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Topological transitions induced by antiferromagnetism in a thin-film topological insulator[1] GEN YIN, QINGLIN HE, LUYAN YU, LEI PAN, KANG WANG, Univ of California - Los Angeles — Ferromagnetism introduced in topological insulators (TIs) opens a non-trivial exchange band gap, providing an exciting platform to control the topological order through an external magnetic field. The magnetization induces a topological transition that breaks time-reversal symmetry, resulting in anomalous Hall effects. Recently, it was experimentally shown that the surface of an antiferromagnetic (AFM) thin film can magnetize the surface Dirac fermions in a TI thin film similar to the case induced by ferromagnetism. Here, we show that when a TI thin film is sandwiched between two antiferromagnetic layers, an unsynchronized magnetic reversal introduces two intermediate spin configurations during the scan of the external field, resulting in a new topological phase with second Chern numbers. This topological phase introduces two counter-propagating chiral edge modes inside the exchange gap, changing the total number of transport channels drastically when the fermi level is close to the Dirac point. Induced by this change, the magnetoresistance of the channel presents an antisymmetric feature during the field scan. With the the help of the high ordering temperature of AFM layers, this transport signature of the phase transition persists up to 90K experimentally.

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