The above expression for the probability of exciting a phonon which can induce an U-scattering process shows that the electrical resistivity at low temperatures is determined not only by the geometry of the Fermi surface (which determines the value of q_{min} in any direction) but also by the elastic anisotropy of the crystal (which determines the value of c in any direction).

To understand the variation with pressure of electrical resistivity at low temperatures, therefore requires that we know both how the Fermi surface changes under pressure and how the elastic anisotropy changes under pressure. In addition to all this we must also know how the matrix elements for the electron phonon interaction change with pressure. Some of this information is, as we have seen, now available directly from experiment, but not all; a summary of the present situation is given in Table III.

B. TEMPERATURE AND PRESSURE DEPENDENCE OF RESISTIVITY AT VERY LOW TEMPERATURES

At sufficiently low temperatures where the phonon wavelengths are large compared to the interatomic distance, the continuum model of a solid gives a good description of the elastic vibrations in real solids. In this temperature region, the number of phonons varies as T^3. On the other hand the electrical resistivity due to these phonons varies more rapidly; theoretically in the simplest case, it is expected to vary as T^5. The reason for this is illustrated in Fig. 19 which shows that if an electron, travelling in the direction of the electric current, is scattered by a phonon of wave vector q through the angle Φ, as indicated, its momentum in the direction of the current is reduced by $(1 - \cos \Phi)$. If Φ is small, this approximates to $\frac{\Phi^2}{2}$. Now $\Phi \simeq q/K_F$ and the magnitude of $q \propto T$.

To determine how the resistivity depends on temperature, we must take into account how the temperature alters both the number of scatterers (the phonons) and the effectiveness of each scattering process (i.e., the change in momentum induced). Consequently there is a factor of T^2 from this last effect in addition to the T^3 that arises from the variation of the number of phonons with temperature. If, therefore, we are at low enough temperatures so that the U-processes are frozen out, it can be shown that: