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【150】Mechanisms for π phase shifts in Little-Parks experiments on single crystals

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The Little-Parks effect, the periodic change in the critical temperature upon threading magnetic flux through a superconducting cylinder, exhibits a maximum or a minimum at zero flux in the presence of time-reversal symmetry. The latter situation, referred to as π rings, is only expected for polycrystalline rings of an unconventional superconductor. Interestingly, recent measurements of the Little-Parks effect in single-crystal rings of 4Hb-TaS_2 show zero and π rings and have been interpreted as evidence of exotic superconductivity. We discuss two scenarios for this unconventional behavior, namely a two-component order parameter and negative interlayer Josephson coupling in a s-wave superconductor, as well as both scenarios' reliance on crystal defects.

Theoretical Work

Theory

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