The Vienna Doctoral Programme on Complex Quantum Systems
invites you to a

Seminar Talk

by

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Fractional quantum Hall effect and Wigner crystallization in suspended graphene

The structure of the many-body ground state of a 2D electron gas has been under intense theoretical and experimental investigation over the past 40 years. Many unexpected findings, e.g. such as the fractional quantum Hall effect, have made this research area as one of the most fascinating of modern condensed matter physics. As for the present aspirations, fractional elementary excitations and their possible non-Abelian statistics have raised hopes for unconventional applications of these systems in future quantum technologies.

Suspended monolayer graphene forms an excellent, new platform to investigate these many-body phenomena. Suspended graphene provides a system where the Coulomb energy is maximized owing to the small dielectric constant of its environment, much lower than obtained in the regular semiconductor heterostructures. This favors crystallization of the electrons into a Wigner crystal phase as well as it enhances the energy gaps of the incompressible fractional quantum Hall (FQH) liquid states. Hence, an unprecedentedly rich sequence of ordered phases can be expected.

We have investigated the Wigner crystal order and the FQH liquid phases of suspended graphene in Corbino geometry. Our results indicate an unconventional sequence of FQH phases, which is consistent with the composite fermion theory including weak residual interactions. With lowering electron density, the sequence of FQH states is interrupted by Wigner crystal order at Landau level filling factors $\nu \sim 1/7 - 1/5$. In my talk, besides the basic 2D electron gas many-body correlations, I will discuss the basic experimental results giving rise to the above conclusions.

Monday, 16 October 2017,
16:30h get-together with coffee and snacks!

Lise Meitner Hörsaal, Strudlhofgasse 4, 1st floor, Vienna

The seminar talk will be preceded by a CoQuS Student talk at 17:00h
by

Armin Hochrainer
University of Vienna
Measuring the momentum correlation between two light beams by detecting one
Hosted by: Anton Zeilinger