

PHYSICS DEPARTMENT  
COLLOQUIUM

***“Two Dimensional Electronic  
Micro-emulsions”***

BY

PROFESSOR STEVEN KIVELSON  
*Stanford University*

In two dimensional electron systems with Coulomb or dipolar interactions, a recently proven theorem implies that there cannot be a direct first order transition from a (Fermi) liquid to a (Wigner) crystalline state. Since old and well-known arguments rule out the possibility of a continuous transition, the implication is that there cannot be any direct transition at all! As a result, between these phases there must be other (microemulsion) phases which can be viewed as a meso-scale mixture of the liquid and crystalline phases. The transport properties of these new electronic phases are investigated and arguments are presented that they are responsible for the various transport anomalies that have been seen in experiments on the strongly correlated 2DEG in high mobility semiconductor devices with low electron densities.

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