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Tunneling conductance measurements in layered magnetic CrBr3 multilayer with and without ferromagnetic contact

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Changes in stacking order and spin configuration can cause dramatic modifications in the electronic properties of 2D magnetic multilayers and their heterostructures. Here, by utilizing tunneling conductance measurements, we demonstrate stacking-dependent interlayer magnetism in CrBr3 multilayers and tunnelling spin-filtering effect in Fe3GeTe2/CrBr3 heterostructures. Frist, we observe that the interlayer coupling of CrBr3 multilayers depends on the stacking order and can be either ferromagnetic or antiferromagnetic. Temperature and magnetic field dependent conductance data revealed their magnetic phase diagrams successfully. Second, with the exfoliated Fe3GeTe2 crystal acting as one ferromagnetic contact and the thin ferromagnetic CrBr3 layers acting as tunnel barrier, we realized the tunnelling spin-valve structure, which exhibits low (high) states of conductance when the two FMs are magnetized in the antiparallel (parallel) configuration. Our work reveals the rich behaviour of atomically thin layered magnetic materials, which can be used to control 2D magnetism and engineer spintronic vdW heterostructures.