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Spin transport in tri-layer MoS_2[1] ASHUTOSH TIWARI, KUN TIAN, University of Utah — Strong spin-orbital coupling and the inversion asymmetry of transition-metal dichalcogenides (TMD) lead to unique spin transport characteristics under externally applied magnetic field. The presence of spin-orbital fields of opposite directions for electrons in K and K' valleys in combination with inter-valley scattering results in a nontrivial spin dynamics. This feature can be probe by measuring nonlocal resistance via electrical Hanle experiments. Optical Hanle measurements revealed 1ns spin life-time in monolayer MoS_2; however, no reports have addressed electrical Hanle measurements which could provide more useful information related to valley degree of freedom for charge carriers. Here, for the first time, we report the all-electrical injection and non-local detection of spin polarized carriers in tri-layer MoS_2 films. We calculated the Hanle curves theoretically when the separation between spin injector and detector is much larger than spin diffusion length. The experimentally observed curve matches the theoretically-predicted Hanle shape under the regime of slow inter-valley scattering. The estimated spin life-time was found to be around 110 ps at 30 K.

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