UNIVERSITÄT BASEL

Swiss Nanoscience Institute Prof. Dr. Christian Schönenberger Klingelbergstrasse 82 Tel. +41 61 267 36 90
CH-4056 Basel Fax +41 61 267 37 84
www. nanoscience.ch christian.schoenenberger@unibas.ch

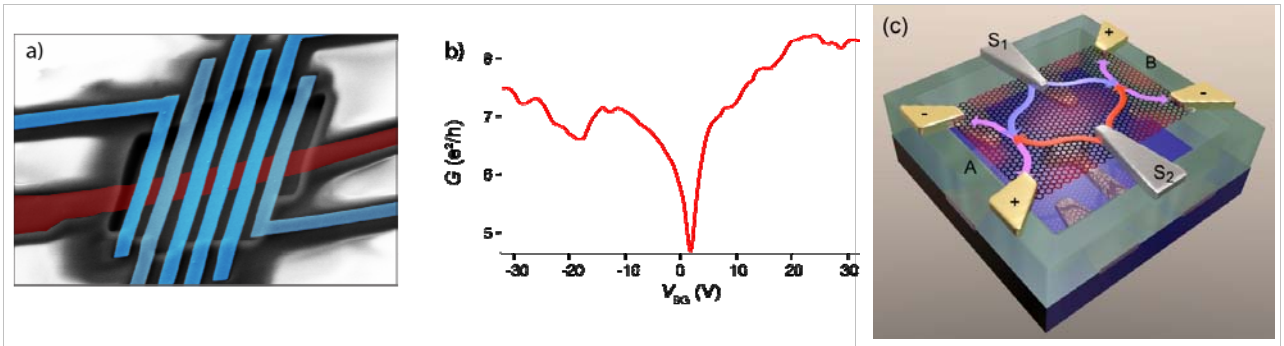
July 2013

PhD-fellowship

Spin-dependent phenomena in Graphene

A fellowship for an **experimental PhD thesis** work is now available in the Nanoelectronics group (www.nanoelectronics.ch) at the University of Basel led by Prof. Christian Schönenberger. We are seeking for an *excellent*, well-qualified and dynamic graduate student with a degree (***Diploma*** or ***Master***) in **physics or nanoscience** who wishes to do leading edge experimental research in the field of quantum transport in graphene in a stimulating environment set by the internationally renowned Department of Physics at the University of Basel (www.physik.unibas.ch) and the Swiss Nanoscience Institute (SNI, www.nanoscience.ch).

Graphene is a new material with exceptional electrical, optical and mechanical properties. In clean materials very high electrical mobilities have been demonstrated. Due to the high mobility and low spin-orbit intercation an induced electron spin polarization may be carried to large distances, which is key for spintronics applications. The goal of the project is to explore **spin-related phenomena** in graphene and related compunds (carbon nanotubes). There are two approaches: in the first one, the magnetic-field induced Zeeman effect (Zeeman spin-Hall effect) in combination with ferromagnetic contacts will be used to manipulate spin and measure spin transport. In the second, we will try to measure spin-polarization with a local probe based on NV centers in diamond. It has been shown that tiny magnetic fields can be probed via optical transitions in these centers. This latter part is a collaboration between the group of Prof. Christian Schönenberger and the group of Prof. Patrcik Maletinsky.



(a) SEM micrograph of a suspended graphene device fabricated on an organic resist (LOR). b) Typical two terminal differential conductance versus backgate voltage at 4K which shows a sharp Dirac point close to 0 V, indicating the high mobility and low doping of LOR suspended graphene devices after current annealing. Envisaged future suspeneded graphene device with multiple terminals.

The successful candidate should be interested in **nanoelectronics** and **quantum physics** and should have a profound understanding of electromagnetism, quatum and solid-state physics. Most of the work will be **experimental**. This includes the fabrication of nanodevices using state-of-the art high resolution fabrication techniques, measurements of tiny electrical signals, cooling devices and electronics to temperatures as low as 20mK and using high-frequency rf electronics. It is crucial that the applicant has done some experimental work before, where he/se has realized to have a pronounced affinity to experimental work. The candidate is eager to be in the lab, where real things happen.

The appointment may start from Oct. 2013 on.

Candidates should e-mail a letter of application together with a brief CV to Prof. Christian Schönenberger, Department for Physics, Klingelbergstrasse 82, CH-4056 Basel, Switzerland;
e-mail: Christian.Schoenenberger@unibas.ch.

UNI BASEL

SNI SWISS NANOSCIENCE INSTITUTE
EINE INITIATIVE DER UNIVERSITÄT BASEL UND DES KANTONS AARGAU