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Chiral exciton in the topological insulator Bi_2Se_3[1] HSIANG-HSI KUNG, MARYAM SALEHI, XUEYUN WANG, NIKESH KOIRALA, MATTHEW BRAHLEK, ALEXANDER LEE, SANG-WOOK CHEONG, SEONGSHIK OH, GIRSH BLUMBERG, Department of Physics & Astronomy, Rutgers University — Materials with novel band structures can host "chiral excitons", where the exciton emission preserves the helicity of the excitation photon, as recently demonstrated in transition metal dichalcogenide monolayers [2] [3]. Here, we report the observation of a highly polarized photoluminescence peak, which is due to chiral exciton emission in the topological insulator Bi_2Se_3. Surprisingly, the energy of the emission is centered at 2.26 eV, much higher than the 0.3 eV bulk band gap of Bi_2Se_3. The excitation profile shows maximum polarization around 2.60 eV excitation, suggesting the chiral exciton is due to interband transition between the topological surface states and a bulk band. We demonstrate that the polarization of the exciton emission is insensitive to temperature and Bi_2Se_3 film thickness, providing a convenient and robust platform for optoelectronic applications.

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[2]H. Zeng, J. Dai, W. Yao, D. Xiao and X. Cui *Nature Nanotech.* **7** 490
[3]K.F. Mak, K. He, J. Shan and T.F. Heinz *Nature Nanotech.* **7** 494

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