

Hoi Chun (Adrian) Po

Dept. of Physics, The Hong Kong University of Science and Technology

Research interests

Theoretical condensed matter physics: symmetries and phases of many-body quantum systems, non-equilibrium quantum dynamics, fundamentals of band theory, topological materials discovery, magnetism and superconductivity, 2D and moiré materials

Employment

The Hong Kong University of Science and Technology Assistant Professor	Mar 2021 — now
Massachusetts Institute of Technology Pappalardo Postdoctoral Fellow in the Physics Dept.	Sep 2018 — Feb '21
Harvard University Postdoctoral fellow of the Dept. of Physics	Jun — Aug 2018

Education

Harvard University Ph.D. in Physics (transferred from UC Berkeley) Advised by Prof. Ashvin Vishwanath	Aug 2016 — May '18
University of California, Berkeley M.A. in Physics	Aug 2013 — May '16
The Chinese University of Hong Kong B. Sc in Physics	Sep 2009 — Jul '13

Honors and Awards

MIT Pappalardo Fellowships in Physics (2018-21)
Outstanding Graduate Student Instructor Award (UC Berkeley, 2014)
Hellman Graduate Award (UC Berkeley, 2014)
Adrian Has Yin Ü Gateway Fellowship (UC Berkeley, 2013)
Caltech-Hong Kong Undergraduate Research Fellowship (2012)
CUHK Convocation Outstanding Services and Creativity Student Awards (2012)
Prof. Charles K. Kao Research Exchange Scholarship (2011)
The Hong Kong SAR Government Scholarship (2009-12)
The Hong Kong Jockey Club Scholarship (2009-12)
C N Yang Scholarship (The Chinese University of Hong Kong, 2009-11)

Service

Reviewer for Phys. Rev. Lett., Phys. Rev. B, Phys. Rev. X, New J. Phys., Nano Lett.,
Nat. Comm., Nat. Phys., Annalen der Phys., Sci. Adv., Science, & Nature
Coordinator, MIT Informal Condensed Matter Theory Seminars (Fall 2019)
Coordinator, Harvard Condensed Matter Theory Kid's Seminars (2017-18)

Selected Invited Talks

- Symmetry Indicators for Topological Materials*, Perimeter Institute for Theoretical Physics, Oct 2019
- Symmetry Indicators of Band Topology*, APS March Meeting, Boston, Mar 2019
- Modeling twisted bilayer graphene*, conference on “New Approaches to Strongly Correlated Quantum Systems,” Aspen Center for Physics, Feb 2019
- Band Structures: Symmetries and Topology*, (Undergraduate) Physics Lecture Series for the Independent Activities Period, MIT, Jan 2019
- Symmetry Indicators of Band Topology*, workshop on “Topological Band Theory,” École normale supérieure de Lyon, Dec 2018
- Lattice homotopy: some applications*, workshop on “Fracton Phases of Matter and Topological Crystalline Order,” PCTS, Princeton University, Dec 2018
- Fragile topological insulators*, Yale University, Sep 2018
- Topological phases in disordered and driven systems*, workshop on “Anderson Localization and Interactions,” Max Planck Institute for the Physics of Complex Systems, Sep 2018
- Modeling bilayer graphene: twist, and plot twists*, workshop on “Symmetry and Topology in Condensed-Matter Physics,” Univ. of Tokyo, Jun 2018
- A Group Structure of Band Structures (and why one should care)*, UC Berkeley, Jun 2017
- Chiral Floquet Phases*, Boston Univ., Apr 2017
- Chiral Floquet Phases of Many-body Localized Bosons*, MIT, Mar 2017
- Electron filling and topological phases of matter*, UC Davis, Apr 2016
- Phonon analog of topological nodal semimetals*, workshop on “Topological Mechanics: from Metamaterials to Robots,” Lorentz Center, Leiden, Oct 2014

Publications (last updated: Feb 2021)

Asterisk (*) indicates equal contribution

Dissertation

Po, H. C. (2018). Keeping it Real: An Alternative Picture for Symmetry and Topology in Condensed Matter Systems. *Doctoral dissertation*, Harvard University, Graduate School of Arts & Sciences.





Preprint(s)

- [1] Watanabe, H., Kato, Y., Po, H. C., & Motome, Y. Fractional corner magnetization of collinear antiferromagnets. arXiv:2101.05058
- [2] Krishnan, A., Vishwanath, A., & Po, H. C. Topological Invariants of a Filling-Enforced Quantum Band Insulator. arXiv:2010.12053
- [3] Wang, L.-L., Po, H. C., Slager, R.-C., & Vishwanath, A. Topological Descendants of Multicritical EuTl_2 . arXiv:2009.10198
- [4] Watanabe, H., & Po, H. C. Fractional Corner Charge of Sodium Chloride. arXiv:2009.04845
- [5] Ono, S., Po, H. C., & Shiozaki, K. \mathbb{Z}_2 -enriched symmetry indicators for topological superconductors in the 1651 magnetic space groups. arXiv:2008.05499

- [6] Nguyen, T., Andrejevic, N., Po, H. C., Tsurimaki, Y., Drucker, N. C., Alatas, A., Alp, E. E., Leu, B. M., Cunsolo, A., Cai, Y. Q., Wu, L., Garlow, J. A., Zhu, Y., Lu, H., Gossard, A. C., Huang, S., & Li, M. Signature of Many-Body Localization of Phonons in Strongly Disordered Superlattices. arXiv:2008.02257

Peer-reviewed

- [7] Kang, M., Fang, S., Ye, L., Po, H. C., Denlinger, J., Jozwiak, C., Bostwick, A., Rotenberg, E., Kaxiras, E., Checkelsky, J. G., & Comin, R.. Topological flat bands in frustrated kagome lattice CoSn. *Nat. Commun.* **11**, 4004 (2020).
- [8] Ono, S., Po, H. C.*, & Watanabe, H*. Refined symmetry indicators for topological superconductors in all space groups. *Sci. Adv.* **6**, eaaz8367 (2020). [Highlighted in the *Journal Club for Condensed Matter Physics*, March (2020)]
- [9] Po, H. C. Symmetry indicators of band topology. *J. Phys.: Condens. Matter* **32**, 263001 (2020). [Invited Topical Review article]
- [10] Wang, D., Tang, F., Po, H. C., Vishwanath, A., & Wan, X. XFe₄Ge₂ (X = Y, Lu) and Mn₃Pt: Filling-enforced magnetic topological metals. *Phys. Rev. B* **101**, 115122 (2020).
- [11] Wang, D., Tang, F., Ji, J., Zhang, W., Vishwanath, A., Po, H. C., & Wan X. A. Two-dimensional topological materials discovery by symmetry-indicator method. *Phys. Rev. B* **100**, 195108 (2019).
- [12] Carr, S., Fang, S., Po, H. C., Vishwanath, A., & Kaxiras, E. Derivation of Wannier orbitals and minimal-basis tight-binding hamiltonians for twisted bilayer graphene: a first-principles approach. *Phys. Rev. Research* **1** (3), 033072 (2019).
- [13] Zhang, Y. H., Po, H. C., & Senthil, T. Landau level degeneracy in twisted bilayer graphene: role of symmetry breaking. *Phys. Rev. B* **100**, 125104 (2019).
- [14] Else, D.V., Po, H. C., & Watanabe, H. Fragile topological phases in interacting systems. *Phys. Rev. B* **99**, 125122 (2019).
- [15] Po, H. C., Zou, L., Senthil, T., & Vishwanath, A. Faithful Tight-binding Models and Fragile Topology of Magic-angle Bilayer Graphene. *Phys. Rev. B* **99**, 195455 (2019).
- [16] Tang, F., Po, H. C., Vishwanath, A. & Wan, X. Comprehensive search for topological materials using symmetry indicators. *Nature* **566**, 486 (2019).
- [17] Tang, F., Po, H. C., Vishwanath, A. & Wan, X. Topological Materials Discovery By Large-order symmetry indicators. *Sci. Adv.* **5**, eaau8725 (2019).
- [18] Tang, F., Po, H. C., Vishwanath, A. & Wan, X. Efficient Topological Materials Discovery Using Symmetry Indicators. *Nature Phys.* **15**, 470 (2019).
- [19] Fidkowski, L., Po, H. C., Potter, A. C. & Vishwanath, A. Interacting invariants for Floquet phases of fermions in two dimensions. *Phys. Rev. B.* **99**, 085115 (2019).

- [20] Zou, L., Po, H. C., Vishwanath, A. & Senthil, T. Band Structure of Twisted Bilayer Graphene: Emergent Symmetries, Commensurate Approximants and Wannier Obstructions. *Phys. Rev. B* **98**, 085435 (2018).
- [21] Po, H. C., Zou, L., Vishwanath, A. & Senthil, T. Origin of Mott insulating behavior and superconductivity in twisted bilayer graphene. *Phys. Rev. X* **8**, 031089 (2018).
- [22] Khalaf, E., Po, H. C., Vishwanath, A. & Watanabe, H. Symmetry indicators and anomalous surface states of topological crystalline insulators. *Phys. Rev. X* **8**, 031070 (2018).
- [23] Po, H. C., Watanabe, H. & Vishwanath, A. Fragile Topology and Wannier Obstructions. *Phys. Rev. Lett.* **121**, 126402 (2018). [ Editors' suggestion]
- [24] Watanabe, H., Po, H. C. & Vishwanath, A. Structure and topology of band structures in the 1651 magnetic space groups. *Sci. Adv.* **4**, eaat8685 (2018).
- [25] Chen, R., Po, H. C., Neaton, J. B. & Vishwanath, A. Topological materials discovery using electron filling constraints. *Nature Phys.* **14**, 55-61 (2018).
- [26] Po, H. C., Fidkowski, L., Vishwanath, A. & Potter, A. C. Radical chiral floquet phases in a periodically driven Kitaev model and beyond. *Phys. Rev. B* **96**, 245116 (2017). [ Editors' suggestion]
- [27] Po, H. C., Watanabe H., Jian, C.-M. & Zaletel, M. P. Lattice homotopy constraints on phases of quantum magnets. *Phys. Rev. Lett.* **119**, 127202 (2017).
- [28] Liu, G.-Q., Xing, J., Ma, W.-L, Wang, P., Li, C.-H, Po, H. C., Zhang, Y.-R., Fan, H., Liu, R.-B. & Pan, X.-Y. Single-shot readout of a nuclear spin weakly coupled to a nitrogen-vacancy center at room temperature. *Phys. Rev. Lett.* **118**, 150504 (2017).
- [29] Morimoto, T., Po, H. C. & Vishwanath, A. Floquet topological phases protected by time glide symmetry. *Phys. Rev. B* **95**, 195155 (2017). [ Editors' suggestion]
- [30] Po, H. C., Vishwanath, A. & Watanabe, H. Symmetry-based indicators of band topology in the 230 space groups. *Nat. Commun.* **8**, 50 (2017).
- [31] Po, H. C., Fidkowski, L., Morimoto, T., Potter, A. C. & Vishwanath, A. Chiral Floquet phases of many-body localized bosons. *Phys. Rev. X* **6**, 041070 (2016).
- [32] Po, H. C., Watanabe, H., Zaletel, M. P. & Vishwanath, A. Filling-enforced quantum band insulators in spin-orbit coupled crystals. *Sci. Adv.* **2**, e1501782 (2016).
- [33] Po, H. C., Bahri, Y. & Vishwanath, A. Phonon analog of topological nodal semimetals. *Phys. Rev. B* **93**, 205158 (2016). [ Editors' suggestion]
- [34] Watanabe, H., Po, H. C., Zaletel, M. P. & Vishwanath, A. Filling-enforced gaplessness in band structures of the 230 space groups. *Phys. Rev. Lett.* **117**, 096404 (2016). [Highlighted in the *Journal Club for Condensed Matter Physics*, August (2017)]

- [35] Po, H. C. & Zhou, Q. A two-dimensional algebraic quantum liquid produced by an atomic simulator of the quantum Lifshitz model. *Nat. Commun.* **6** 8012 (2015).
- [36] Watanabe, H., Po, H. C., Vishwanath, A. & Zaletel, M. P. Filling constraints for spin-orbit coupled insulators in symmorphic and nonsymmorphic crystals. *Proc. Natl. Acad. Sci.* **112**, 14551– 14556 (2015).
- [37] Liu, G.-Q., Jiang, Q.-Q, Chang, Y.-C., Liu, D.-Q., Li, W.-X., Gu, C.-Z., Po, H. C., Zhang, W.-X., Zhao, N. & Pan, X.-Y. Protection of centre spin coherence by dynamic nuclear spin polarization in diamond. *Nanoscale* **6**, 10134–10139 (2014).
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- [40] Liu, G.-Q.* , Po, H. C.* , Du, J., Liu, R.-B. & Pan, X.-Y. Noise-resilient quantum evolution steered by dynamical decoupling. *Nat. Commun.* **4**, 2254 (2013).