Following Melz, we concentrate our attention on the γ cross-section whose position is indicated-in Fig. 9(a). It is the extremal orbit around the point U whose position in the Brillouin zone is illustrated in Fig. 9(b). In order to understand what happens to the area of this cross-section when the metal is compressed, we must look at the E–k

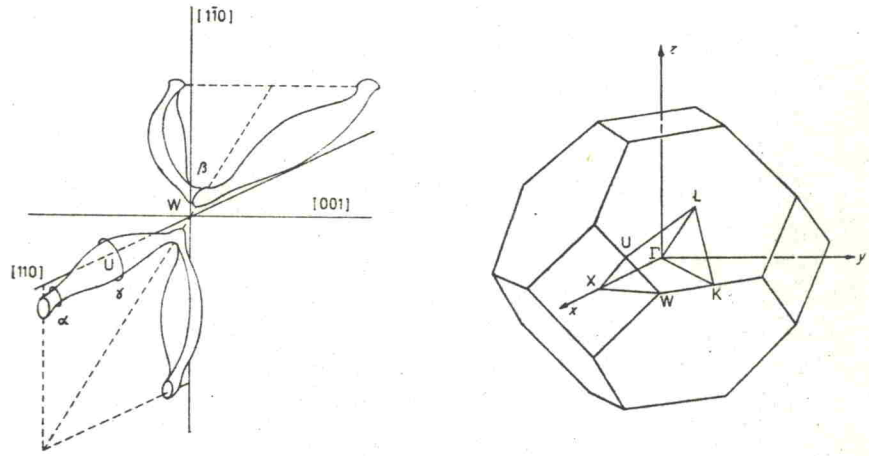

FIG. 9. (a). Part of the 3rd zone Fermi surface of Al. (From Melz, 1966b.) (b). First Brillouin zone of the f.c.c. structure showing labelling of some symmetry points.

curves in the neighbourhood of the point U. The general form of the E–k curves of Al in the specified symmetry directions as calculated by Ashcroft (1963) is illustrated in Fig. 10. The general form of these curves is quite similar to that for free electrons but with certain degeneracies removed by the effect of the weak pseudo-potential.

The inset of Fig. 10 shows the region around U and our attention is focussed on the highest of the 3 bands (U_3); in particular on whether this intersects the Fermi level. The Fermi level is also indicated in the diagram.

The γ oscillations are measured with the applied magnetic field in the [110] direction and two points on the corresponding extremal cross-section are indicated by A and B (Fig. 10). On going from U towards Γ (the centre of the zone) the E–k curve reaches the Fermi level at A and on going from U towards X (the centre of the square zone face) the E–k curve reaches the Fermi level at B.

The energy of the third band at U is given by: