PhD Program between the Freie Universität Berlin (FUB) and the China Scholarship Council (CSC)

Open PhD Position at Freie Universität Berlin, offered only to Chinese CSC scholarship candidates 2020

Please Note: this PhD position is only offered to Chinese PhD candidates for the application in the framework of the FUB-CSC PhD Program.

**Department/Institute:** Department of Physics

**Subject area:** Physics/Quantum Nanoscience

**Name of Supervisor:** Prof. Kirill Bolotin

**Number of open PhD positions:** 1

**Type of the PhD Study:** Full Time (Sandwich may be discussed)

**Project title:** Ultrafast spintronics in two-dimensional semiconductors

---

**PhD Project description:**

Spin-based electronics (“spintronics”) may revolutionize electronic devices. One of the exciting material classes for spintronics are two-dimensional semiconductors such as molybdenum disulfide (MoS2). In this material that is only a few atoms thick, the spin degree of freedom can be initialized by light. Many group are now investigating if “optospintronic” devices, where spins written, manipulated, and read optically. In this project, we are developing a unique approach to probe spins in MoS2 on ultrafast (<1ps) time scales. The approach is based on a combination of two very powerful techniques: photocurrent spectroscopy and Kerr microscopy. The ultimate goal of the project is to record and to understand the dynamics of spins in MoS2 and its heterostructure of femtosecond time scale. We will also investigate potential spintronic device concepts.

During the project, you will: 1) Learn modern nanofabrication technology, ultralow temperature techniques, state of the art laser techniques; 2) Grow, transfer, and stack 2D materials using custom-designed state-of-art setups; 3) Carry out photoluminescence, Raman spectroscopy, photocurrent, and electrical transport measurements on 2D heterostructures, 4) Present conference talks, write papers and patents. 5) Work in a dynamic multinational team on one of the hottest areas of physics.

---

**Language requirements:**

The working language of the group is English. All accents are welcome! IELTS: 6.5 oder TOEFL: 95 ibt
**Academic requirements:**

The Bolotin lab (bolotingroup.com) specializes in quantum electronics and optoelectronics of two-dimensional materials. We pioneered ultrahigh mobility graphene devices, Fractional Quantum Hall effect in graphene, strain engineering techniques in 2D materials, measurements of excitons in 2D semiconductors. The key experimental techniques are electrical transport, strain engineering, photocurrent spectroscopy, and state-of-art nanofabrication. The group strives to understand fundamental quantum mechanical behaviors of these materials as well as to find their new applications. The PI won prestigious European Research Council Starter award, NSF career award, and a Sloan fellowship.

The group is funded by prestigious grants from European Research Council, German Science Foundation (DFG), as well as by American funding agencies. The group is a member of two large-scare German research clusters (TRR). Freie University Berlin is a German Excellent University.

**Information of the professor or research group leader (website, awards etc.):**

bolotingroup.com

**Please Note:** In a first step, the complete application should be submitted to csc@international.fu-berlin.de for evaluation by January 4th, 2020. Please do not contact the professor before. He/she will get in contact with you after having received the complete application via the International Office of Freie Universität Berlin in January.