Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Properties of the BCS-BEC condensate in the BEC regime JESPER LEVINSEN, VICTOR GURARIE, University of Colorado at Boulder — We study a gas of fermions undergoing a wide resonance s-wave BCS-BEC crossover, in the BEC regime at zero temperature. We calculate the chemical potential and the speed of sound of this Bose-condensed gas, as well as the condensate depletion, in the low density approximation. We discuss how higher order terms in the low density expansion can be constructed. We demonstrate that the standard BCS-BEC gap equation is invalid in the BEC regime and is inconsistent with the results obtained here. The low density approximation we employ breaks down in the intermediate BCS-BEC crossover region. Hence our theory is unable to predict how the chemical potential and the speed of sound evolve once the interactions are tuned towards the BCS regime. As a part of our theory, we derive the well known result for the bosonic scattering length diagrammatically and check that there are no bound states of two bosons.

Jesper Levinsen
University of Colorado at Boulder

Date submitted: 30 Nov 2005 Electronic form version 1.4