USC Viterbi School of Engineering
Ming Hsieh Department of Electrical and Computer Engineering

Ming Hsieh Institute **Seminar Series**

Photonics

Nonlinear Topological Photonics

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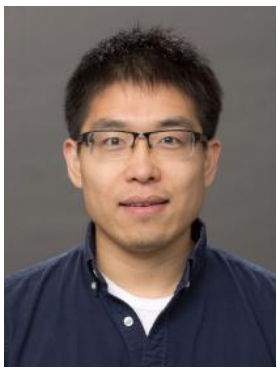
Date: Thursday, February 16, 2023
Time: 4:00pm – 5:30pm
In-person: EEB 248

Abstract: Topological photonics is a rapid developing field, drawing inspirations from the recent successes in electronic systems. Yet, there are two major differences between photons and electrons: (1) photons obey Maxwell's equations, which naturally permit nonlinearities, whereas the Schrodinger equation is always linear; (2) photons are bosons, which allows one to easily probe responses at virtually any desired energy (frequency) without the limitation of the Fermi energy. Based on these differences, I will present our recent theoretical and experimental results in understanding the role of optical nonlinearity in topological physics. On the theory side, these include defining topological invariants in driven nonlinear photonic crystals [1] and identifying various topological phases, such as the Floquet Chern insulators [1], dipole phases [2], quadrupole phases [3,4], and topological polaritons [5]. On the experiment side, I will present our recent results towards observing Floquet Chern insulators, protecting out-of-plane photon radiation losses using topology [6] and their potential applications as grating couplers [7]. Finally, I will present an outlook for potential opportunities in science and technology such as night-vision goggles.

References: [1] Nature Communications 10, 4194 (2019). [2] Physical Review Letters 126, 113901 (2021). [3] Nature Communications 11, 3119 (2020). [4] Physical Review Letters 129, 063902 (2022). [5] Physical Review Letters 130, 043801 (2023). [6] Nature 574, 501 (2019). [7] Nature 580, 467 (2020).



Biography: Bo Zhen is currently an Assistant Professor in the Department of Physics and Astronomy at the University of Pennsylvania. He received his B.S. degrees (Mathematics and Physics) from Tsinghua University in 2008 and his Ph.D. degree (Physics) from MIT in 2014. His honors and awards include Air Force Young Investigator program (2018), Kaufman New Investigator (2018), Army Early Career Award for Scientists and Engineers (2019), Office of Naval Research Young Investigator program (2021), Sloan Research Fellowship (2021), and International Commission for Optics Prize (2021).

Hosted by: Mercedeh Khajavikhan; Michelle Povinelli, Constantine Sideris; Hossein Hashemi; Wade Hsu; Mengjie Yu; Wei Wu; Tony Levi; Alan E. Willner; Andrea Martin Armani