散逸を取り入れた超伝導における平均場理論とその演算子対応

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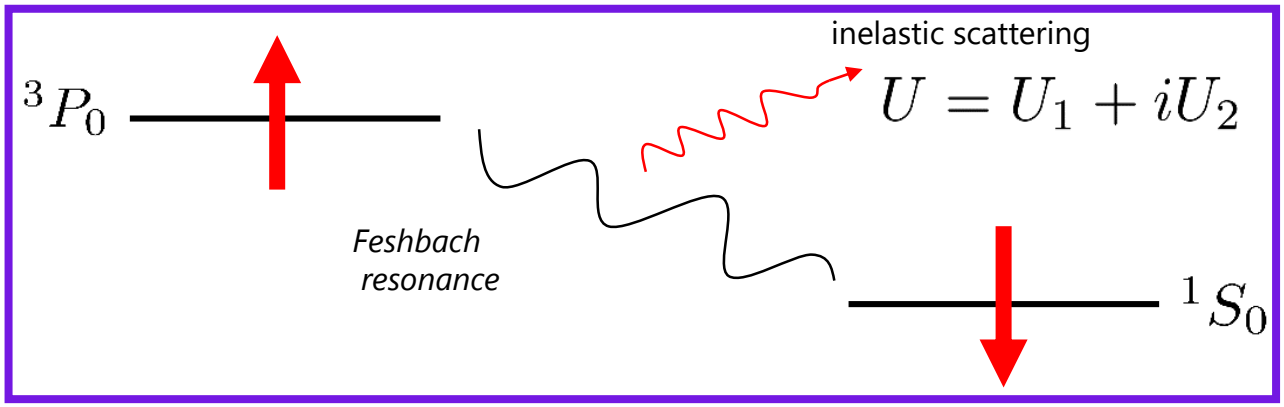
Q. What happens when the interaction of BCS Hamiltonian becomes complex ? ← due to dissipation

A. Complex gap equation and novel properties of quasiparticles are obtained!

Experiment ?



Orbital Feshbach Resonance

NH mean field theory

We decouple the Hamiltonian with the expectation value calculated by the NH Hamiltonian without fluctuation

We can obtain left and right eigenstates respectively !

$$|BCS\rangle_R = \prod_{\boldsymbol{k}} \left(u_{\boldsymbol{k}} + v_{\boldsymbol{k}} c^\dagger_{\boldsymbol{k}\uparrow} c^\dagger_{-\boldsymbol{k}\downarrow} \right) |0\rangle$$

$$|BCS\rangle_L = \prod_{\boldsymbol{k}} \left(u_{\boldsymbol{k}} + \bar{v}_{\boldsymbol{k}} c_{-\boldsymbol{k}\downarrow} c_{\boldsymbol{k}\uparrow} \right)^\dagger |0\rangle$$

Order parameters are not complex conjugate !