where the primes have been suppressed for notational convenience. The dimensionless constant γ_1 of equation 2.18 is that used by *Störmer* [1955, pp. 219–224][1] and is related to the constants of equations 2.7 and 2.9 by 7/8

$$\gamma_1^4 = \frac{1}{16}\left(\frac{q\mathfrak{M}}{v\gamma m}\right)^2 \Gamma^4 \tag{2.20}$$

37 cont.

In this system of units, the particle gyrates about the guiding field line

$$r = \cos^2 \lambda \tag{2.21}$$

with unit frequency when in the equatorial plane and has the dimensionless velocity

$$W_0 = 1/4\gamma_1^2 \tag{2.22}$$

The values of γ_1 for particles and energies relevant to the Van Allen radiation are given in Figures 2 and 3. For ease of computation, the relation between W_0^2 and γ_1 is plotted in Figure 4.

[1] This book is a primary reference to work done on motion in a dipole field up to 1955. It contains an extensive discussion of the equations of motion and their solution by numerical integration.

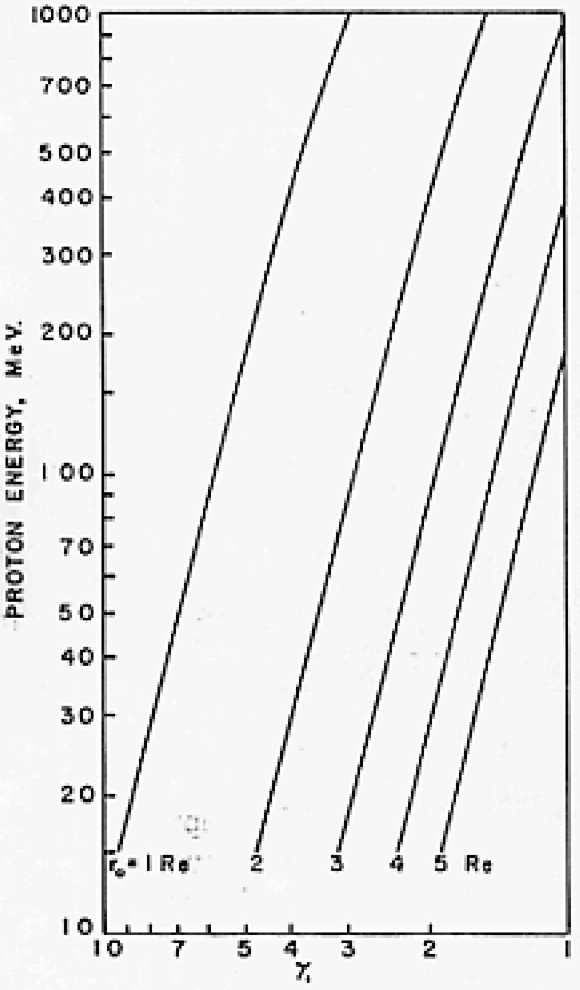

Fig. 2

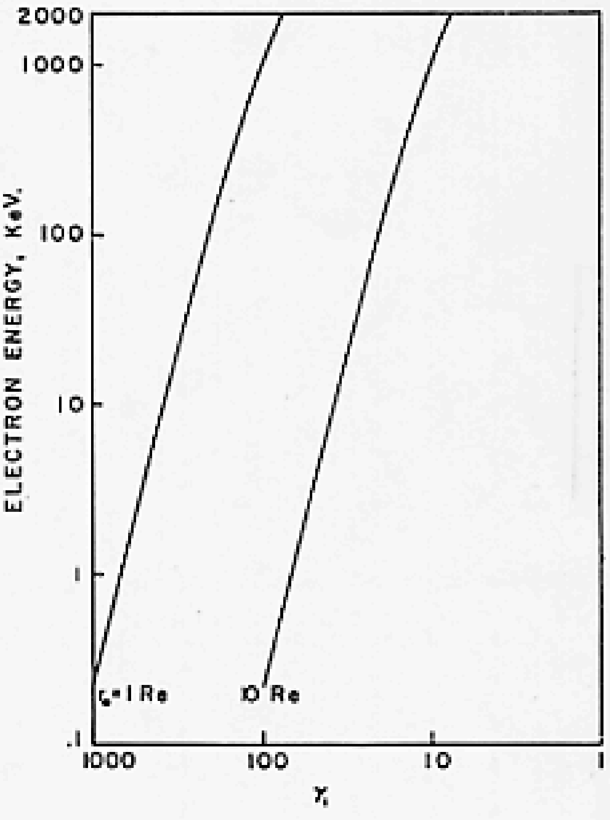

Fig. 3

Figs. 2–3. Values of γ_1 for particles and energies relevant to the Van Allen radiation. The particles are labeled according to their guiding field line with r_0 given in earth radii. ($\mathfrak{M}$ = 8.06×10^{25} gauss cm³. R_e = radius of the earth = 6,378 km.