and at the same time Bragg-reflected by the appropriate lattice planes.

U-processes are very important because they provide a means by which the momentum in the electron system can be communicated directly to the lattice as a whole. They therefore provide an immediate source of electrical resistivity. They are also important because G is a large vector and therefore even when q is small, U-processes make possible large angle scattering processes. This is particularly important at low temperatures (Bailyn, 1960).

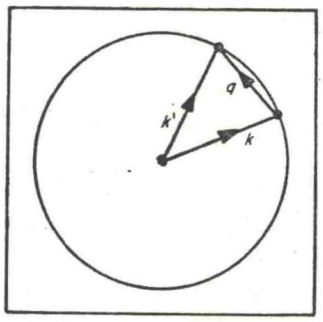

FIG. 16. Normal scattering process.

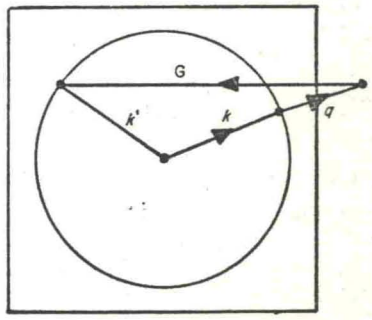

FIG. 17. Umklapp process.

The conservation of energy condition (equation 37) severely limits the possible scattering processes. This is because $\hbar\omega$ (which is of order kT for $T < \theta$ and of order $k\theta$ at higher temperatures) is so small compared to E_k that a phonon cannot significantly change the electron energy. Moreover since, at normal temperatures, kT itself is very small compared to E_F, there are unoccupied electron states only very close to the Fermi level; this in turn means that because of the Pauli principle only electrons close to the Fermi level (effectively on the Fermi surface) can be scattered and then only into other states (which must of course be unoccupied) that are themselves on the Fermi surface. This condition of scattering only from and to states on the Fermi surface is observed in all subsequent discussions and illustrations of scattering processes. (It applies, of course, equally to impurity scattering.)

In Figs. 16 and 17 a normal scattering process (or N-process) and a U-process are illustrated. In the example shown, the Fermi surface corresponds to a spherical surface and the Brillouin zone is shown as square for simplicity. The important point is that the Fermi surface