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Large Unidirectional Magnetoresistance in a Magnetic Topological Insulator KENJI YASUDA, The University of Tokyo, ATSUSHI TSUKAZAKI, Tohoku University, RYUTARO YOSHIMI, KEI TAKAHASHI, RIKEN, MASASHI KAWASAKI, The University of Tokyo, YOSHINORI TOKURA, RIKEN — Interactions between conduction electrons and magnetization yield various kinds of magnetoresistance. Among them, current-direction dependent or unidirectional magnetoresistance (UMR) has recently been found as a nonlinear current-voltage characteristic for heterostructures composed of ferromagnet and normal metal. Here, we report on the UMR in magnetic/nonmagnetic topological insulator (TI) heterostructures, $Cr_x(Bi_{1-y}Sb_y)_{2-x}Te_3/(Bi_{1-y}Sb_y)_2Te_3$ thin films, that is shown to be several orders of magnitude larger than those in other previously reported systems. From the angular, magnetic field and temperature dependence, the UMR is identified to originate from the asymmetry in scattering of surface Dirac electrons by magnons. In particular, the large magnitude of UMR is an outcome of spin-momentum locking and small Fermi wavenumber at the surface state of TI. In fact, with changing the Fermi energy, the UMR can be maximized around the Dirac point with the minimal Fermi wavenumber.

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