

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Spin-dependent photocurrent in topological insulator/magnetic insulator heterostructures¹ YU PAN, TIMOTHY PILLSBURY, Department of Physics, Penn State University, YUNQIU (KELLY) LUO, Department of Physics, Ohio State University, JAMES KALLY, HAILONG WANG, ANTHONY RICHARDELLA, Department of Physics, Penn State University, TAO LIU, MINGZHONG WU, Department of Physics, Colorado State University, ROLAND KAWAKAMI, Department of Physics, Ohio State University, NITIN SAMARTH, Department of Physics, Penn State University — The emerging field of 'topological spintronics' relies on interfacing the helical Dirac surface states of topological insulators (TIs) with magnetism. Heterostructures that combine TIs with insulating magnetic materials are particularly relevant within this context. Here, we describe the discovery of a spin-dependent photocurrent (PC) in heterostructures of yttrium iron garnet (YIG) and 3D topological insulators. We find that the magnetic field-dependent PC maps out the magnetization state of the YIG layer, as confirmed by a direct comparison with magneto-optical Kerr effect measurements. We gain insight into the phenomenon by studying the spin-dependent PC as a function of the chemical potential of the TI film, as well as by examining its variation with the temperature and the wavelength of the optical excitation.

¹Funded by ONR and by C-SPIN, a funded center of STARnet, an SRC program sponsored by MARCO and DARPA.

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Date submitted: 11 Nov 2016

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