**Electrical control of valley degree of freedom in 2D semiconductors**

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Exploring electron’s degree of freedom in solids has enabled the development of new electronics with novel functionalities. For example, electron’s charge degree of freedom has led to the development of transistors forming the basis of today’s electronics. Electron’s spin degree of freedom has provided us spin based magnetic memory devices. More recently, electrons in a 2D periodic crystal are found to possess a new type of degree of freedom that may be useful beyond charge and spin, which is called valley. In this talk, I will introduce electron’s valley degree of freedom in solids and discuss electrical, magnetic and optical phenomena arising from valley in 2D crystals.