

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Hartree-Fock Instability Theorem for a Two Dimensional Electron Gas in the Presence of Rashba Spin-Orbit Coupling GEORGE SIMION, GABRIELE F. GIULIANI, Physics Department, Purdue University — With the idea of spin control in electronic devices in mind, great interest has recently developed on the physics of the two dimensional electron liquid in the presence of spin-orbit coupling of the Rashba type. In order to gain insight into the effects of the Coulomb interactions on the static and dynamic properties of this system we have carried out a systematic study of a number of possible solutions of the corresponding Hartree-Fock problem. In particular we have been able to prove that, similarly to the case of jellium in the absence of spin-orbit coupling, the homogeneous chiral Hartree-Fock states are unstable vis a vis the formation of certain classes of inhomogeneous spin-density-wave states. This result holds for all densities and constitutes the rigorous extension of the Overhauser Hartree-Fock instability theorem to the case of the spin-orbit coupled jellium. Basic properties of these inhomogeneous states have been analyzed and will be discussed.

George Simion
Physics Department, Purdue University

Date submitted: 03 Dec 2004

Electronic form version 1.4