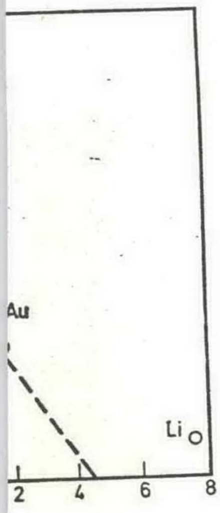
no counterpart in ξ) we are
nparison between this quan-
imately proportional to each
is figure shows not only the



efficient of K and thermoelectric
lale and Mundy, 1961.)

als under *normal pressure*, but,
essed metal. The approximate
and Mundy, 1961).
ationship is as follows. Assume
a function only of the Fermi
the lattice, θ, and the temper-
; likewise the resistivity $\varrho = {}^1/\sigma$

$$\left.\frac{\partial \ln \sigma}{\partial \ln E_F}\right)_{\theta, T} \frac{d\ln E_F}{d\ln V} + \quad \frac{d\ln \theta}{d\ln V} \qquad (45)$$

e basis of the following simpli-

$$\frac{d\ln \theta}{d\ln V} = -\gamma \quad \text{(the Grüneisen parameter)}$$

$$\frac{\partial \ln \sigma}{\partial \ln \theta} = 2 \quad \text{at high temperatures (see equation 39 above)}$$

$$\frac{d\ln E_F}{d\ln V} = -\frac{2}{3} \quad \text{on the basis of the free-electron model or the effective mass approximation.}$$

Also:

$$\left(\frac{\partial \ln \sigma}{\partial \ln E_F}\right)_\theta = \xi \qquad \text{as defined in equation (45)}$$

$$\therefore \left(\frac{\partial \ln \varrho}{\partial \ln V}\right) - 2\gamma = \frac{2}{3}\xi$$

The left-hand side of this equation is just what we earlier denoted by $\partial \ln K/\partial \ln V$ so that the relationship between this quantity and ξ is established. The coefficient of proportionality on this simple treatment is just $\frac{2}{3}$, and this corresponds to the dashed line shown in Fig. 22.

The basis of this derivation is that σ depends on V *only* through E_F and θ, and that θ has no direct dependence on E_F. (It is a simple matter to generalize equation 45 for the situations where θ has an explicit E_F dependence.)

The experimental information thus suggests that these assumptions are approximately correct, i.e., the dependence of K on volume appears to arise largely from the change in E_F with V. This is an important fact which we will refer to again below.

2. *The Behaviour of* K *at very high Pressures*

So far we have considered only the initial slope of the resistivity-volume curves. On the other hand, considerable information is available about the pressure dependence of resistivity at room temperature up to quite high pressures. The experimental work of Bridgman (1949, 1952), for example, extends up to pressures of about 100,000 b at room temperature. Measurements to still higher pressures have been made by Stager and Drickamer (1963) not only at room temperature but also at low temperatures (see also Bundy, 1959; Balchan and Drickamer, 1961; Bundy and Strong 1962).