

Abstract Submitted
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Finite Size Effects in the BCS-BEC Crossover from Functional Renormalization MICHAEL SCHERER, Institute for Theoretical Solid State Physics, RWTH Aachen — We apply the functional renormalization group approach to the BCS-BEC crossover for an ultracold gas of fermionic atoms. Formulated in terms of a scale-dependent effective action, the functional RG interpolates continuously between the atomic or molecular microphysics and the macroscopic physics on large length scales. A systematic derivative expansion provides for both a description of the many-body physics and its expected universal features as well as an accurate account of the few-body physics and the associated BEC and BCS limits. Furthermore we put the system into a finite volume and employ periodic boundary conditions to study the effect of a finite size on the few-body scattering physics as well as the critical temperature for the phase transition to superfluidity.

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