E-01	1.702E 00	3.387E 00	1.370E-01
5.500	1.316E 00	4.371E-01	1.754E 00	3.677E 00	1.465E-01
6.000	1.327E 00	4.771E-01	1.804E 00	3.958E 00	1.557E-01
6.500	1.337E 00	5.176E-01	1.855E 00	4.231E 00	1.647E-01
7.000	1.346E 00	5.584E-01	1.905E 00	4.497E 00	1.733E-01
7.500	1.355E 00	5.995E-01	1.954E 00	4.756E 00	1.818E-01
8.000	1.363E 00	6.409E-01	2.004E 00	5.009E 00	1.900E-01
8.500	1.370E 00	6.826E-01	2.053E 00	5.256E 00	1.980E-01
9.000	1.377E 00	7.284E-01	2.105E 00	5.496E 00	2.059E-01
9.500	1.383E 00	7.708E-01	2.154E 00	5.731E 00	2.136E-01
10.000	1.390E 00	8.134E-01	2.203E 00	5.960E 00	2.211E-01
20.000	1.469E 00	1.690E 00	3.159E 00	9.726E 00	3.409E-01
30.000	1.511E 00	2.625E 00	4.136E 00	1.249E 01	4.234E-01
40.000	1.539E 00	3.614E 00	5.153E 00	1.465E 01	4.851E-01
50.000	1.560E 00	4.610E 00	6.170E 00	1.642E 01	5.332E-01
60.000	1.576E 00	5.617E 00	7.193E 00	1.792E 01	5.718E-01
80.000	1.601E 00	7.648E 00	9.249E 00	2.037E 01	6.303E-01
100.000	1.619E 00	9.690E 00	1.131E 01	2.232E 01	6.728E-01
200.000	1.671E 00	2.004E 01	2.171E 01	2.859E 01	7.848E-01
300.000	1.699E 00	3.047E 01	3.217E 01	3.235E 01	8.354E-01
400.000	1.719E 00	4.092E 01	4.264E 01	3.504E 01	8.651E-01
500.000	1.733E 00	5.140E 01	5.313E 01	3.714E 01	8.848E-01
600.000	1.745E 00	6.188E 01	6.362E 01	3.886E 01	8.990E-01
800.000	1.764E 00	8.286E 01	8.463E 01	4.157E 01	9.183E-01
1000.000	1.779E 00	1.038E 02	1.056E 02	4.368E 01	9.309E-01

ELECTRONS IN POLYETHYLENE

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	2.465E 01	3.784E-03	2.465E 01	2.282E-04	8.747E-05
0.015	1.791E 01	3.709E-03	1.792E 01	4.697E-04	1.185E-04
0.020	1.429E 01	3.667E-03	1.430E 01	7.845E-04	1.469E-04
0.025	1.201E 01	3.638E-03	1.202E 01	1.168E-03	1.735E-04
0.030	1.044E 01	3.619E-03	1.044E 01	1.616E-03	1.987E-04
0.035	9.279E 00	3.602E-03	9.283E 00	2.125E-03	2.228E-04
0.040	8.390E 00	3.601E-03	8.394E 00	2.692E-03	2.460E-04
0.045	7.686E 00	3.606E-03	7.690E 00	3.315E-03	2.686E-04
0.050	7.113E 00	3.618E-03	7.117E 00	3.992E-03	2.906E-04
0.055	6.638E 00	3.633E-03	6.641E 00	4.720E-03	3.122E-04
0.060	6.237E 00	3.653E-03	6.241E 00	5.497E-03	3.333E-04
0.065	5.894E 00	3.675E-03	5.898E 00	6.321E-03	3.542E-04
0.070	5.598E 00	3.699E-03	5.601E 00	7.192E-03	3.747E-04
0.075	5.338E 00	3.725E-03	5.342E 00	8.106E-03	3.950E-04
0.080	5.110E 00	3.753E-03	5.114E 00	9.063E-03	4.150E-04
0.085	4.907E 00	3.762E-03	4.911E 00	1.006E-02	4.346E-04
0.090	4.725E 00	3.793E-03	4.729E 00	1.110E-02	4.541E-04
0.095	4.562E 00	3.825E-03	4.566E 00	1.218E-02	4.733E-04
0.100	4.415E 00	3.859E-03	4.419E 00	1.329E-02	4.924E-04
0.150	3.466E 00	4.245E-03	3.470E 00	2.623E-02	6.780E-04
0.200	2.986E 00	4.674E-03	2.990E 00	4.185E-02	8.570E-04
0.250	2.700E 00	5.136E-03	2.705E 00	5.949E-02	1.032E-03
0.300	2.513E 00	5.617E-03	2.518E 00	7.869E-02	1.204E-03
0.350	2.379E 00	6.118E-03	2.385E 00	9.911E-02	1.375E-03
0.400	2.280E 00	6.620E-03	2.287E 00	1.205E-01	1.544E-03
0.450	2.206E 00	7.133E-03	2.213E 00	1.428E-01	1.712E-03
0.500	2.148E 00	7.646E-03	2.156E 00	1.657E-01	1.879E-03
0.550	2.103E 00	8.162E-03	2.111E 00	1.891E-01	2.046E-03
0.600	2.067E 00	8.681E-03	2.076E 00	2.130E-01	2.210E-03
0.650	2.038E 00	9.203E-03	2.047E 00	2.373E-01	2.374E-03
0.700	2.014E 00	9.729E-03	2.024E 00	2.618E-01	2.537E-03
0.750	1.995E 00	1.026E-02	2.005E 00	2.867E-01	2.698E-03
0.800	1.979E 00	1.079E-02	1.989E 00	3.117E-01	2.859E-03
0.850	1.965E 00	1.133E-02	1.977E 00	3.369E-01	3.019E-03
0.900	1.954E 00	1.187E-02	1.966E 00	3.623E-01	3.179E-03
0.950	1.945E 00	1.241E-02	1.957E 00	3.878E-01	3.337E-03
1.000	1.937E 00	1.296E-02	1.950E 00	4.134E-01	3.495E-03
1.100	1.925E 00	1.405E-02	1.939E 00	4.648E-01	3.809E-03
1.200	1.917E 00	1.516E-02	1.932E 00	5.165E-01	4.120E-03
1.300	1.912E 00	1.628E-02	1.928E 00	5.683E-01	4.430E-03

ELECTRONS IN POLYETHYLENE

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.908E 00	1.741E-02	1.926E 00	6.202E-01	4.738E-03
1.500	1.906E 00	1.855E-02	1.925E 00	6.721E-01	5.044E-03
1.600	1.906E 00	1.969E-02	1.925E 00	7.241E-01	5.350E-03
1.700	1.906E 00	2.082E-02	1.926E 00	7.760E-01	5.654E-03
1.800	1.906E 00	2.199E-02	1.928E 00	8.279E-01	5.957E-03
1.900	1.907E 00	2.317E-02	1.931E 00	8.797E-01	6.259E-03
2.000	1.909E 00	2.437E-02	1.933E 00	9.315E-01	6.561E-03
2.200	1.913E 00	2.678E-02	1.940E 00	1.035E 00	7.165E-03
2.400	1.918E 00	2.924E-02	1.947E 00	1.138E 00	7.769E-03
2.600	1.923E 00	3.174E-02	1.955E 00	1.240E 00	8.374E-03
2.800	1.928E 00	3.419E-02	1.963E 00	1.342E 00	8.979E-03
3.000	1.934E 00	3.676E-02	1.971E 00	1.444E 00	9.583E-03
3.500	1.947E 00	4.337E-02	1.990E 00	1.696E 00	1.110E-02
4.000	1.960E 00	5.022E-02	2.010E 00	1.946E 00	1.264E-02
4.500	1.971E 00	5.734E-02	2.029E 00	2.194E 00	1.419E-02
5.000	1.982E 00	6.458E-02	2.047E 00	2.439E 00	1.576E-02
5.500	1.992E 00	7.196E-02	2.064E 00	2.683E 00	1.735E-02
6.000	2.002E 00	7.946E-02	2.081E 00	2.924E 00	1.894E-02
6.500	2.010E 00	8.707E-02	2.097E 00	3.163E 00	2.055E-02
7.000	2.018E 00	9.479E-02	2.113E 00	3.401E 00	2.217E-02
7.500	2.025E 00	1.026E-01	2.128E 00	3.637E 00	2.379E-02
8.000	2.032E 00	1.105E-01	2.143E 00	3.871E 00	2.543E-02
8.500	2.039E 00	1.185E-01	2.157E 00	4.103E 00	2.706E-02
9.000	2.045E 00	1.272E-01	2.172E 00	4.334E 00	2.871E-02
9.500	2.050E 00	1.354E-01	2.186E 00	4.564E 00	3.037E-02
10.000	2.056E 00	1.437E-01	2.200E 00	4.792E 00	3.204E-02
20.000	2.125E 00	3.194E-01	2.445E 00	9.096E 00	6.519E-02
30.000	2.163E 00	5.063E-01	2.670E 00	1.301E 01	9.704E-02
40.000	2.189E 00	6.986E-01	2.888E 00	1.661E 01	1.269E-01
50.000	2.209E 00	8.947E-01	3.104E 00	1.995E 01	1.546E-01
60.000	2.225E 00	1.093E 00	3.319E 00	2.306E 01	1.804E-01
80.000	2.251E 00	1.496E 00	3.746E 00	2.873E 01	2.267E-01
100.000	2.270E 00	1.902E 00	4.173E 00	3.379E 01	2.670E-01
200.000	2.331E 00	3.973E 00	6.305E 00	5.314E 01	4.107E-01
300.000	2.367E 00	6.071E 00	8.438E 00	6.681E 01	5.001E-01
400.000	2.392E 00	8.179E 00	1.057E 01	7.737E 01	5.622E-01
500.000	2.412E 00	1.029E 01	1.270E 01	8.599E 01	6.084E-01
600.000	2.428E 00	1.241E 01	1.484E 01	9.327E 01	6.443E-01
800.000	2.453E 00	1.666E 01	1.911E 01	1.051E 02	6.971E-01
1000.000	2.473E 00	2.090E 01	2.338E 01	1.146E 02	7.344E-01

ELECTRONS IN POLYSTYRENE

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	2.260E 01	3.926E-03	2.261E 01	2.499E-04	9.940E-05
0.015	1.646E 01	3.846E-03	1.646E 01	5.129E-04	1.343E-04
0.020	1.315E 01	3.799E-03	1.315E 01	8.553E-04	1.661E-04
0.025	1.106E 01	3.768E-03	1.106E 01	1.272E-03	1.959E-04
0.030	9.617E 00	3.747E-03	9.620E 00	1.758E-03	2.241E-04
0.035	8.554E 00	3.728E-03	8.558E 00	2.310E-03	2.510E-04
0.040	7.739E 00	3.726E-03	7.743E 00	2.925E-03	2.770E-04
0.045	7.092E 00	3.731E-03	7.096E 00	3.601E-03	3.021E-04
0.050	6.565E 00	3.742E-03	6.569E 00	4.334E-03	3.267E-04
0.055	6.129E 00	3.758E-03	6.132E 00	5.122E-03	3.508E-04
0.060	5.760E 00	3.778E-03	5.764E 00	5.964E-03	3.744E-04
0.065	5.445E 00	3.801E-03	5.448E 00	6.857E-03	3.976E-04
0.070	5.172E 00	3.826E-03	5.176E 00	7.799E-03	4.205E-04
0.075	4.933E 00	3.853E-03	4.937E 00	8.788E-03	4.432E-04
0.080	4.723E 00	3.882E-03	4.727E 00	9.824E-03	4.655E-04
0.085	4.536E 00	3.891E-03	4.540E 00	1.090E-02	4.874E-04
0.090	4.369E 00	3.923E-03	4.373E 00	1.203E-02	5.090E-04
0.095	4.219E 00	3.957E-03	4.223E 00	1.319E-02	5.305E-04
0.100	4.083E 00	3.992E-03	4.087E 00	1.439E-02	5.518E-04
0.150	3.208E 00	4.395E-03	3.213E 00	2.838E-02	7.590E-04
0.200	2.766E 00	4.845E-03	2.771E 00	4.524E-02	9.591E-04
0.250	2.502E 00	5.328E-03	2.507E 00	6.427E-02	1.155E-03
0.300	2.330E 00	5.831E-03	2.335E 00	8.498E-02	1.347E-03
0.350	2.209E 00	6.355E-03	2.216E 00	1.070E-01	1.538E-03
0.400	2.119E 00	6.879E-03	2.126E 00	1.301E-01	1.728E-03
0.450	2.051E 00	7.413E-03	2.059E 00	1.540E-01	1.915E-03
0.500	1.999E 00	7.948E-03	2.007E 00	1.786E-01	2.102E-03
0.550	1.958E 00	8.484E-03	1.966E 00	2.038E-01	2.287E-03
0.600	1.925E 00	9.024E-03	1.934E 00	2.294E-01	2.471E-03
0.650	1.899E 00	9.566E-03	1.908E 00	2.554E-01	2.653E-03
0.700	1.878E 00	1.011E-02	1.888E 00	2.818E-01	2.834E-03
0.750	1.860E 00	1.066E-02	1.871E 00	3.084E-01	3.013E-03
0.800	1.846E 00	1.121E-02	1.857E 00	3.352E-01	3.192E-03
0.850	1.834E 00	1.177E-02	1.845E 00	3.622E-01	3.369E-03
0.900	1.824E 00	1.233E-02	1.836E 00	3.894E-01	3.546E-03
0.950	1.816E 00	1.289E-02	1.828E 00	4.167E-01	3.721E-03
1.000	1.809E 00	1.345E-02	1.822E 00	4.441E-01	3.896E-03
1.100	1.798E 00	1.458E-02	1.813E 00	4.991E-01	4.243E-03
1.200	1.792E 00	1.573E-02	1.807E 00	5.544E-01	4.587E-03
1.300	1.787E 00	1.688E-02	1.804E 00	6.098E-01	4.929E-03

ELECTRONS IN POLYSTYRENE

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	STOPPING POWER TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.784E 00	1.804E-02	1.802E 00	6.652E-01	5.268E-03
1.500	1.783E 00	1.922E-02	1.802E 00	7.207E-01	5.606E-03
1.600	1.783E 00	2.040E-02	1.803E 00	7.762E-01	5.943E-03
1.700	1.783E 00	2.156E-02	1.805E 00	8.316E-01	6.277E-03
1.800	1.784E 00	2.277E-02	1.807E 00	8.870E-01	6.610E-03
1.900	1.786E 00	2.398E-02	1.810E 00	9.423E-01	6.942E-03
2.000	1.787E 00	2.521E-02	1.813E 00	9.975E-01	7.274E-03
2.200	1.792E 00	2.770E-02	1.819E 00	1.108E 00	7.937E-03
2.400	1.797E 00	3.023E-02	1.827E 00	1.217E 00	8.599E-03
2.600	1.802E 00	3.279E-02	1.835E 00	1.327E 00	9.261E-03
2.800	1.807E 00	3.531E-02	1.843E 00	1.435E 00	9.924E-03
3.000	1.813E 00	3.795E-02	1.851E 00	1.544E 00	1.058E-02
3.500	1.826E 00	4.474E-02	1.871E 00	1.812E 00	1.224E-02
4.000	1.838E 00	5.178E-02	1.890E 00	2.078E 00	1.392E-02
4.500	1.850E 00	5.910E-02	1.909E 00	2.341E 00	1.561E-02
5.000	1.861E 00	6.654E-02	1.927E 00	2.602E 00	1.733E-02
5.500	1.870E 00	7.412E-02	1.944E 00	2.860E 00	1.905E-02
6.000	1.879E 00	8.183E-02	1.961E 00	3.116E 00	2.079E-02
6.500	1.888E 00	8.965E-02	1.977E 00	3.370E 00	2.254E-02
7.000	1.895E 00	9.759E-02	1.993E 00	3.622E 00	2.430E-02
7.500	1.902E 00	1.056E-01	2.008E 00	3.872E 00	2.607E-02
8.000	1.909E 00	1.138E-01	2.023E 00	4.120E 00	2.784E-02
8.500	1.915E 00	1.220E-01	2.037E 00	4.367E 00	2.962E-02
9.000	1.921E 00	1.309E-01	2.052E 00	4.611E 00	3.141E-02
9.500	1.926E 00	1.393E-01	2.066E 00	4.854E 00	3.321E-02
10.000	1.932E 00	1.478E-01	2.079E 00	5.095E 00	3.501E-02
20.000	1.998E 00	3.285E-01	2.327E 00	9.633E 00	7.080E-02
30.000	2.034E 00	5.205E-01	2.555E 00	1.373E 01	1.049E-01
40.000	2.059E 00	7.181E-01	2.777E 00	1.749E 01	1.366E-01
50.000	2.077E 00	9.194E-01	2.997E 00	2.095E 01	1.659E-01
60.000	2.093E 00	1.123E 00	3.216E 00	2.417E 01	1.930E-01
80.000	2.117E 00	1.537E 00	3.653E 00	3.000E 01	2.414E-01
100.000	2.135E 00	1.954E 00	4.089E 00	3.517E 01	2.831E-01
200.000	2.193E 00	4.079E 00	6.272E 00	5.477E 01	4.294E-01
300.000	2.226E 00	6.232E 00	8.458E 00	6.845E 01	5.188E-01
400.000	2.250E 00	8.394E 00	1.064E 01	7.896E 01	5.803E-01
500.000	2.269E 00	1.056E 01	1.283E 01	8.751E 01	6.256E-01
600.000	2.284E 00	1.274E 01	1.502E 01	9.470E 01	6.607E-01
800.000	2.308E 00	1.709E 01	1.940E 01	1.064E 02	7.120E-01
1000.000	2.326E 00	2.145E 01	2.377E 01	1.157E 02	7.481E-01

ELECTRONS IN LUCITE

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	2.251E 01	4.356E-03	2.252E 01	2.511E-04	1.106E-04
0.015	1.640E 01	4.268E-03	1.640E 01	5.151E-04	1.495E-04
0.020	1.311E 01	4.215E-03	1.311E 01	8.587E-04	1.850E-04
0.025	1.103E 01	4.177E-03	1.103E 01	1.276E-03	2.180E-04
0.030	9.588E 00	4.151E-03	9.592E 00	1.764E-03	2.494E-04
0.035	8.530E 00	4.128E-03	8.534E 00	2.318E-03	2.792E-04
0.040	7.717E 00	4.125E-03	7.722E 00	2.935E-03	3.079E-04
0.045	7.073E 00	4.130E-03	7.077E 00	3.612E-03	3.358E-04
0.050	6.548E 00	4.144E-03	6.552E 00	4.347E-03	3.631E-04
0.055	6.113E 00	4.162E-03	6.117E 00	5.137E-03	3.897E-04
0.060	5.746E 00	4.185E-03	5.750E 00	5.981E-03	4.159E-04
0.065	5.431E 00	4.211E-03	5.436E 00	6.876E-03	4.417E-04
0.070	5.159E 00	4.240E-03	5.164E 00	7.820E-03	4.672E-04
0.075	4.922E 00	4.272E-03	4.926E 00	8.812E-03	4.923E-04
0.080	4.712E 00	4.305E-03	4.716E 00	9.850E-03	5.172E-04
0.085	4.526E 00	4.323E-03	4.530E 00	1.093E-02	5.416E-04
0.090	4.359E 00	4.360E-03	4.363E 00	1.206E-02	5.658E-04
0.095	4.209E 00	4.399E-03	4.214E 00	1.322E-02	5.898E-04
0.100	4.074E 00	4.439E-03	4.078E 00	1.443E-02	6.136E-04
0.150	3.202E 00	4.891E-03	3.207E 00	2.844E-02	8.450E-04
0.200	2.761E 00	5.386E-03	2.766E 00	4.533E-02	1.068E-03
0.250	2.498E 00	5.923E-03	2.504E 00	6.440E-02	1.286E-03
0.300	2.326E 00	6.483E-03	2.332E 00	8.513E-02	1.500E-03
0.350	2.206E 00	7.066E-03	2.213E 00	1.072E-01	1.713E-03
0.400	2.106E 00	7.649E-03	2.113E 00	1.304E-01	1.925E-03
0.450	2.039E 00	8.242E-03	2.047E 00	1.544E-01	2.136E-03
0.500	1.987E 00	8.835E-03	1.996E 00	1.792E-01	2.345E-03
0.550	1.946E 00	9.429E-03	1.956E 00	2.045E-01	2.552E-03
0.600	1.914E 00	1.002E-02	1.924E 00	2.303E-01	2.758E-03
0.650	1.888E 00	1.062E-02	1.898E 00	2.564E-01	2.961E-03
0.700	1.867E 00	1.122E-02	1.878E 00	2.829E-01	3.163E-03
0.750	1.849E 00	1.183E-02	1.861E 00	3.097E-01	3.363E-03
0.800	1.835E 00	1.243E-02	1.847E 00	3.367E-01	3.562E-03
0.850	1.823E 00	1.305E-02	1.836E 00	3.638E-01	3.760E-03
0.900	1.814E 00	1.366E-02	1.827E 00	3.911E-01	3.956E-03
0.950	1.806E 00	1.427E-02	1.820E 00	4.185E-01	4.151E-03
1.000	1.799E 00	1.489E-02	1.814E 00	4.460E-01	4.344E-03
1.100	1.789E 00	1.613E-02	1.805E 00	5.013E-01	4.729E-03
1.200	1.782E 00	1.738E-02	1.800E 00	5.568E-01	5.110E-03
1.300	1.778E 00	1.864E-02	1.796E 00	6.124E-01	5.487E-03

ELECTRONS IN LUCITE

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.775E 00	1.991E-02	1.795E 00	6.681E-01	5.862E-03
1.500	1.774E 00	2.120E-02	1.795E 00	7.238E-01	6.235E-03
1.600	1.774E 00	2.248E-02	1.796E 00	7.795E-01	6.605E-03
1.700	1.775E 00	2.375E-02	1.798E 00	8.352E-01	6.973E-03
1.800	1.776E 00	2.506E-02	1.801E 00	8.907E-01	7.339E-03
1.900	1.777E 00	2.638E-02	1.804E 00	9.462E-01	7.703E-03
2.000	1.779E 00	2.772E-02	1.807E 00	1.002E 00	8.067E-03
2.200	1.784E 00	3.042E-02	1.814E 00	1.112E 00	8.794E-03
2.400	1.789E 00	3.318E-02	1.822E 00	1.222E 00	9.518E-03
2.600	1.794E 00	3.597E-02	1.830E 00	1.332E 00	1.024E-02
2.800	1.800E 00	3.870E-02	1.838E 00	1.441E 00	1.097E-02
3.000	1.805E 00	4.157E-02	1.847E 00	1.549E 00	1.169E-02
3.500	1.819E 00	4.895E-02	1.868E 00	1.818E 00	1.350E-02
4.000	1.832E 00	5.659E-02	1.888E 00	2.085E 00	1.532E-02
4.500	1.843E 00	6.453E-02	1.908E 00	2.348E 00	1.716E-02
5.000	1.854E 00	7.262E-02	1.927E 00	2.609E 00	1.902E-02
5.500	1.864E 00	8.085E-02	1.945E 00	2.867E 00	2.089E-02
6.000	1.873E 00	8.921E-02	1.962E 00	3.123E 00	2.278E-02
6.500	1.882E 00	9.771E-02	1.979E 00	3.377E 00	2.467E-02
7.000	1.889E 00	1.063E-01	1.996E 00	3.628E 00	2.658E-02
7.500	1.897E 00	1.151E-01	2.012E 00	3.878E 00	2.849E-02
8.000	1.903E 00	1.239E-01	2.027E 00	4.125E 00	3.040E-02
8.500	1.910E 00	1.328E-01	2.043E 00	4.371E 00	3.233E-02
9.000	1.916E 00	1.426E-01	2.058E 00	4.615E 00	3.426E-02
9.500	1.921E 00	1.518E-01	2.073E 00	4.857E 00	3.621E-02
10.000	1.926E 00	1.610E-01	2.087E 00	5.097E 00	3.815E-02
20.000	1.994E 00	3.574E-01	2.351E 00	9.603E 00	7.663E-02
30.000	2.030E 00	5.660E-01	2.596E 00	1.365E 01	1.130E-01
40.000	2.055E 00	7.806E-01	2.836E 00	1.733E 01	1.466E-01
50.000	2.074E 00	9.992E-01	3.073E 00	2.072E 01	1.774E-01
60.000	2.089E 00	1.221E 00	3.310E 00	2.385E 01	2.058E-01
80.000	2.113E 00	1.669E 00	3.782E 00	2.950E 01	2.560E-01
100.000	2.132E 00	2.122E 00	4.254E 00	3.449E 01	2.990E-01
200.000	2.189E 00	4.428E 00	6.617E 00	5.318E 01	4.474E-01
300.000	2.223E 00	6.762E 00	8.985E 00	6.610E 01	5.366E-01
400.000	2.247E 00	9.107E 00	1.135E 01	7.598E 01	5.973E-01
500.000	2.265E 00	1.146E 01	1.372E 01	8.398E 01	6.417E-01
600.000	2.281E 00	1.382E 01	1.610E 01	9.070E 01	6.760E-01
800.000	2.304E 00	1.854E 01	2.084E 01	1.016E 02	7.258E-01
1000.000	2.323E 00	2.326E 01	2.558E 01	1.102E 02	7.606E-01

ELECTRONS IN AIR

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.970E 01	5.012E-03	1.971E 01	2.892E-04	1.463E-04
0.015	1.441E 01	4.909E-03	1.442E 01	5.901E-04	1.969E-04
0.020	1.155E 01	4.843E-03	1.155E 01	9.805E-04	2.428E-04
0.025	9.733E 00	4.797E-03	9.737E 00	1.454E-03	2.855E-04
0.030	8.475E 00	4.765E-03	8.479E 00	2.006E-03	3.259E-04
0.035	7.548E 00	4.735E-03	7.552E 00	2.632E-03	3.642E-04
0.040	6.835E 00	4.731E-03	6.840E 00	3.329E-03	4.011E-04
0.045	6.269E 00	4.738E-03	6.273E 00	4.093E-03	4.370E-04
0.050	5.808E 00	4.753E-03	5.812E 00	4.922E-03	4.719E-04
0.055	5.425E 00	4.775E-03	5.429E 00	5.813E-03	5.062E-04
0.060	5.101E 00	4.803E-03	5.106E 00	6.763E-03	5.398E-04
0.065	4.824E 00	4.834E-03	4.829E 00	7.771E-03	5.730E-04
0.070	4.585E 00	4.868E-03	4.590E 00	8.833E-03	6.057E-04
0.075	4.375E 00	4.906E-03	4.380E 00	9.949E-03	6.380E-04
0.080	4.190E 00	4.945E-03	4.195E 00	1.112E-02	6.700E-04
0.085	4.026E 00	4.973E-03	4.031E 00	1.233E-02	7.014E-04
0.090	3.879E 00	5.016E-03	3.884E 00	1.360E-02	7.326E-04
0.095	3.747E 00	5.062E-03	3.752E 00	1.491E-02	7.635E-04
0.100	3.627E 00	5.109E-03	3.632E 00	1.626E-02	7.943E-04
0.150	2.856E 00	5.637E-03	2.862E 00	3.197E-02	1.093E-03
0.200	2.466E 00	6.211E-03	2.472E 00	5.089E-02	1.380E-03
0.250	2.233E 00	6.834E-03	2.240E 00	7.221E-02	1.661E-03
0.300	2.081E 00	7.483E-03	2.088E 00	9.537E-02	1.937E-03
0.350	1.975E 00	8.161E-03	1.984E 00	1.200E-01	2.210E-03
0.400	1.899E 00	8.836E-03	1.908E 00	1.457E-01	2.480E-03
0.450	1.843E 00	9.527E-03	1.852E 00	1.723E-01	2.748E-03
0.500	1.800E 00	1.021E-02	1.810E 00	1.996E-01	3.012E-03
0.550	1.766E 00	1.090E-02	1.777E 00	2.275E-01	3.274E-03
0.600	1.740E 00	1.158E-02	1.752E 00	2.559E-01	3.532E-03
0.650	1.720E 00	1.227E-02	1.732E 00	2.846E-01	3.787E-03
0.700	1.704E 00	1.295E-02	1.717E 00	3.136E-01	4.039E-03
0.750	1.691E 00	1.364E-02	1.705E 00	3.428E-01	4.288E-03
0.800	1.681E 00	1.433E-02	1.696E 00	3.722E-01	4.534E-03
0.850	1.673E 00	1.498E-02	1.688E 00	4.018E-01	4.776E-03
0.900	1.667E 00	1.568E-02	1.683E 00	4.314E-01	5.016E-03
0.950	1.662E 00	1.637E-02	1.679E 00	4.612E-01	5.254E-03
1.000	1.659E 00	1.707E-02	1.676E 00	4.910E-01	5.490E-03
1.100	1.655E 00	1.848E-02	1.673E 00	5.507E-01	5.956E-03
1.200	1.653E 00	1.991E-02	1.673E 00	6.105E-01	6.415E-03
1.300	1.654E 00	2.134E-02	1.675E 00	6.702E-01	6.870E-03

ELECTRONS IN AIR

ENERGY	STOPPING POWER COLLISION	STOPPING POWER RADIATION	TOTAL	RANGE	RADIATION YIELD
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.656E 00	2.279E-02	1.679E 00	7.298E-01	7.319E-03
1.500	1.659E 00	2.424E-02	1.683E 00	7.893E-01	7.763E-03
1.600	1.663E 00	2.571E-02	1.689E 00	8.487E-01	8.204E-03
1.700	1.667E 00	2.717E-02	1.695E 00	9.078E-01	8.640E-03
1.800	1.672E 00	2.866E-02	1.701E 00	9.667E-01	9.074E-03
1.900	1.677E 00	3.016E-02	1.708E 00	1.025E 00	9.505E-03
2.000	1.683E 00	3.168E-02	1.714E 00	1.084E 00	9.933E-03
2.200	1.694E 00	3.473E-02	1.729E 00	1.200E 00	1.078E-02
2.400	1.705E 00	3.783E-02	1.743E 00	1.315E 00	1.163E-02
2.600	1.716E 00	4.097E-02	1.757E 00	1.429E 00	1.246E-02
2.800	1.728E 00	4.394E-02	1.771E 00	1.543E 00	1.329E-02
3.000	1.738E 00	4.714E-02	1.786E 00	1.655E 00	1.412E-02
3.500	1.764E 00	5.538E-02	1.820E 00	1.933E 00	1.616E-02
4.000	1.789E 00	6.393E-02	1.852E 00	2.205E 00	1.820E-02
4.500	1.811E 00	7.282E-02	1.884E 00	2.473E 00	2.024E-02
5.000	1.831E 00	8.187E-02	1.913E 00	2.736E 00	2.229E-02
5.500	1.851E 00	9.108E-02	1.942E 00	2.995E 00	2.434E-02
6.000	1.868E 00	1.004E-01	1.969E 00	3.251E 00	2.639E-02
6.500	1.885E 00	1.099E-01	1.995E 00	3.503E 00	2.844E-02
7.000	1.901E 00	1.196E-01	2.020E 00	3.752E 00	3.049E-02
7.500	1.915E 00	1.294E-01	2.045E 00	3.998E 00	3.254E-02
8.000	1.929E 00	1.393E-01	2.068E 00	4.241E 00	3.459E-02
8.500	1.942E 00	1.493E-01	2.091E 00	4.482E 00	3.663E-02
9.000	1.955E 00	1.603E-01	2.115E 00	4.720E 00	3.868E-02
9.500	1.966E 00	1.705E-01	2.137E 00	4.955E 00	4.074E-02
10.000	1.978E 00	1.809E-01	2.159E 00	5.188E 00	4.280E-02
20.000	2.133E 00	4.008E-01	2.534E 00	9.447E 00	8.229E-02
30.000	2.225E 00	6.344E-01	2.859E 00	1.316E 01	1.185E-01
40.000	2.283E 00	8.745E-01	3.158E 00	1.648E 01	1.514E-01
50.000	2.324E 00	1.119E 00	3.443E 00	1.951E 01	1.814E-01
60.000	2.355E 00	1.366E 00	3.721E 00	2.231E 01	2.089E-01
80.000	2.400E 00	1.868E 00	4.268E 00	2.732E 01	2.576E-01
100.000	2.433E 00	2.374E 00	4.807E 00	3.173E 01	2.994E-01
200.000	2.520E 00	4.948E 00	7.468E 00	4.828E 01	4.445E-01
300.000	2.564E 00	7.552E 00	1.012E 01	5.974E 01	5.325E-01
400.000	2.593E 00	1.017E 01	1.276E 01	6.852E 01	5.928E-01
500.000	2.614E 00	1.279E 01	1.541E 01	7.564E 01	6.372E-01
600.000	2.630E 00	1.542E 01	1.805E 01	8.163E 01	6.714E-01
800.000	2.655E 00	2.068E 01	2.334E 01	9.135E 01	7.215E-01
1000.000	2.674E 00	2.595E 01	2.862E 01	9.907E 01	7.566E-01

ELECTRONS IN STANDARD EMULSION

ENERGY	STOPPING POWER			RANGE	RADIATION YIELD
	COLLISION	RADIATION	TOTAL		
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
0.010	1.315E 01	2.109E-02	1.317E 01	4.605E-04	9.478E-04
0.015	9.884E 00	2.110E-02	9.905E 00	9.038E-04	1.255E-03
0.020	8.050E 00	2.084E-02	8.071E 00	1.467E-03	1.532E-03
0.025	6.863E 00	2.113E-02	6.884E 00	2.140E-03	1.791E-03
0.030	6.028E 00	2.159E-02	6.049E 00	2.917E-03	2.045E-03
0.035	5.405E 00	2.224E-02	5.427E 00	3.791E-03	2.301E-03
0.040	4.922E 00	2.270E-02	4.945E 00	4.758E-03	2.557E-03
0.045	4.535E 00	2.311E-02	4.559E 00	5.812E-03	2.809E-03
0.050	4.219E 00	2.350E-02	4.242E 00	6.950E-03	3.059E-03
0.055	3.955E 00	2.386E-02	3.978E 00	8.168E-03	3.305E-03
0.060	3.730E 00	2.420E-02	3.755E 00	9.463E-03	3.548E-03
0.065	3.538E 00	2.452E-02	3.562E 00	1.083E-02	3.788E-03
0.070	3.370E 00	2.483E-02	3.395E 00	1.227E-02	4.025E-03
0.075	3.224E 00	2.513E-02	3.249E 00	1.378E-02	4.258E-03
0.080	3.094E 00	2.543E-02	3.119E 00	1.535E-02	4.488E-03
0.085	2.978E 00	2.559E-02	3.004E 00	1.698E-02	4.714E-03
0.090	2.875E 00	2.587E-02	2.901E 00	1.867E-02	4.936E-03
0.095	2.781E 00	2.615E-02	2.807E 00	2.043E-02	5.156E-03
0.100	2.697E 00	2.643E-02	2.723E 00	2.224E-02	5.374E-03
0.150	2.148E 00	2.910E-02	2.177E 00	4.303E-02	7.439E-03
0.200	1.869E 00	3.148E-02	1.900E 00	6.775E-02	9.329E-03
0.250	1.702E 00	3.421E-02	1.736E 00	9.537E-02	1.109E-02
0.300	1.593E 00	3.707E-02	1.630E 00	1.252E-01	1.278E-02
0.350	1.518E 00	4.009E-02	1.558E 00	1.566E-01	1.442E-02
0.400	1.464E 00	4.301E-02	1.507E 00	1.892E-01	1.601E-02
0.450	1.424E 00	4.593E-02	1.470E 00	2.229E-01	1.756E-02
0.500	1.394E 00	4.880E-02	1.442E 00	2.572E-01	1.905E-02
0.550	1.371E 00	5.164E-02	1.423E 00	2.921E-01	2.051E-02
0.600	1.353E 00	5.445E-02	1.408E 00	3.275E-01	2.193E-02
0.650	1.340E 00	5.724E-02	1.397E 00	3.631E-01	2.330E-02
0.700	1.329E 00	6.001E-02	1.389E 00	3.990E-01	2.465E-02
0.750	1.320E 00	6.277E-02	1.383E 00	4.351E-01	2.596E-02
0.800	1.314E 00	6.551E-02	1.379E 00	4.713E-01	2.724E-02
0.850	1.309E 00	6.731E-02	1.376E 00	5.076E-01	2.845E-02
0.900	1.305E 00	7.003E-02	1.375E 00	5.440E-01	2.965E-02
0.950	1.302E 00	7.278E-02	1.374E 00	5.803E-01	3.082E-02
1.000	1.299E 00	7.554E-02	1.375E 00	6.167E-01	3.198E-02
1.100	1.297E 00	8.112E-02	1.378E 00	6.894E-01	3.425E-02
1.200	1.296E 00	8.677E-02	1.383E 00	7.618E-01	3.646E-02
1.300	1.297E 00	9.248E-02	1.390E 00	8.340E-01	3.863E-02

ELECTRONS IN STANDARD EMULSION

ENERGY	STOPPING POWER			RANGE	RADIATION YIELD
	COLLISION	RADIATION	TOTAL		
MEV	MEV CM2/G	MEV CM2/G	MEV CM2/G	G/CM2	
1.400	1.299E 00	9.824E-02	1.397E 00	9.057E-01	4.076E-02
1.500	1.301E 00	1.041E-01	1.405E 00	9.771E-01	4.285E-02
1.600	1.304E 00	1.099E-01	1.414E 00	1.048E 00	4.492E-02
1.700	1.307E 00	1.161E-01	1.423E 00	1.119E 00	4.697E-02
1.800	1.311E 00	1.220E-01	1.433E 00	1.189E 00	4.899E-02
1.900	1.314E 00	1.280E-01	1.442E 00	1.258E 00	5.099E-02
2.000	1.318E 00	1.340E-01	1.452E 00	1.327E 00	5.296E-02
2.200	1.326E 00	1.460E-01	1.472E 00	1.464E 00	5.685E-02
2.400	1.333E 00	1.582E-01	1.491E 00	1.599E 00	6.067E-02
2.600	1.341E 00	1.704E-01	1.511E 00	1.732E 00	6.442E-02
2.800	1.348E 00	1.826E-01	1.531E 00	1.864E 00	6.811E-02
3.000	1.355E 00	1.949E-01	1.550E 00	1.994E 00	7.173E-02
3.500	1.372E 00	2.261E-01	1.598E 00	2.311E 00	8.058E-02
4.000	1.387E 00	2.577E-01	1.645E 00	2.620E 00	8.915E-02
4.500	1.401E 00	2.895E-01	1.690E 00	2.919E 00	9.747E-02
5.000	1.413E 00	3.218E-01	1.735E 00	3.211E 00	1.056E-01
5.500	1.424E 00	3.545E-01	1.779E 00	3.496E 00	1.135E-01
6.000	1.435E 00	3.876E-01	1.822E 00	3.774E 00	1.212E-01
6.500	1.444E 00	4.209E-01	1.865E 00	4.045E 00	1.287E-01
7.000	1.453E 00	4.546E-01	1.908E 00	4.310E 00	1.361E-01
7.500	1.461E 00	4.886E-01	1.950E 00	4.569E 00	1.433E-01
8.000	1.469E 00	5.229E-01	1.992E 00	4.823E 00	1.504E-01
8.500	1.476E 00	5.575E-01	2.033E 00	5.071E 00	1.573E-01
9.000	1.483E 00	5.945E-01	2.077E 00	5.315E 00	1.642E-01
9.500	1.489E 00	6.296E-01	2.118E 00	5.553E 00	1.709E-01
10.000	1.495E 00	6.650E-01	2.160E 00	5.787E 00	1.775E-01
20.000	1.571E 00	1.402E 00	2.972E 00	9.715E 00	2.871E-01
30.000	1.611E 00	2.187E 00	3.798E 00	1.269E 01	3.671E-01
40.000	1.638E 00	3.009E 00	4.647E 00	1.506E 01	4.288E-01
50.000	1.658E 00	3.839E 00	5.497E 00	1.704E 01	4.779E-01
60.000	1.674E 00	4.678E 00	6.352E 00	1.873E 01	5.180E-01
80.000	1.698E 00	6.372E 00	8.070E 00	2.152E 01	5.797E-01
100.000	1.716E 00	8.076E 00	9.792E 00	2.376E 01	6.254E-01
200.000	1.770E 00	1.671E 01	1.848E 01	3.108E 01	7.490E-01
300.000	1.799E 00	2.542E 01	2.722E 01	3.551E 01	8.063E-01
400.000	1.820E 00	3.415E 01	3.597E 01	3.869E 01	8.403E-01
500.000	1.836E 00	4.289E 01	4.473E 01	4.118E 01	8.631E-01
600.000	1.849E 00	5.165E 01	5.350E 01	4.322E 01	8.797E-01
800.000	1.869E 00	6.917E 01	7.104E 01	4.645E 01	9.022E-01
1000.000	1.885E 00	8.670E 01	8.858E 01	4.897E 01	9.171E-01