



PSI Condensed Matter Colloquium

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Prof. Andras Kis
EPFL Lausanne, Switzerland

Exciton Manipulation in 2D TMDC Heterostructures

The discovery of graphene marked the start of research in 2D electronic materials which was expanded in new directions with MoS_2 and other layered semiconducting materials. They have a wide range of interesting fundamental properties and potential applications. New opportunities are enabled by the band structure of transition metal dichalcogenides (TMDCs) in which we could harness the valley degree of freedom for valleytronics and next-generation photonics. Long-lived interlayer excitons in van der Waals heterostructures based on TMDCs have recently emerged as a promising platform for this, allowing control over exciton diffusion length, energy and polarisation. I will show here how by using $\text{MoS}_2/\text{WSe}_2$ van der Waals heterostructures, we can realize excitonic transistors with switching action, confinement and control over diffusion length at room temperature in a reconfigurable potential landscape. Heterostructures with a long-range moiré potential such as in $\text{MoSe}_2/\text{WSe}_2$, on the other hand, offer the way to control polarization, emission and wavelength emitted by different optically active regions in the moiré

