**Electron spin and valley in semiconductors**

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Understanding the electron’s quantum degree of freedom (DoF) in semiconductors may enable the development of new devices with enhanced functionality and performance. Electron’s spin DoF, in particular, has been extensively studied in light of developing spin-based devices that combine logic, storage and fast switches for information processing. Additionally, a new quantum DoF of electrons has emerged recently, called valley, in atomically thin 2D materials such as molybdenum disulfide (MoS2). In this talk, we describe recent developments in semiconductor spintronics and valleytronics.