

Impurity Scattering Effects in Unconventional Superconductors

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The study of the impurity effects in the unconventional superconductors is invaluable tool to investigate the gap symmetry as well as to understand the real experimental data because most of samples are inevitably contaminated by various disorders. One of the most powerful and widely employed theoretical methods to study the impurity effects is the “ T -matrix approximation”.

In the first part of the lectures, I will discuss the basic ideas and minimum level of mathematics of the “ T -matrix approximation” for the d -wave and multiband sign-changing s -wave superconducting state. Then, in the second part, I will discuss the consequences of the impurity scattering and how to understand the several superconducting properties such as NMR, penetration depth, thermal conductivity, etc. Most of discussions of the application part will deal with the experimental data of Fe-based superconducting compounds.