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Optical and Electrical Control of Valley Pseudospin in Atomically-Thin Semiconductors

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Electronic valleys are energy extrema of Bloch bands in momentum space. In analogy to electrons with spin degrees of freedom, valley indexes can be considered as pseudospins for new modes of electronic and photonic device operation. In this talk, I will discuss the experimental progress on the investigation of these pseudospins using atomically-thin semiconductors, which are either single or bilayer group VI transition metal dichalcogenides. I will show that these new 2D semiconductors not only behave as remarkable excitonic systems, but also provide an ideal system for optical and electrical control of valley degrees of freedom.