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Nuclear pairing from microscopic forces: singlet channels and higher-partial waves

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Pairing gaps [1] in isospin-symmetric nuclear matter and neutron matter
are investigated using the chiral nucleon-nucleon potential at the N^{3}LO order
in the two-body sector [2] and the N^{2}LO order in the three-body sector [2,3].

After a short introduction to chiral potentials and related techniques (renormalization group approaches [4]),
we present results for the singlet channel ($^1S_0$) and higher partial coupled waves ($^3PF_2$
and $^3SD_1$) [5].
The role of three-body forces and other many-body correlations is discussed
in comparison with available {\it ab-initio} microscopic calculations [1,6] whenever is possible.

We will also show **(a)** a preliminary analysis of the Cooper pair wavefunctions and **(b)** the
extension of our formalism to finite temperature in connection with neutron star cooling mechanisms.

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