

## Pavan Hosur

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### Education:

B.Tech., Engg. Physics	Indian Institute of Technology, Bombay, India	2003 - 2007
Ph.D., Physics (PhD Advisor)	University of California, Berkeley Ashvin Vishwanath)	2007 - 2012
Post Doc	Stanford University	2012 - 2016

### Employment History:

Associate Professor, University of Houston	2022 - present
Assistant Professor, University of Houston	2016 - 2022

### Honors and Awards:

- NSF CAREER award 2021
- Acknowledged in the Scientific Background for the 2016 Nobel Prize in Physics
- Sigma XI full member

### Recent Research Highlights:

- We showed that topological materials host Luttinger surfaces on their boundaries in addition to the well-known topological surface states. The Luttinger surfaces surprisingly survive symmetry breaking perturbations on the surface that destroy the surface states.
- We devised a route to a perfect superconducting diode effect where the diode figure of merit acquires its maximum theoretical value. Besides its practical implications, the result also sheds new light on fundamental behavior of equilibrium electrons.
- We developed the theory that describes the response of an electron gas in solids to rotation. In chiral materials, we predict a current along the axis of rotation. Our result generalizes the well-known chiral vortical effect from relativistic high-energy physics to crystalline solids and to rotation that is non-uniform in space and time. It also resolves controversies surrounding the adaptation of the chiral vortical effect to condensed matter.
- We calculated the superconductor vortex spectrum in Weyl semimetals and showed that it is dominated by the Fermi arc states. We predicted that tilting the vortex axis produces periodic oscillations in the specific heat and changes the fundamental nature of the vortex between fermionic and bosonic. The critical points between the fermionic vortex-bosonic vortex transitions enjoy an exotic and elusive supersymmetry.
- We derived criteria for the existence of Majorana fermions on the surface of Weyl semimetals in the presence of a bulk superconductor vortex. The criteria depend only on the connectivity of the Fermi arcs and the positions of the bulk Weyl nodes; these data are easily available from band structure calculations or photoemission experiments.

### Lab Facilities / Expertise:

Theory of

- (1) strongly correlated and topological matter
- (2) thermalization and chaos in quantum systems

**Five Selected Publications** ([Link to full list via Google Scholar: https://scholar.google.com/citations?user=AQ9LuS0AAAAJ&hl=en](https://scholar.google.com/citations?user=AQ9LuS0AAAAJ&hl=en))

1. *Intrinsic superconducting diode effects in tilted Weyl and Dirac semimetals*, Kai Chen, Bishnu Karki, Pavan Hosur, Phys. Rev. B 109, 064511 (2024)
2. *Intrinsic surface superconducting instability in Type-I Weyl Semimetals*, Aymen Nomani, Pavan Hosur, Phys. Rev. B 108, 165144 (2023)
3. *Proximity-induced equilibrium supercurrent and perfect superconducting diode effect due to band asymmetry*, Pavan Hosur, Daniel Palacios, Phys. Rev. B 108, 094513 (2023)
4. *Superconductor vortex spectrum including Fermi arcs states in time-reversal symmetric Weyl semimetals*, Rauf Giwa, Pavan Hosur, Phys. Rev. Lett. 130, 156402 (2023).
5. *Fermi arc criterion for surface Majorana modes in superconducting time-reversal symmetric Weyl semimetals*, Rauf Giwa, Pavan Hosur, Phys. Rev. Lett. 127, 187002 (2021).