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Many-body Effects near s- and p-wave Feshbach resonance in BEC-BCS Problem: A Tractable Crossing-symmetric Approach[1] KHANDKER QUADER, RENYUAN LIAO, Department of Physics, Kent State University — In the fermion BEC-BCS crossover problem. many-body effects may influence properties, such as scattering parameters, nature of pairing, etc. close to a Feshbach resonance. We study effects such as these using a tractable diagrammatic crossing-symmetric approach. Our method allows us to include quantum fluctuations, such as, density, current, spin, spin-current, and higher-order fluctuations in a self-consistent fashion. The underlying fermionic interaction is reflected in the "driving" term. Taking the "driving" term to be finite-range, and of arbitrary strength, we perform calculations on the BEC and BCS sides. These are related to the 2-body singlet and triplet scattering parameters, and can be connected with experimental s and p-wave Feshbach resonances. We include the l=0 density and spin fluctuations, as well as the l=1 current and spin-current fluctuatiuons. We obtain renormalized scattering amplitudes, pairing amplitudes and nature of pairing, etc. on the BEC and BCS side. We compare our results with experiment, and with other theory calculations.

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