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Imbalanced Fermi superfluids beyond mean-field.[1] JACQUES TEMPERE, SERGHEI KLIMIN, JOZEF DEVREESE, Universiteit Antwerpen —
Cold atomic Fermi gases undergo pairing transitions leading to superfluidity, as has been demonstrated in recent experiments. In superconducting metals, the number of spin-up and spin-down fermions forming the Cooper pairs is always equal, but in the experiments with atomic superfluids, the number of each pairing partner can be tuned individually. This allows to probe the effect of population imbalance on the pairing properties, and has rekindled much theoretical interest in these systems. Here, we describe how to tackle fluctuations beyond mean field, and at nonzero temperature through an extension of the path-integral scheme developed by Randeria and co-workers. The results are discussed in the context of the recent (sometimes conflicting) experimental observations of imbalanced Fermi superfluids.

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