and, at the same time, $\varepsilon_F - \varepsilon_0$ in the prefactor is gradually replaced by ω_0 , enhancing the isotope effect [8]. This fits the experimental data.

I would like to stress that the usual saddle point singularity, extensively studied by several groups, e.g. J. Friedel, A. Labbe, J. Bok, D. Newns, R. Markievicz (see [9] for references) does not lead to such consequences. The enhancement of T_c is weak, and no new energy scale is introduced in the BCS integral, so that the absence of the isotope effect cannot be explained. Therefore the statement that the flat regions are equivalent to 2D van Hove singularities is wrong.

3. Bad Coulomb screening

Under proper assumptions the flat region can dominate in the total density of states; then, however, we encounter another puzzle. The ARPES experiments of the same groups established a marked anisotropy of the energy gap (in the BCS theory the gap corresponds to the absolute value of the order parameter). The usual belief is that with phonon-mediated interaction no anisotropy of the order parameter can be obtained, even in case if the energy spectrum of the metal is anisotropic. This is due to exchange of phonons with high momenta which effectively connect all points of the Fermi surface in the BCS equation (1) (see Fig.5).

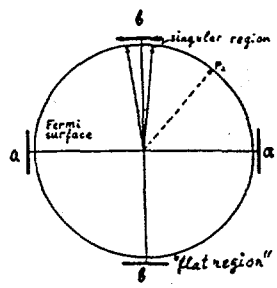

Fig. 5. Fermi surface with singular regions having a high density of states. A short range interaction connects any point with the singular region, whereas a long range interaction connects only points within this region.

However, this statement, being true for good metals, is not so evident for the substances under consideration. According to numerous experimental data, they are intermediate between metals and ionic crystals. The cross-over between these two limiting cases can be imagined as the change of the Debye screening radius from interatomic distances to infinity, and the HTSC can be viewed as substances where all Coulomb-based interactions are screened at large distances. This refers also to the electron attraction mediated by phonons, since it is due to the electron-ion interaction. Therefore it is reasonable to assume this interaction in the form

$$V(k) = g\left(\frac{\kappa^2}{k^2+\kappa^2}\right)^n \frac{\omega^2(k)}{(\xi-\xi')^2 - \omega^2(k)} \tag{3}$$

where $\kappa \ll K$ is the reciprocal Debye radius, ξ is the electronic energy, and K - the reciprocal lattice period. Since different models lead to different powers n, we will simply assume n>1. Under such circumstances the exchange of phonons with small momenta becomes dominant, and we cannot reach the singular region from some distant place (Fig.5) without decreasing drastically the value of the order parameter. Therefore it becomes very anisotropic, and its maxima are located in the regions with the maximal density of states [10]; this, in fact, is observed in experiment. Moreover the values, distant from the singular regions, will be defined by the maximal value, the connection being established through the BCS equation. Therefore the critical temperature is defined only by these singular regions.

4. Two types of the order parameter

In a purely phonon picture there can be no changes of sign of the order parameter, and this contradicts many reliable experimental data. However, apart from phonons, there can exist interactions of some other origin. The isotope effect tells us that the phonons dominate. Therefore these other interactions can become important only, if their nature differs substantially from the phonon-mediated attraction. We will assume