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Magnetic proximity effect in a topological insulator-magnetic insulator heterostructure WENMIN YANG, SHUO YANG, KEHUI WU, JIANWANG CAI, YONGQING LI, Institute of Physics Chinese Academy of Sciences — Ferromagnetic topological insulators (TIs) have become one of the most actively pursued materials in condensed matter physics due to their unique properties, where several exotic phenomena have been predicted and observed, such as the quantum anomalous Hall effect and the topological magneto-electric effect. In this talk, I will introduce the fabrication and characterization of a heterostructure consisting of a thin film of the topological insulator Bi_2Se_3 and the magnetic insulator $\text{Y}_3\text{Fe}_5\text{O}_{12}$ (YIG), and study the low temperature transport properties. Compared to non-magnetic Bi_2Se_3 , the magnetoresistance (MR) of Bi_2Se_3 -YIG deviates from the typical weak antilocalization behavior in low perpendicular magnetic fields. In parallel fields, we observe unusual negative MR and sharp MR jumps when single domains nucleate and annihilate. Furthermore, magnetization measurements reveal that this unusual MR correlates to domain wall configurations of the YIG layer. These results can be explained due to the appearance of a perpendicular magnetic exchange field at the interface. The understanding of the interfacial interaction is valuable to further reveal unique physics in TI based magnetic heterostructures.

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