

PHYSICAL CHEMISTRY SEMINAR

Wednesday, February 14, 2024

10:30-11:30 a.m. BRWN 4102

"Ultrafast Dynamics in 2D Materials and Heterostructures Visualized with Time- and Angle-Resolved Photoemission"



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Abstract:

The optical and electronic properties of two-dimensional (2D) materials make them attractive for a variety of applications in quantum information processing, solar-energy harvesting, and catalysis. However, the dynamics of electrons, holes, and excitons formed after photo-excitation are often complex and involve many states that are optically dark, making their characterization with optical spectroscopy alone difficult. We present our recent work imaging the quantum states of 2D materials and their heterostructures in momentum space using time- and angle-resolved photoemission. A unique combination of tunable ultrashort extreme ultraviolet (XUV) pulses with 61 MHz repetition rate and time-of-flight momentum microscopy (ToF k-mic) enables the parallel recording of electron dynamics in all states across the full Brillouin zone after perturbative excitation. We will present results on pseudospin dynamics in graphene, valley circular dichroism in monolayer WS₂, and hybridized excitons in MoSe₂/WS₂ bilayers.



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