

## Weak-Localization Effect on the Density of States in Disordered d-wave Superconductors

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**Abstract:** The weak-localization effect on the quasiparticle density of states (DOS) is studied with the diagrammatic technique in the binary-alloy model of disordered two-dimensional d-wave superconductors both in the Born and the unitary limits. We derive in details the expressions of the Goldstone modes (cooperon and diffuson) for quasiparticle diffusion. For generic Fermi surfaces, the DOS is shown to be subject to a quantum interference correction of logarithmic suppression. In the combined limit of unitarity and nested Fermi surface (the UN limit), it is found that the self-energy diagrams with two  $\pi$ -mode diffusons make additional contributions to the weak-localization effect, which has not been considered in the previous diagrammatic analysis. Due to the contributions of these new diagrams, the DOS in the UN limit is shown to have also a negative logarithmic correction, which is qualitatively different from the previous prediction.

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Key words: weak localization, d-wave superconductor, density of states

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