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Probing and manipulating valley coherence of dark excitons in WSe_2 monolayer

Wednesday, 23 December 2020 09:00 (40 minutes)

Monolayers of semiconducting transition metal dichalcogenides are two-dimensional direct-gap systems that host tightly-bound excitons with an internal degree of freedom corresponding to the valley of the constituting carriers. Strong spin-orbit interaction and the resulting ordering of the spin-split subbands in the valence and conduction bands makes the lowest-lying excitons in WX_2 (X being S or Se) spin-forbidden and optically dark. This results in their long lifetime, making them potentially interesting for valleytronics. With polarization-resolved photoluminescence experiments performed on a WSe_2 monolayer encapsulated in a hexagonal boron nitride, we demonstrate how the intrinsic exchange interaction in combination with the applied in-plane and perpendicular magnetic fields enables one to probe and manipulate the valley degree of freedom of the dark excitons.

Primary author: Dr SLOBODENIUK, Artur (Charles University)

Presenter: Dr SLOBODENIUK, Artur (Charles University)

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