Seminar/Talk

Quantized States, Berry Phases, and Quantum-Hall Wedding-Cake structures in Graphene Quantum Dots

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Recent progress in creating and probing graphene quantum dots (QDs) with fixed build-in potentials has offered a new platform to investigate Klein tunneling related phenomena. In this talk, I describe scanning tunneling spectroscopy measurements of the energy spectrum of graphene QDs as a function of energy, spatial position, and magnetic field. In the absence of a magnetic field, confinement of graphene carriers in a p-n junction resonator gives rise to a series of quasi-bound single particle states which result from oblique Klein scattering at the p-n interface. Applying a weak magnetic field, we observe a giant and discontinuous change in the energy of time-reversed angular-momentum states, which manifests itself as the appearance of “new” resonances in the tunneling density of states. This behavior corresponds to the on/off switching of a π- Berry phase when a weak critical magnetic field is reached. With increased applied magnetic field, the QD states can be confined even further as they condense into highly degenerate Landau levels providing the first spatial visualization of the interplay between spatial and magnetic confinement. This is observed as formation of the seminal wedding-cake structures of concentric compressible and incompressible density rings in strong magnetic fields.

Thursday, March 22, 2018 09:00am - 10:00am
Mondi Seminar Room 2, Central Building

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