
HL 10: Invited Talk Dietsche

Time: Monday 14:45–15:30

Location: HSZ 01

Invited Talk HL 10.1 Mon 14:45 HSZ 01
The Bose-Einstein condensation of excitons in quantum-Hall bilayers — •WERNER DIETSCHKE and LARS TIEMANN — MPI für Festkörperforschung, Stuttgart

The possibility of Bose-Einstein condensation of excitons (BEC) in semiconductors has long been debated but proved to be elusive so far. There is now mounting evidence of a BEC in a rather unusual exciton system: two 2-dimensional electron gases separated by a few nm residing in GaAs based quantum wells. The densities and a perpendicular magnetic field are adjusted so that just half a Landau level is filled in each layer. Occupied and unoccupied electron states in the two layers interact via Coulomb forces and behave now like exci-

tons. Unusual transport properties like a quantized Hall drag and a vanishing resistance in the counter flow geometry have already shown unusual properties of this system. Unfortunately, the existence of a BEC was not evident because it is difficult to demonstrate the superflow of charge-neutral excitations in a solid. Recent experiments, however, show an increase of the tunnel conductance between the two layers by more than four orders of magnitude, a nearly vanishing inter-layer bias voltage and a distinct critical current resembling the one of the DC-Josephson effect between superconductors. These phenomena are a very strong evidence of an excitonic superfluid where tunneling would be equivalent to Andreev reflection demonstrating the phase coherence of the excitons.