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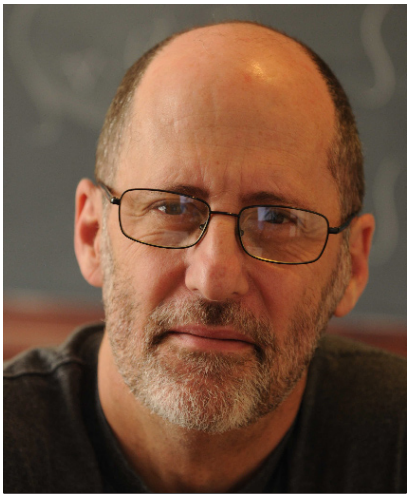
THE UNIVERSITY of WISCONSIN MADISON

Department of Physics Colloquium

Friday, September 24, 2010 • 4:00 P.M. • 2241 Chamberlin Hall

cookies & coffee served at 3:30 p.m

Bose Condensation, Superfluidity, and the Quantum Hall Effect



J.P. Eisenstein

Caltech

Composite particles consisting of an even number of fermions (e.g. ^{4}He atoms) can pretend to be bosons. Bosons, of course, can Bose condense and do remarkable things. Superconductivity, which is certainly remarkable when you stop to think about it, results (sort of) from the Bose condensation of electron pairs. With this in mind, theorists have speculated since the early 1960s that excitons (electron-hole pairs in a semiconductor) might be able to do the same thing.

In this talk I will describe experiments done at Caltech on a special collection of excitons that exists in equilibrium and does indeed show many (but not all) of the expected signs of excitonic superfluidity. Surprisingly, the system in question is a double layer two dimensional electron gas. With no valence band holes in sight, where do the excitons come from?