

Part IV

Conclusion

Chapter 12

Consequences

12.1 Super-Phenomena

Until now it has been commonly thought that the existence of the isotope effect in superconductors leaves only one way for explanation of the superconductivity phenomenon - the way based on the phonon mechanism.

Over fifty years of theory development based on the phonon mechanism, has not lead to success. All attempts to explain why some superconductors have certain critical temperatures (and critical magnetic fields) have failed.

This problem was further exacerbated with the discovery of high temperature superconductors. How can we move forward in HTSC understanding, if we cannot understand the mechanism that determines the critical temperature elementary superconductors?

In recent decades, experimenters have shown that isotopic substitution in metals leads to a change in the parameters of their crystal lattice and thereby affect the Fermi energy of the metal. As results, the superconductivity can be based on a nonphonon mechanism.

The theory proposed in this paper suggests that the specificity of the association

mechanism of electrons pairing is not essential. It is merely important that such a mechanism was operational over the whole considered range of temperatures. The nature of the mechanism forming the electron pairs does not matter, because although the work of this mechanism is necessary it is still not a sufficient condition for the superconducting condensate's existence. This is caused by the fact that after the electron pairing, they still remain as non-identical particles and cannot form the condensate, because the individual pairs differ from each other as they commit uncorrelated zero-point oscillations. Only after an ordering of these zero-point oscillations, an energetically favorable lowering of the energy can be reached and a condensate at the level of minimum energy can then be formed. Due to this reason the ordering of zero-point oscillations must be considered as the cause of the occurrence of superconductivity.

Therefore, the density of superconducting carriers and the critical temperature of a superconductor are determined by the Fermi energy of the metal, The critical magnetic field of a superconductor is given by the mechanism of destruction of the coherence of zero-point oscillations.

In conclusion, the consideration of zero-point oscillations allows us to construct the theory of superconductivity, which is characterized by the ability to give estimations for the critical parameters of elementary superconductors. These results are in satisfactory agreement with measured data.

This approach permit to explain the mechanism of superfluidity in liquid helium. For electron shells of atoms in S-states, the energy of interaction of zero-point oscillations can be considered as a manifestation of Van-der-Waals forces. In this way the apposite quantitative estimations of temperatures of the helium liquefaction and its transition to the superfluid state was obtained.

Thus it is established that both related phenomena, superconductivity and superfluidity, are based on the same physical mechanism - they both are consequences of the ordering of zero-point oscillations.

12.2 A Little More About Pseudo-Theories

It is important not only that the number of pseudo-theories emerged in the twentieth century, but more important is the fact that they are long-lived and continue to exist today. It would seem to be all clear to them since they do not satisfy the main principle of the natural sciences. One might think that the editorial boards of scientific physics journals can be blamed in it. The most of reviewers in these journals are theorists naturally. Often they developed their own criterion of the correctness of a particular article. They believe in their own theories, and not allowed to publish articles that are not consistent with these theories, even if it is obvious that the models in these studies are consistent with the measured data.

As pseudo-theories violate the Gilbert's-Galileo's basic principle, apparently, the editors of these journals need to mark this moment. It probably makes sense to open in professional journals special columns with the name of the type "Hypothetical studies which at this stage has not yet satisfy the general principle of the natural science" and to publish on pages of these columns results of studies that in according with our systematization must be placed in the cell 4 of Table 1.1. In this case, the readers and the Nobel committee will be easier to develop a cautious attitude to these theories.

