Hari Padma, Ph.D.

Case Western Reserve University
Department of Physics
2076 Adelbert Rd, Cleveland, OH 44106
hari.padma@case.edu

PROFESSIONAL APPOINTMENTS

2026- **Frederick Reines Assistant Professor of Physics**
Department of Physics, Case Western Reserve University

2022-25 **Postdoctoral Fellow**
Department of Physics, Harvard University
Research Advisor: Matteo Mitrano, Assistant Professor of Physics

ACADEMIC PREPARATION

2021 **Ph.D. in Materials Science & Engineering**
The Pennsylvania State University (Penn State)
Research Advisor: Venkatraman Gopalan, Professor of Materials Science & Engineering

2015 **Bachelor of Technology in Engineering Design**
Indian Institute of Technology Madras (IIT Madras)

PUBLICATIONS

Total Publications: 23

Selected Publications

1. **H. Padma**, P. Sharma, S. F. R. TenHuisen, F. Glerean, A. Roll, P. Zhou, S. Kundu, A. Romaguera, E. Skoropata, H. Ueda, B. Liu, E. Paris, Y. Wang, S-H. Lee, Z. Mao, M. P. M. Dean, E. W. Huang, E. Razzoli, Y. Wang, M. Mitrano (2026). "Light-Induced Charge Order Mode in a Metastable Cuprate Ladder" *Physical Review Letters* (in press)

2. **H. Padma**, F. Glerean, S. F. R. TenHuisen, Z. Shen, H. Wang, L. Xu, J. D. Elliott, C. C. Homes, E. Skoropota, H. Ueda, B. Liu, E. Paris, A. Romaguera, B. Lee, W. He, Y. Wang, S-H. Lee, H. Choi, S. Park, Z. Mao, M. Calandra, H. Jang, E. Razzoli, M. P. M. Dean, Y. Wang, M. Mitrano (2025). "Symmetry-protected electronic metastability in an optically driven cuprate ladder" *Nature Materials* 24, 1584

3. **H. Padma**, J. Thomas, S. F. R. TenHuisen, W. He, Z. Guan, J. Li, B. Lee, Y. Wang, S-H. Lee, Z. Mao, H. Jang, V. Bisogni, J. Pelliciari, M. P. M. Dean, S. Johnston, M. Mitrano (2025). "Beyond-Hubbard hole pairing in a cuprate ladder" *Physical Review X,* 15 021049

4. **H. Padmanabhan**, V. A. Stoica, P. K. Kim, M. Poore, T. Yang, X. Shen, A. Reid, M-F. Lin, S. Park, J. Yang, H. Wang, N. Z. Koocher, D. Puggioni, A. B. Georgescu, L. Min, S. H. Lee, Z. Mao, J. M. Rondinelli, A. M. Lindenberg, L-Q. Chen, X. Wang, R. D. Averitt, J. W. Freeland, V. Gopalan (2022). "Large Exchange Coupling Between Topological Bands and Localized Spins in $MnBi_2Te_4$" *Advanced Materials* 2202841.

5. **H. Padmanabhan**, M. Poore, P. Kim, N. Z. Koocher, V. A. Stoica, D. Puggioni, H. Wang, X. Shen, A. H. Reid, M. Gu, M. Wetherington, S. H. Lee, R. Schaller, Z. Mao, A. M. Lindenberg, X. Wang, J. M. Rondinelli, R. D. Averitt, V. Gopalan (2022). "Interlayer magnetophononic coupling in $MnBi_2Te_4$" *Nature Communications* 13, 1929.

Additional Publications

6. **H. Padma** (2023). “Coherence at first sight” *Matter* 6 (8).

7. **H. Padmanabhan**, J. M. Munro, I. Dabo, V. Gopalan (2020). “Antisymmetry: Fundamentals and Applications” *Annual Review of Materials Research* 50.

8. **H. Padmanabhan**, Y. Park, D. Puggioni, Y. Cao, Y. Shi, J. Chakhalian, J. M. Rondinelli, V. Gopalan (2018). "Linear and nonlinear optical probe of the ferroelectric-like phase transition in a polar metal, $LiOsO_3$” *Applied Physics Letters* 113, 122906.

9. **H. Padmanabhan**, M. L. Kingsland, J. M. Munro, D. B. Litvin, I. Dabo, V. Gopalan (2017). "Spatio-temporal symmetry - Point groups with time translations” *Symmetry* 9 (9), 197.

10. **H. Padmanabhan**, B. R. K. Nanda (2016). "Intertwined lattice deformation and magnetism in monovacancy graphene" *Physical Review B* 93, 165403.

11. H. Wang, V. Stoica, C. Dai, M. Paściak, S. Das, T. Yang, M. A. P. Gonçalves, J. Kulda, M. R. McCarter, A. Mangu, Y. Cao, **H. Padma**, U. Saha, D. Zhu, T. Sato, S. Song, M. Hoffmann, **P.** Kramer, S. Nelson, Y. Sun, Q. Nguyen, Z. Zhang, R. Ramesh, L. Martin, A. M. Lindenberg, L-Q. Chen, J. W. Freeland, J. Hlinka, v. Gopalan, H. Wen (2025). “Terahertz field-activation of polar skyrons” *Nature Communications* 16, 8994.

12. V. A. Stoica, T. Yang, S. Das, Y. Cao, H. Wang, Y. Kubota, C. Dai, **H. Padma**, Y. Sato, A. Mangu, Q. L. Nguyen, Z. Zhang, D. Talreja, M. E. Zajac, D. A. Walko, A. D. DiChiara, S. Owada, K. Miyanishi, K. Tamasaku, T. Sato, J. M. Glownia, V. Esposito, S. Nelson, M. C. Hoffman, R. D. Schaller, A. M. Lindenberg, L. W. Martin, R. Ramesh, I. Matsuda, D. Zhu, L-Q. Chen, H. Wen, V. Gopalan, J. W. Freeland (2024). “Nonequilibrium pathways to emergent polar supertextures” *Nature Materials* 23, 1394.

13. A. Verma, D. Golez, O. Y. Gorobtsov, K. Kaj, R. Russell, J. Z. Kaaret, E. Lamb, G, Khalsa, H. P. Nair, Y. Sun, Y. Bouck, N. Schreiber, J. Ruf, V. Ramaprasad, Y. Kubota, T. Togashi, V. A. Stoica, **H. Padma**, J. W. Freeland, N. A. Benedek, O. G. Shpyrko, J. W. Harter, R. D. Averitt, D. G. Schlom, K. M. Shen, A. J. Millis, A. Singer (2024). “Picosecond volume expansion drives a later-time insulator-metal transition in a nano-textured Mott insulator” *Nature Physics* 20, 807.

14. H. Wang, Y. Xiong, **H. Padma**, Y. Wang, Z. Wang, R. Claes, G. Brunin, L. Min, R. Zu, M. T. Wetherington, Y. Wang, Z. Mao, G. Hautier, L-Q. Chen, I. Dabo, V. Gopalan (2023). “Strong electron-phonon coupling driven pseudogap modulation and density wave fluctuations in a correlated polar metal” *Nature Communications* 14, 5769.

15. Y. Shi, A. E. Duwel, D. M. Callahan, Y. Sun, F. A. Hong, **H. Padmanabhan**, V. Gopalan, R. Engel-Herbert, S. Ramanathan, L-Q. Chen (2022). “Dynamics of voltage-driven oscillating insulator-metal transitions” *Physical Review B* 104, 064308.

16. E. Berger, S. Jamnuch, C. Uzundal, C. Woodahl, **H. Padmanabhan**, A. Amado, P. Manset, Y. Hirata, I. Matsuda, V. Gopalan, Y. Kubota, S. Owada, K. Tono, M. Yabashi, C. Schwartz, W. Drisdell, J. Freeland, T. Pascal, M. Zuerch (2020). “Extreme Ultraviolet Second Harmonic Generation in a Polar Metal” *Nano Letters* 21, 6095.

17. X. Tan, E. E. McCabe, F. Orlandi, P. Manuel, M. Batuk, J. Hadermann, Z. Deng, C. Jin, I. Nowik, R. Herber, C. U. Segre, S. Liu, M. Croft, C.-J. Kang, S. Lapidus, C. E. Frank, **H. Padmanabhan**, V. Gopalan, M. Wu, M.-R. Li, G. Kotliar, D. Walker, M. Greenblatt (2019). “$MnFe_{0.5}Ru_{0.5}O_3$: An above-room-temperature antiferromagnetic semiconductor” *Journal of Materials Chemistry C* 7, 509.

18. S. Yoshida, H. Akamatsu, R.Tsuji, O. Hernandez, **H. Padmanabhan**, A. S. Gupta, A. S. Gibbs, K. Mibu, S. Murai, J. M. Rondinelli, V. Gopalan, K. Tanaka, K. Fujita (2018). “Hybrid Improper Ferroelectricity in $(Sr,Ca)_3Sn_2O_7$ and Beyond: Universal Relationship between Ferroelectric Transition Temperature and

Tolerance Factor in $n = 2$ Ruddlesden Popper Phases“ *Journal of the American Chemical Society* 140, 46, 15690.

19. V. Liu, B. K. VanLeeuwen, **H. Padmanabhan**, J. M. Munro, I. Dabo, V. Gopalan, D. B. Litvin (2018). "Spatio- temporal Symmetry: Crystallographic Point Groups with Time Translations and Time inversion" *Acta Crystallographica A* 74, 399.

20. J. M. Munro, H. Akamatsu, **H. Padmanabhan**, V. Liu, Y. Shi, L. Q. Chen, B. VanLeeuwen, I. Dabo, V. Gopalan (2018). "Discovering Minimum Energy Pathways through Distortion Symmetry" *Physical Review B* 98, 085107.

21. S. Yoshida, K. Fujita, H. Akamatsu, O. Hernandez, A. S. Gupta, F. G. Brown, **H. Padmanabhan**, A. S. Gibbs, T. Kuge, R. Tsuji, S. Murai, J. M. Rondinelli, V. Gopalan, K. Tanaka (2018). “Ferroelectric $Sr_3Zr_2O_7$: Competition between Hybrid Improper Ferroelectric and Antiferroelectric Mechanisms” *Advanced Functional Materials* 28, 1801856.

22. M. R. Li, E. E. McCabe, P. W. Stephens, M. Croft, L. Collins, S. V. Kalinin, Z. Deng, M. Retuerto, A. Gupta, **H. Padmanabhan**, V. Gopalan, C. P. Grams, J. Hemberger, F. Orlandi, P. Manuel, W. Li, C. Jin, D. Walker, M. Greenblatt (2017). "Magnetostriction-polarization coupling in multiferroic Mn_2MnWO_6” *Nature Communications* 8, 2037.

23. S. W. Kim, Z. Deng, S. Yu, **H. Padmanabhan**, W. Zhang, V. Gopalan, C. Jin, M. Greenblatt (2017). “A(II)$GeTeO_6$ (A = Mn, Cd, Pb): Non-Centrosymmetric Layered Tellurates with $PbSb_2O_6$-Related Structure” *Inorganic Chemistry* 56, 15, 9019.

INVITED TALKS

1. “Decoding light-driven quantum materials”
   Case Western Reserve University, Physics Colloquium, February 2026

2. “Symmetry-protected electronic metastability in a driven cuprate ladder”
   Driven Quantum Systems, July 2025

3. “Symmetry-protected electronic metastability in a driven cuprate ladder”
   Max Planck Institute for Solid State Research, July 2025

4. “Decoding and controlling quantum materials with light”
   Case Western Reserve University, Special Seminar, February 2025

5. “Decoding and controlling quantum materials with light”
   University of Notre Dame, Physics and Astronomy Colloquium, February 2025

6. “Electronic metastability in a light-driven cuprate ladder”
   Boston University, Condensed Matter Physics Seminar, October 2024

7. “Electronic metastability in a light-driven cuprate ladder”
   SSRL/LCLS User Meeting, September 2024

8. “Interrogation and manipulation of exchange pathways in the magnetic topological insulator $MnBi_2Te_4$”
   APS March Meeting, March 2023

9. “Interrogation and manipulation of exchange pathways in $MnBi_2Te_4$”
   SLAC National Accelerator Laboratory, November 2022

10. “Exchange coupling between localized spins and itinerant bands in the topological insulator $MnBi_2Te_4$”
    Gordon Research Seminar: *Ultrafast Phenomena in Cooperative Systems*, October 2022

11. "Phononic control of magnetism in a topological insulator"
SPIE Optics + Photonics: *Ultrafast Nonlinear Imaging and Spectroscopy VII*, August 2021

12. "Phononic control of magnetism in a topological insulator"
Lawrence Berkeley National Laboratory, Molecular Foundry Seminar, May 2021

13. "Ultrafast phononic control of magnetism in a topological insulator"
North American Materials Colloquium Series, April 2021

TEACHING & MENTORING EXPERIENCE

Teaching

- Advanced Instrumentation Laboratory (Spring 2026), Case Western Reserve University

Mentoring

- Doctoral advisor, Case Western Reserve University: 1 graduate student
- Semester-long research projects, Harvard: 2 undergraduate students
- Summer research internships, Harvard: 3 undergraduate students
- NSF Research Experience for Undergraduates (REU), Penn State: 4 undergraduate students

PROFESSIONAL SERVICE

Scientific Refereeing

- Research grants: EPiQS, Gordon and Betty Moore Foundation.
- Beamtime proposals: Stanford Synchrotron Radiation Lightsource.
- Manuscripts: *Physical Review X*, *Physical Review Letters*, *Nano Letters*, *npj Computational Materials, Physical Review B, Physical Review Research, National Science Review.*

Leadership

- Chair (Elected), Gordon Research Seminar, *Ultrafast Phenomena in Cooperative Systems* (2024) held in Lucca, Italy.
- Organizer and host of the weekly "Condensed Matter Experiment Journal Club" at Harvard, 2023-24.

Science Outreach

- Developed and conducted a semester-long (remote) group project on quantum materials at Bellaire High School, TX as part of the quantum information outreach efforts of NSF iQuISe at MIT.

- Designed, managed, and ran day-long science demo booths at the Central Pennsylvania Festival of the Arts in 2017, 2018, and 2019, as part of NSF science outreach efforts.