$$\Delta(p) = \int K(p,p')\, f[\Delta(p')]\, d^3p'/(2\pi)^3 \qquad (16)$$

will connect Δ at any p with the singular region, and hence will not permit $\Delta(p)$ to be anisotropic, except for the case, if $K(p,p')$ is anisotropic. In principle this could be achieved by spin-fluctuation exchange, if their relevant momenta were concentrated within narrow intervals around some particular values.

However we consider, as much more natural, the idea of a small momentum transfer. Although the high T_C materials are certainly metals, they are in some sense close to ionic crystals This can be traced from the experimental observation that in the infrared as well as in Raman measurements the phonon peaks are very high (see e.g. ref. [15], [4]). It has also to be considered that structural models consisting of differently charged ions are of much help, not less than band structure calculations based on the LDA method. The cross-over from metals to ionic crystals can be understood if one imagines that the Coulomb forces, which are the basis of all real interactions, are poorly screened, i.e. the Debye screening radius is not of atomic size, as in good metals, but much larger. The expression for the square of the reciprocal Debye radius is $\varkappa^2 = 4\pi(e^2/\varepsilon_\infty)\nu(\mu)$, where ε_∞ is the part of the dielectric constant due to ionic cores, and $\nu(\mu)$ - the state density. Substituting eq. (12) we obtain:

$$\varkappa^2(0) = \frac{2\sqrt{2}N_s e^2 m_x^{1/2} P_{y0}}{\pi\, \varepsilon_\infty\, d(\mu-\varepsilon_0)^{1/2}}\ , \qquad (17)$$

where N_s is the number of singular points per Brillouin zone and we have taken into account 2 spin projections.

From this formula it can be seen that $\varkappa^2(0)$ is small only in case of large ε_∞. The experimental measurements of the dielectric constant as function of frequency [16] give very different values, sometimes larger than 1000, but in case of a complicated energy spectrum it is not easy to decide how ε_∞ has to be extracted, and so we will simply make the assumption that $\varepsilon_\infty \gg 1$. There appear several momentum scales in the problem. For simplicity we consider the extreme case

$$p_{F1} = [2m_x(\mu-\varepsilon_0)]^{1/2} \ll \varkappa \ll P_{y0} \ll d^{-1} \ll K\ , \qquad (18)$$

where p_{F1} is the 1D Fermi momentum, d is the period along c, and K is the reciprocal lattice period in the plane; in reality other cases are also possible.

There is no unique way to chose the model interaction. We will assume that the square of the electron-phonon interaction matrix element entering the phonon mediated electron interaction, as well as the electron-phonon scattering probability, is multiplied by