Three-Body Contact of the Resonant Fermi Gas

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For fermions with two internal states and two-body interactions of large scattering length a, we express the number of nearby fermion triplets in terms of a quantity C_3, the three-body contact.

We calculate the three-body contact in a high-temperature regime, similar to a virial expansion. First, at the unitary limit, we use a wave-function approach, and we find an analytical formula for the three-body contact in this case. Second, we use a diagrammatic approach in the BEC-BCS crossover. In this approach, the non-trivial scaling of the three-body correlation function is recovered, and we are able to calculate the three-body contact by numerically solving the 3-body problem. At unitarity, we numerically recover the result of the wave-function approach. These calculations could be used as benchmarks for comparisons with experiments.