Engineering spin-valley physics in bilayers of MoSe2

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Monolayers of transition metal dichalcogenides (MX2, M=Mo,W) are found to have their valence band maximum at K point. In most instances when the second layer is added, the interaction between the two layers results in the valence band maximum shifting to Gamma. As the valence band maximum at K point is contributed primarily by dxy and dx2-y2 orbitals of the transition metal atom, one finds that spin-orbit interactions lead to large spin splittings of the valence band maximum. This has interesting consequences as spin-orbit interactions alone cannot lead to magnetic order. This then implies that the spin splitting at the symmetry point -K is opposite in direction to that at K. In this talk I will present our recent results of how the spin splittings evolve for bilayers of MoSe2 .

This is work done in collaboration with Poonam Kumari and Joydeep Chatterjee.