NEW YORK CITY COLLEGE OF TECHNOLOGY
Physics Department
Center for Theoretical Physics

Quantum Hall Phases "Seen" as Quantum Liquids

Presented by:
Prof. Aron Pinczuk

Columbia University
New York, NY, USA

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Abstract

Quantum Hall phases are archetypes of the remarkable many-electron states that emerge in electron fluids under conditions of greatly reduced dimensionality. These are collective phases that, unlike superfluids, are not characterized by an order-parameter, but, instead, by the emergence of novel quasiparticles. Quantum Hall fluids support characteristic low-energy excitation modes that manifest underlying fundamental interactions and the key physics of quasiparticles.

Highly sensitive optical measurements carried out at very low temperatures are experimental venues to study low-lying excitations that take the fluids of electrons above the ground states. Of particular interest are the excitation modes that demonstrate novel quantum liquid behavior and that offer insights on unexpected collective responses.

This presentation considers elastic as well as inelastic light scattering studies of quantum Hall phases. Inelastic light scattering studies uncover low-lying excitations that are significant in the intriguing physics of quantum Hall fluids. Elastic (Rayleigh) scattering measurements probe the spatial non-uniformity and reveals that quantum Hall phases may break into sub-micron size domains of electron fluid. Recent results explore excitations of the quantum Hall fluids that reside in the second Landau level (at level filling factors such as $\nu=5/2$ and $\nu=8/3$). The quantum Hall fluids in higher Landau levels are of great current interest for applications in topologically protected quantum

information processing.

Light refreshments will be served.