3:30 pm • Wednesday, November 7, 2012 • 2241 Chamberlin Hall • Coffee at 4:30

Special Colloquim

Steven Kivelson

Stanford University's Prabu Goel Family Professor of Physics

Electronic Liquid Crystalline Phases in Highly Correlated Electronic Systems

Department of Physics Colloquium

WISCONSIN

In one extreme, where the interactions are sufficiently weak compared to the interactions, electrons form a "Fermi liquid" – the state that accounts for the properties of simple metals. In the other extreme, where the interactions are dominant, the electrons form various "Mott" insulating or "Wigner crystalline" phases, often characterized by broken spatial and/or magnetic symmetries. Corresponding charge and/or magnetically ordered insulating phases are common in nature. Between these two extremes lie highly correlated electronic fluids, and correspondingly a host of interesting and perplexing materials, including such diverse systems as the cuprate and iron-based high temperature superconductors, the failed metamagnet $Sr_3Ru_2O_7$, and a variety of quantum Hall fluids. Some insight into electron fluids in this rich intermediate coupling regime can be obtained from viewing them as partially melted electron solids, rather than as strongly interacting gases. Here, analogies with the liquid crystalline phases of complex classical fluids provide useful guidance for a new approach to this key problem in condensed matter physics.

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