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Experimental observation of optical Weyl points and Fermi arcs¹

MIKAEL RECHTSMAN, Department of Physics, The Pennsylvania State University

We directly observe the presence type-II Weyl points for optical photons in a three-dimensional dielectric structure comprising arrays of evanescently-coupled, single-mode, helical waveguides. We also observe the corresponding Fermi arc surface states emerging from Weyl points (despite the use of the ‘Fermi arc’ terminology, we are referring to bosons rather than fermions). The Weyl points are manifested by the presence of conical diffraction at the Weyl frequency in the photonic band structure, and the Fermi arc states are manifested by the emergence of surface states as we scan in frequency past the Weyl point. We map the Weyl points to Dirac points of the isofrequency surface, and the Fermi arcs to chiral edge states of an anomalous Floquet insulator.

In collaboration with: Jiho Noh,[1] Sheng Huang,[2] Daniel Leykam*,[3] Y. D. Chong,[3,4] Kevin Chen,[2] and Mikael C. Rechtsman[1]

[1] Department of Physics, The Pennsylvania State University, University Park, PA 16802, USA [2] Department of Electrical and Computer Engineering, University of Pittsburgh, Pittsburgh, Pennsylvania 15261, USA [3] School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore 637371, Singapore [4] Centre for Disruptive Photonic Technologies, Nanyang Technological University, Singapore 637371, Singapore

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