Spin-Orbit and Magnetic Proximity Effects in Layered Heterostructures

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Abstract. Layered van der Waals heterostructures represents set of systems embedding emergent properties due to proximity effects. Specifically, graphene in vicinity to semiconducting transition metal dichalcogenides can borrow unique spin-momentum locking near the transition metal dichalcogenide valleys and modify its intrinsic spin-orbit coupling [1]. Considering in addition to semiconducting layer a magnetic layer, the time-reversal symmetry violates the valley-Zeeman spin-orbit term. Applying transverse electric field permits to modify carrier level occupation and introduce a valve effect [2]. In this talk we discuss density functional theory calculations and effective tight-binding model of the van der Waals heterostructure leading to so-called ex-so-tic device where bilayer graphene is proximitized by strong spin-orbit coupling from one side and magnetic exchange interaction from the other side [3].

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