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Topological valleytronics in 2D Transition Metal Dichalcogenides Semiconductors[1]

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In many crystals the Bloch bands have inequivalent and well separated energy extrema in the momentum space, known as valleys. The valley index constitutes a well-defined discrete degree of freedom for low-energy carriers that may be used to encode information. This has led to the concept of valleytronics, a new type of electronics based on manipulating the valley index of carriers. In the first part of this talk, I will describe a general scheme based on inversion symmetry breaking to control the valley index, using graphene and monolayers of MoS2 as an example. In particular, the valley Hall effect and valley-dependent optical selection will be discussed. In the second part, I will discuss the Berry phase effect on excitons formation and dynamics.

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