SFB-Seminar (Research Project C5)

TIME:
11 Nov 2014, 15:00 - 18:00

LOCATION:
Humboldt-Universität zu Berlin
Institut für Mathematik und Institut für Physik
AG Mathematische Physik von Raum, Zeit und Materie
IRIS Gebäude, Vortragsraum 2.07
Zum Großen Windkanal 6
12489 Berlin-Adlershof

PROGRAM:

15:00 - 15:30 Coffee-Break

15:30 - 16:30 **Prof. Dr. Gordon Semenoff (University of British Columbia)**

The Relativistic World of Graphene

Graphene is a two-dimensional semi-metal where the electron obeys an emergent relativistic Dirac equation. The resulting electronic properties of this substance make it both a fascinating case study in condensed matter physics and a promising new material for electronics technology. It also offers a novel testing ground for fundamental issues associated with the quantization of the relativistic particle, such as Zetterbewegung and the Schwinger and Klein effects which have proven difficult to test in the particle physics world, but are visible in and have profound effects on the physics of graphene. As well, graphene electrons are putatively strongly coupled and some effects of strong interactions, such as dynamical symmetry breaking and the fractional quantum Hall effect havebeen observed. This provides a simple example of the symmety breaking phenomenon as well as posing a puzzle as to why, if interactions are strong, so much of the physics of graphene is described by weakly interacting, or even non-interacting electrons. Some ideas about how strong interactions

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are manifest in graphene will be presented.

16:30 - 17:00 Coffee-Break

17:00 - 18:00 **Prof. Dr. Charlotte Kristjansen (NBI - Copenhagen University)**

Graphene - A string theoretical perspective

The particle/string duality, also known as the AdS/CFT correspondence, offers the possibility of accessing a strongly coupled particle theory by means of a weakly coupled string theory. On the basis of this idea one could hope that the putatively strongly coupled graphene electrons in an electromagnetic field would have a dual string theoretical description. We will discuss how one can set up a certain string theoretical model involving higher dimensional Dp-branes which might have the capability of describing certain qualitative features of graphene. In particular, we will discuss how one could hope to describe the quantum Hall effect from the string theoretical perspective.

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