gonal cerium (β) is 3.05. For the collapsed face-centered cubic cerium (α) they found that the valence varies from 3.54 to 3.67 depending on the pressure and temperature. The room temperature magnetic susceptibility for samarium is in reasonable agreement with a $4f^5\ 5d^1\ 6s^2$ configuration (where the 5d and 6s electrons are the valence electrons), but the behaviors at both low and high temperatures cannot be explained by any simple model. [1, 4, 5, 6]

It should be noted that recent positron annihilation studies by Gustafson and Mackintosh [7] also confirm the trivalency of normal cerium (γ) and gadolinium, and the divalency of ytterbium.

3. VERY LOW TEMPERATURE SPECIFIC HEAT DATA

The specific heat of a metal in general is given by

$$C_p = C_v^l + C_v^e + C_v^n + C_v^m + C^d \qquad (1)$$

where C_p is the heat capacity at constant pressure, the subscript v designates the heat capacity at constant volume, the superscript l refers to the lattice, e the electronic, n the nuclear and m the magnetic contributions to the specific heat

TABLE I. Electronic Specific Heat Constants [9]

Rare Earth	$\gamma \times 10^4$ (cal/g-at. deg.^{2})	Rare Earth	$\gamma \times 10^4$ (cal/g-at. deg.^{2})
La	24.1	Tb	21.6
α-Ce	138[a] (50.2)[b]	Dy	22.1
γ-, β-Ce	17.3 (25.1)[b]	Ho	62
Pr	52.3	Er	31
Nd	21.3 (53.7)[c]	Tm	47.1 (42.9)[d]
Pm	24	Yb	6.93
Sm	25.3	Lu	24.4
Eu	13.8 ± 2.4[b]	Sc	25.8
Gd	24[e]	Y	24.1

a. This paper, see text concerning α-Ce (Section 7.2).
b. After Lounasmaa, [10].
c. After Lounasmaa, [11].
d. After Lounasmaa, [12].
e. Estimated value.

and C^d is the dilation term or the difference between C_p and C_v. C^d can be neglected for all the rare earth metals at

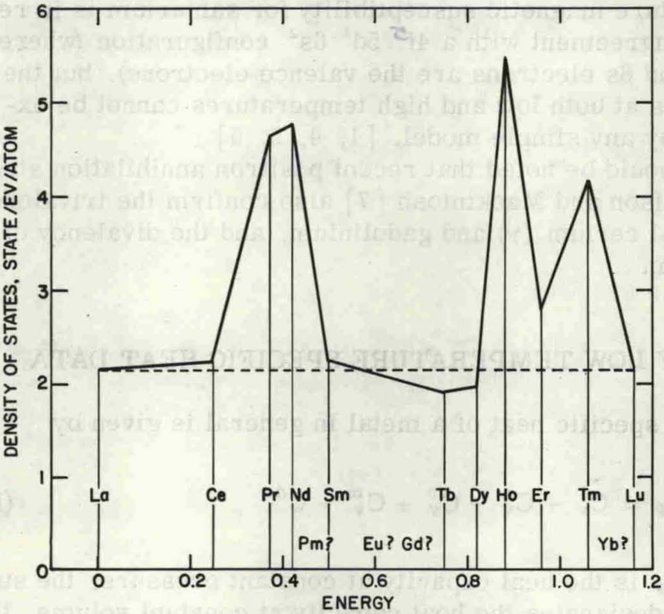

Fig. 1. Density of states values for the rare earth metals assuming that Eqn. (3) is correct and the linear contribution to the low temperature specific heat is representative of the electronic specific heat.

temperatures below 100°K, and, therefore, we can drop all subscripts in Eqn. (1). Of the terms in Eqn. (1), C^e is of prime importance here since it is directly proportional to the density of states of the electrons at the Fermi surface. The electronic contribution to the specific heat is given by

$$C^e = \gamma T \tag{2}$$

where T is the absolute temperature and γ is the electronic specific heat constant. The electronic specific heat con-