CENIDE & WIN Seminar Series on 2D-MATURE

DFG IRTG 2803 & NSERC CREATE

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"Quantum functionality in 2D materials"

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10:00 a.m. ET / 16:00 p.m. CET

Adina Luican-Mayer is an Associate Professor and Interim Chair of the Physics Department at the University of Ottawa. She leads MaQTech, an NSERC CREATE training program in Materials for Quantum Technologies as well as an NSERC Alliance Quantum Consortium, "Programmable quantum simulators based on 2D materials (PQS2D)"
Dr. Luican-Mayer received her PhD in Physics from Rutgers University (2012). Prior to joining uOttawa, she was the Alexei Abrikosov distinguished postdoctoral fellow at the Center for Nanoscale Materials at Argonne National Laboratory. She is the recipient of uOttawa Faculty of Science Early Career Researcher of the year (2020) and Ontario Early Researcher Award (2021).

Material systems, devices, and circuits, based on the manipulation of individual charges, spins, and photons in solid-state platforms are key for quantum technologies. The field of two-dimensional (2D) materials presents an emerging opportunity for the development of next-generation quantum technologies, while also pushing the boundaries of fundamental understanding of condensed matter systems. Through a combination of nanofabrication methods, scanning probe microscopy and other supporting techniques, our laboratory explores quantum functionality in 2D materials and their heterostructures.
In this talk, I will focus on three topics: 1. Progress in realizing a quantum simulation platform using scanning tunnelling microscopy and spectroscopy of novel moiré structures created by twisting 2D layers. 2. 2D semiconducting devices for quantum information science. 3. Environmental sensing using 2D field effect transistors.
In the first part of the talk, I will focus on novel phenomena in moiré structures created by twisting 2D layers. I will discuss the demonstration of reversible local response of domain wall networks using scanning tunneling microscopy in ferroelectric interfaces of marginally twisted WS2 bilayers. Moreover, in the case of twisted WS2 bilayers close to 60°, we observe signatures of flat bands and study the influence of atomic relaxation on their band structure. In the second part of the talk, I will discuss our progress in realizing quantum-confined devices in 2D semiconductors, including quantum dots and quantum point contacts. Lastly, I will describe our progress in realizing selective gas sensors using graphene field effect transistors.