of exciting a phonon which
ıat the electrical resistivity
ly by the geometry of the
e of $q_{\min}$ in any direction)
ʏstal (which determines the

ure of electrical resistivity
ıat we know both how the
how the elastic anisotropy
his we must also know how
ıon interaction change with
e have seen, now available
nmary of the present situa-

NDENCE OF RESISTIVITY
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e the phonon wavelengths
ance, the continuum model
e elastic vibrations in real
ımber of phonons varies as
ivity due to these phonons
implest case, it is expected
ated in Fig. 19 which shows
tion of the electric current,
q through the angle Φ, as
of the current is reduced by
es to $\frac{\Phi^2}{2}$. Now $\Phi \simeq q/K_F$

ds on temperature, we must
alters both the number of
ness of each scattering pro-
ed). Consequently there is a
n to the T^3 that arises from
h temperature. If, therefore,
t the U-processes are frozen

$$\varrho_{\mathrm{ph}} \propto T^5/\theta^6 \tag{38}$$

where θ is the characteristic lattice temperature of the metal. If the volume of the metal is changed by pressure, θ alters and this provides one important mechanism for the change in resistivity with pressure at low temperatures.

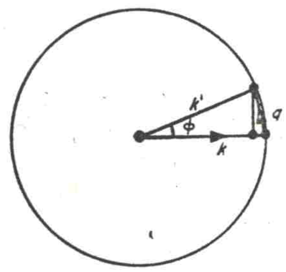

FIG. 19. Small angle scattering by phonons.

C. EFFECT OF TEMPERATURE AND PRESSURE ON ELECTRICAL RESISTIVITY AT HIGH TEMPERATURES

At high temperatures, i.e., $T \gtrsim \theta$, most of the phonons that are excited are of large q vector (typically about half the dimensions of the Brillouin zone) so that all collisions with phonons can produce a large change in the momentum of the conduction electrons. We may therefore expect that the electrical resistivity due to phonon scattering will depend directly on the number of phonons excited at a given temperature. Alternatively, looking at the problem in classical rather than quantum terms, we may expect the resistivity due to the lattice vibrations to be proportional to the mean square amplitude of these vibrations. In either case we write:

$$\varrho_{\mathrm{ph}} = K \frac{T}{M\theta^2} \tag{39}$$

where M is the mass of the ions that make up the lattice and K is a parameter that involves all the complex interactions between the conduction electrons and the ions.

If we compare equations (38) and (39) we see that at high temperatures ϱ_{ph} depends inversely on θ^2 and at very low temperatures inversely on θ^6. We also known that, in general, θ increases with in-