

Electronic structure of van der Waals 2 dimensional materials

PhD-thesis announcement

A joint Ph.D. project between DICO / LIDYL / CEA Saclay (F) and University of Bohemia (CZ)

Supervisors: Professors Christine Richter (DICO, CYU), Jan Minar (UWB)

Experimental and computational condensed matter & surface physics

Start: September or October 2024

Contact: christine.richter@cyu.fr, jminar@ntc.zcu.cz

Context

With charge-based electronics getting to their limits in storage density, speed and energy consumption, spin-based electronics (spintronics) is now a central research topic and promises significant improvements in device performances. Controlling spins is a major goal in spintronics since it is a low-energy-consumption handle to act on a fundamental property of matter.

A class of Quantum Materials, two-dimensional (2D) van der Waals materials such as transition metal dichalcogenide (TMDC) are promising candidates to achieve this goal. By combining advanced angle- and spin- resolved photoemission spectroscopy (ARPES and SARPES), the project of this thesis aims at a thorough characterization of the spin-split bands of TMDCs thin layers and in their combination in twisted structures.

PhD research program

The goals of the PhD thesis are twofold. In a first stage the exfoliation of single layer 2D samples and their stacking to twisted and hybrid structures will also be aimed. The studies of the electronic structure by ARPES will include spin and time-dependent measurements at the ATTOLab laser facility in CEA Saclay with HHG (higher harmonic generation) photons and investigations with a small spot He-lamp and as well at synchrotron radiation centers.

In a second stage the student will join the research group of Prof. Jan Minar at University of West Bohemia, Pilsen, Czech Republic. There she/he will complete her/his experimental experience with computational skills for interpretation of experimental results.

Candidate

We are seeking a highly motivated candidate, with good skills in experimental physics, data analysis, and a Master degree in solid state physics. Experience with lasers, quantum materials, vacuum technology, or (angle-resolved) photoemission spectroscopy will be highly beneficial. Good oral communication and writing skills in English are required.

Please send your motivation letter, CV, academic transcripts, and the names and contact information (including email addresses) of two or three referees by E-mail.

References

M. Fanciulli et al. PhysRevLett.131.066402 DOI: 10.1103

F. Boschini et al. RevModPhys.96.015003 DOI: 10.1103