# BCS regime of the two-dimensional fermionic Hubbard model:ground-state phase diagram

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**Abstract**

A significant part of the T=0 phase diagram of the two-dimensional Fermi-Hubbard model (U< 5, n < 0.8) is controlled by Fermi liquid physics with weak effective BCS-type coupling. We access this regime in a controlled way using bold-line diagrammatic Monte Carlo technique in combination with the semi-analytic treatment of the weak instability in the Cooper channel. We obtain the corresponding T=0 phase diagram
in the (n,U) plane, describing the competition between the p- and d-wave superfluid states. We also claim the values of the dimensionless BCS coupling constants—controlling the superfluid Tc—at
the phase boundaries, which prove to be very small up to U=4, n = 0.6.

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