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RESEARCH INTERESTS	Gravitational Waves, Data-driven Modeling, and Numerical Relativity.	
EMPLOYMENT	<b>Assistant Professor</b> , Department of Mathematics, University of Massachusetts, Dartmouth (UMassD).	2023 – Present
	Marie Curie Fellow, Albert Einstein Institute (AEI), Potsdam.	2021 – 2023
	Klarman Fellow, Cornell University.	2020 – 2021
	Postdoctoral Scholar, California Institute of Technology.	2019 – 2020
EDUCATION	Ph.D. Physics California Institute of Technology, Pasadena, USA. Thesis: <i>Black hole simulations: from supercomputers to your laptop.</i> Advisors: Prof. Mark Scheel and Prof. Yanbei Chen.	2019
	M.Sc. Physics and B.E. Mechanical Engineering Birla Institute of Technology and Science, Pilani, India.	2014
PROFESSIONAL MEMBERSHIP	Simulating eXtreme Spacetimes (SXS) Collaboration. • Member of the executive committee.	2023–
	LIGO Virgo Kagra (LVK) Collaboration. • Co-chair of the Waveforms working group.	2021–2025
	LISA Consortium. • Co-coordinator of eccentricity definition project, Waveforms WG.	2025–2026
AWARDS/HONORS	<i>Brandenburg Postdoc Prize</i> , Ministry of Science, Research and Culture.	2022
	<i>Marie Curie Fellowship</i> , Albert Einstein Institute.	2021
	<i>Klarman Fellowship</i> , Cornell University.	2020
	Honorable mention in the GWIC-Braccini PhD Thesis Prize competition.	2020
	<i>Prabhat Award</i> for Best Outgoing Student in Physics, BITS, Pilani.	2013

PUBLICATION  
SUMMARY

- A total of **56** short-author papers.
- 4 other publications (white papers, reviews, etc).
- Selected publications (full list [below](#)).
  1. Varma et al., *Physical Review Letters*, 128, 191102 (2022).
  2. Islam, Varma, et al., *Physical Review D*, 103, 064022 (2021).
  3. Varma et al., *Physical Review Research*, 1, 033015 (2019).
  4. Varma et al., *Physical Review Letters*, 122, 011101 (2019).
  5. Varma et al., *Physical Review D*, 99, 064045 (2019).

MENTORSHIP

**PhD students**

- Varenya Upadhyaya, UMassD. 2025-
- Abhishek Ravishankar, UMassD. 2024-
- Adhrit Ravichandran, UMassD. 2023-
- Swati Singh, UMassD. 2024-2025

**Masters students**

- Matthew Stearns, UMassD. 2025-2026
- Thanay Narayanamurthy, UMassD. 2024
- Neeresh Perla, UMassD. 2023
- Matteo Boschini, UMilano-Bicocca. 2022

**Undergraduate students**

- Dan Tran, UMassD. Spring 2026
- Ryan Berry, UMassD. Summer 2024
- Afura Taylor, MIT. Summer 2019
- Jackie Lodman, Caltech. Summer 2019
- Hao Zhang, Peking University. Summer 2017

RESEARCH GRANTS

NSF research grant PHY-2309301, “Gravitational Wave Models for Black Hole - Neutron Stars in General Relativity and Beyond”, **V. Varma** (PI). \$180,000 (2023 - 2026).

Office of Naval Research grant for UMassD Marine and Undersea Technology Research Program, “Learning Nonlinear Dynamical Systems from Sparse and Noisy Data: Applications to Signal Detection and Recovery”, S. Field (PI), **V. Varma** (co-PI), Z. Chen (co-PI), A. Heryudono (co-PI), B. Keith (co-PI). \$438,284 (2022 - 2025).

COMPUTING  
GRANTS

Dutch Research Council supercomputer allocation grant 2024.002, “Simulations of spinning eccentric binary black hole mergers”, Antoni Ramos-Buades (PI), **V. Varma** (co-PI), Maria Haney (co-PI).

– 8,700,000 Cpu hours (2024 - 2026).

NSF ACCESS supercomputer allocation grants SEE230009 (2023-2025) and TRA250026 (2025-2026), “Anvil for students enrolled in High Performance Scientific Computing taught at the University of Massachusetts Dartmouth”, **V. Varma** (PI), S. Field (co-PI), A. Heryudono (co-PI).

- 256,000 Cpu hours (2025 - 2026).
- 160,000 Cpu hours (2023 - 2025).

NSF ACCESS supercomputer allocation grant PHY990002, “Gravitational Waves From Compact Binaries: Computational Contributions to LIGO”, S. Teukolsky (PI), **V. Varma** (co-PI), 9 more SXS co-PIs.

- 50,000,000 Cpu hours (2025 - 2026).
- 27,000,000 Cpu hours (2024 - 2025).
- 25,000,000 Cpu hours (2023 - 2024).
- 20,000,000 Cpu hours (2022 - 2023).
- 15,000,000 Cpu hours (2021 - 2022).

Texas Advanced Computing Center (TACC) grant PHY20018, “Gravitational Waves from Compact Binaries: Computational Contributions to LIGO”, S. Teukolsky (PI), **V. Varma** (co-PI), 9 more SXS co-PIs.

- 39,200,000 Cpu hours (2024 - 2025).
- 30,800,000 Cpu hours (2023 - 2024).

## TEACHING

### Instructor

- Introduction to Scientific Computation, MTH 280. Spring 2025, Spring 2026
- Differential Equation, MTH 212. Fall 2025
- High Performance Scientific Computing, DSC 520. Fall 2023, Spring 2024, Fall 2024

### Guest lecturer

- Special Topics in Physics (Gravitational Waves), PHY 510. Spring 2024
- Computational Physics, IMPRS, AEL. Spring 2022
- Gravitational Wave Astrophysics, University of Potsdam. Summer 2022

### Teaching assistant

- Physics 1, Classical Mechanics and Electromagnetism, Caltech. 2014
- Physics 2, Waves, Quantum Mechanics, and Statistical Physics, Caltech. 2015
- Physics 106, Topics in Classical Physics, Caltech. 2015

## SERVICE

### Leadership

- Co-coordinator, LISA Consortium Waveforms working group project on “Waveform conventions: eccentricity definitions”. 2025 –
- Executive committee member, SXS Collaboration. 2023–
- Co-chair, LVK Waveforms working group. 2021 – 2025

### Conferences and Workshops

- Organizer, Workshop “Scientific Machine Learning for Gravitational Wave Astronomy”, incl. panel on “Research Careers at all stages”, ICERM. June 2025
- Organizer, Workshop “Simulating Extreme Spacetimes with SpEC and SpECTRE”, incl. panel on “Careers in Industry”, ICERM. Aug 2024

- Organizer, Mini-Symposium “High Order Methods for Computational Relativity”, NAHOMCon, Dartmouth College. June 2024
- Scientific Organizing Committee, PAX Workshop, MIT. Aug 2022

#### Seminar series

- CSCDR Seminar, UMassD. 2024–
- Astrophysics Lunch Seminar, Cornell. 2020 – 2021

#### University service (UMassD)

- Co-Director, ACCOMPLISH STEM Scholarship Program. 2024–2026
- Data Science Steering Committee. 2024–
- Applied Statistics Committee. 2024–
- Math Dept. Liaison to Biomedical Engr. and Biotechnology program. 2024–
- Webmaster, Mathematics department website. 2024–
- Webmaster, CSCDR website. 2024–

#### Thesis committees

- Feroz Shaik, PhD defense, UMassD. 2025
- Parth Sastry, Masters thesis defense, UMassD. 2025
- Adhrit Ravichandran, PhD dissertation proposal, UMassD. 2024
- Bhaskar Verma, PhD dissertation proposal, UMassD. 2024
- Som Bishoyi, PhD dissertation proposal, UMassD. 2024
- Maite Mateu Lucena, PhD defense, University of the Balearic Islands. 2023

#### Journal referee

- *Physical Review D*
- *Physical Review Letters*
- *Astrophysical Journal Letters*
- *Classical and Quantum Gravity*
- *Nature Astronomy*
- *Scientific Reports - Nature*
- *Mathematical Reviews/MathSciNet - American Mathematical Society*

#### Grant referee/panelist

- STFC DiRAC
- NSF PHY
- NSF RCC
- NASA FINESST

#### Miscellaneous

- Jury member for best student talk prize, Eastern Gravity Meeting, UNH. May 2025
- Panelist for College of Arts and Sciences Open House, UMassD. Dec 2023, Dec 2024
- Panelist for the Faculty Positions Workshop, UMassD. May 2024

#### OUTREACH

Popular science lecture on *Smashing black holes together*, at the Seagrave Memorial Observatory, North Scituate, Aug 2026.

Popular science lecture on *Smashing black holes together*, at the Alden Planetarium, Worcester, Oct 2025.

Popular science lecture on *The gravitational wave revolution*, at the Osher Lifelong Learning Institute, URI, Nov 2024.

Brandenburg Postdoc Prize talk on *Catching runaway black holes*, Potsdam Museum, Potsdam, Nov 2022.

Popular science lecture on *The intricate dance of wobbling binary black holes*, during the November of Science, Hannover, Nov 2021.

Popular science article on *Ripples from colliding black holes*, for Caltech letters, March 2019.

Public talk on *Tumbling black holes*, for Astronomy on Tap, Pasadena, March 2019.

Developed the [binary black hole explorer](#), a teaching tool aimed at undergraduate and graduate students, to learn about precessing binary black hole mergers through visualizations, Nov 2018.

Invited speaker for BITS Embryo Lecture on *A career in Science*, Feb 2015.

## IN THE NEWS

### Paper coverage

- *First measurement of a large recoil.*  
Varma, et al., *Physical Review Letters*, 128, 191102 (2022).  
[APS](#), [New Scientist](#), [Discover Magazine](#), [Science News](#), [Indian Express](#), [Scientias](#), [Sciences et Avenir](#), [CNET](#), [Big Think](#), [Daily Express](#), [Antov Petrov](#).
- *Hints of spin-orbit resonances.*  
Varma, et al., *Physical Review Letters*, 128, 031101 (2022).  
[Cornell](#), [Ars Technica](#), [Universe Today](#).
- *Improved spin black hole measurements.*  
Biscoveanu, et al., *Physical Review Letters*, 126, 171103 (2021).  
[Cornell](#).
- *Method for measuring recoils kicks using LIGO.*  
Varma, et al., *Physical Review Letters*, 124, 101104 (2020).  
[Cornell](#), [Inside Science](#).
- *First surrogate model for extreme mass ratio inspirals.*  
Rifat, et al. , *Physical Review D*, 101, 081502 (R) (2020).  
[Quanta magazine](#).
- *First surrogate model for black hole merger remnants.*  
Varma, et al., *Physical Review Letters*, 122, 011101 (2019).  
[Caltech](#), [OleMiss](#).

### University highlights

- [UMassD contributions to LIGO discovery, GW231123 \(2025\)](#).
- [Coverage of the gravitational waves group at UMassD \(2024\)](#).
- [UMassD contributions to LISA science \(2024\)](#).
- [New insights on BBH properties from surrogate models, UMassD \(2023\)](#).
- [Brandenburg postdoc prize announcement, AEI \(2022\)](#).
- [Klarman Fellow profile, Cornell \(2021\)](#)
- [Cornell Daily Sun coverage of Klarman Fellows \(2020\)](#).

### Expert commentary

- [Quoted in a popular science book, The Gravity of Math: How Geometry Rules the Universe \(2024\)](#).
- [Natal black hole kicks from supernovae, Business Insider \(2024\)](#).

- [Mass and angular momentum in general relativity, Quanta Magazine \(2023\)](#).

### Miscellaneous

- [Anvil supercomputer science highlight](#) on NR and surrogate models (2024).
- [ACCESS and HPC Wire highlights](#) on DSC 520 class at UMassD (2024).
- [APS press conference on surrogate models and visualizations](#) (2019).

### SEMINARS AND INVITED TALKS

37. APS Global Summit, Invited Session on *A beginner's guide to Gravitational Physics*, Denver, March 2026.
36. Astrophysical Sciences and Technology Colloquium, RIT, Rochester, January 2026.
35. Physics Colloquium, University of Rhode Island, Kingston, October 2025.
34. Physics and Astronomy Colloquium, University of Mississippi, Oxford, April 2025.
33. HPC Day, UMass. Amherst, April 2025.
32. Gravitational Seminar, University of Texas, Austin, Feb 2025.
31. APS Global Summit, Invited Session on *Twenty Years of Binary Black Hole Simulations*, Anaheim, March 2025.
30. Fundamental Physics Meets Waveforms With LISA Workshop, AEI, Potsdam, Sep 2024.
29. Gravity Seminar, Universitat de les Illes Balears, Palma, May 2023.
28. Gravity Seminar, Niels Bohr Institute, Copenhagen, May 2023.
27. Observational Relativity and Cosmology Seminar, AEI, Hannover, May 2023.
26. Physics and Astrophysics at the Extreme (PAX) Workshop, MIT, Aug 2022.
25. Astrophysics Seminar, University of Milano-Bicocca, June 2022.
24. Astrophysical and Planetary Sciences Lunch Seminar, CU Boulder, March 2022.
23. GW Next Meeting, Online, Jan 2022.
22. Computational Science Seminar, UMassD, Dec 2021.
21. IGFAE Seminar, USC, Santiago de Compostela, Oct 2021.
20. Astrophysical and Cosmological Relativity Seminar, AEI, Potsdam, Oct 2021.
19. Gravitational Wave Astronomy Group Seminar, Flatiron CCA, July 2021.
18. Gravitational Wave Astrophysics Conference, Hefei, June 2021.
17. Physics Seminar, IIT Madras, Apr 2021.
16. Physics Colloquium, HRI Allahabad, Dec 2020.
15. ICERM Workshop, Brown University, Nov 2020.
14. Lunch Seminar, Cornell, Ithaca, Sep 2020.

13. Strong Gravity Seminar, Perimeter Institute, Waterloo, Nov 2019.
12. Lunch Seminar, Cornell, Ithaca, Oct 2019.
11. GR Seminar, University of Jena, Jena, Oct 2019.
10. Astrophysical and Cosmological Relativity Seminar, AEI, Potsdam, Oct 2019.
9. Astrophysics Seminar, University of Birmingham, Birmingham, Oct 2019.
8. CaJAGWR Seminar, Caltech, Pasadena, Aug 2019.
7. GW-CMB Seminar, IUCAA, Pune, May 2019.
6. Physics Seminar, IISER, Pune, May 2019.
5. ICTS Seminar, Bangalore, May 2019.
4. Astrophysics Seminar, IISc, Bangalore, May 2019.
3. APS Press Conference, APS April meeting, Denver, April 2019.
2. LIGO Seminar, Caltech, Pasadena, Oct 2018.
1. Workshop on Reduced Order Modeling, AEI, Potsdam, June 2018.

CONFERENCE  
CONTRIBUTIONS  
AND ATTENDANCE

Contributed talks are indicated by a †.

40. MUST Research Program Technical Review Meeting, UMassD, July 2025.
39. Scientific Machine Learning for Gravitational Wave Astronomy<sup>†</sup>, ICERM, June 2025.
38. Eastern Gravity Meeting, UNH, May 2025.
37. MUST Research Program Technical Review Meeting, UMassD, July 2024.
36. Simulating Extreme Spacetimes with SpEC and SpECTRE (SXSCon), ICERM, Aug 2024.
35. High Order Methods for Computational Relativity (NAHOMCon), Dartmouth College, June 2024.
34. APS April meeting<sup>†</sup>, Sacramento, Apr 2024.
33. LIGO Virgo Kagra Collaboration Meeting, Baton Rouge, Mar 2024.
32. HPC Day, UMassD, Nov 2023.
31. Moriond Gravitation, La Thuile, Mar 2023.
30. LIGO Virgo Kagra Collaboration Meeting, Chicago, Mar 2023.
29. Gravitational Wave Physics and Astronomy Workshop, Melbourne, Dec 2022.
28. Fall 2020 Reunion Event, ICERM, Brown University, July 2022.
27. Gravitational Wave and Multimessenger Astronomy Workshop, Bad Honnef, Apr 2022.
26. LIGO Virgo Kagra Collaboration Meeting, Virtual, Mar 2022.
25. Black-Hole Ringdown Workshop, Flatiron CCA, Feb 2022.

24. Gravitational Wave Physics and Astronomy Workshop, Hannover, Dec 2021.
23. Kick Off Workshop of the Einstein Telescope Observational Science Board, Virtual, Sep 2021.
22. LIGO Virgo Kagra Collaboration Meeting, Virtual, Sep 2021.
21. Virtual APS April meeting<sup>†</sup>, April 2021.
20. Virtual APS April meeting<sup>†</sup>, April 2020.
19. GR22-Amaldi13<sup>†</sup>, Valencia, July 2019.
18. AstroInformatics<sup>†</sup>, Caltech, June 2019.
17. APS April meeting<sup>†</sup>, Denver, April 2019.
16. LIGO Virgo Kagra Collaboration Meeting, Lake Geneva, March 2019.
15. LIGO Virgo Kagra Collaboration Meeting, Maastricht, Sep 2018.
14. APS April meeting<sup>†</sup>, Columbus, April 2018.
13. APS April meeting<sup>†</sup>, Columbus, April 2018 (On behalf of K. Barkett).
12. Pacific Coast Gravity Meeting<sup>†</sup>, Caltech, Pasadena, March 2018.
11. Workshop on The Architecture of LISA Science Analysis: Imagining the Future, Caltech, Pasadena, January 2018.
10. Pacific Coast Gravity Meeting<sup>†</sup>, UC Santa Barbara, March 2017.
9. APS April Meeting<sup>†</sup>, Washington, DC, Jan 2017.
8. APS April Meeting<sup>†</sup>, Salt Lake City, April 2016.
7. TASC Meeting<sup>†</sup>, CSU Fullerton, Nov 2015.
6. Gravitational Wave Astrophysics School, Caltech, Pasadena, July 2015.
5. LIGO Virgo Kagra Collaboration Meeting, Pasadena, March 2015.
4. Gravitational Wave Physics and Astronomy Workshop, IUCAA, Pune, Dec 2013.
3. ICTS Summer School on Numerical Relativity, ICTS, Bangalore, June 2013.
2. BITS-IUCAA Workshop on Gravitational-Wave Data Analysis, Goa, Dec 2012.
1. Fifth International ASTROD Symposium on Laser Astrodynamics, Space Test of Relativity and Gravitational-Wave Astronomy, RRI, Bangalore, July 2012.

## PUBLICATIONS

This list only includes short-author papers (peer-reviewed or under review); for the full list, see [INSPIRE](#).

56. A. Ravichandran, P. Nee, K. Mitman, T. Islam, S. Field, **V. Varma**, et al.  
*Merger remnant and eccentricity dynamics surrogates for eccentric nonspinning black hole binaries.*  
Submitted to *Physical Review D*, [arxiv:2605.00124](#).
55. T. Islam, A. Ravichandran, P. Nee, S. Field, **V. Varma**, et al.  
*Including higher-order modes in a quadrupolar eccentric numerical relativity surrogate using universal eccentric modulation functions.*  
Submitted to *Physical Review D*, [arxiv:2604.17868](#).

54. P. Nee, A. Ravichandran, S. Field, T. Islam, H. Pfeiffer, **V. Varma**, et al.  
*Eccentric binary black holes: A new framework for numerical relativity waveform surrogates.*  
 Submitted to *Physical Review Letters*, [arxiv:2510.00106](#).
53. A. Maurya, P. Kumar, S. Field, C. Mishra, P. Nee, K. Paul, H. Pfeiffer, A. Ravichandran, **V. Varma**.  
*Chase Orbits, not Time: A Scalable Paradigm for Long-Duration Eccentric Gravitational-Wave Surrogates.*  
 Submitted to *Physical Review Letters*, [arxiv:2510.00116](#).
52. A. Shaikh, **V. Varma**, A. Ramos-Buades, H. Pfeiffer, M. Boyle, et al.  
*Defining eccentricity for spin-precessing binaries.*  
*Classical and Quantum Gravity*, 42, 195012 (2025), [arxiv:2507.08345](#).  
 Focus Issue on Gravitational Wave Physics and Astrophysics Ten Years After GW150914.
51. S. Miller, M. Isi, K. Chatziioannou, **V. Varma**, S Hourihane.  
*Measuring spin precession from massive black hole binaries with gravitational waves: insights from time-domain signal morphology.*  
*Physical Review D*, 112, 104046 (2025), [arxiv:2505.14573](#).
50. M. Scheel, et al. (incl. **V. Varma**).  
*The SXS Collaboration's third catalog of binary black hole simulations.*  
*Classical and Quantum Gravity*, 42, 195017 (2025), [arxiv:2505.13378](#).
49. S. Field, **V. Varma**, J. Blackman, B. Gadre, C. Galley, T. Islam, et al.  
*GWSurrogate: A Python package for gravitational wave surrogate models .*  
*Journal of Open Source Software*, 10 (107), 7073, [arxiv:2504.08839](#).
48. G. Re, et al. (incl. **V. Varma**).  
*Modeling the BMS transformation induced by a binary black hole merger.*  
*Physical Review D*, 111, 124019 (2025), [arxiv:2503.09569](#).
47. P. Nee, A. Gamboa, H. Pfeiffer, L. Pompili, A. Ramos-Buades, **V. Varma**, et al.  
*Impact of eccentricity and mean anomaly in numerical relativity mergers.*  
*Classical and Quantum Gravity*, 42, 135011 (2025), [arxiv:2503.05422](#).
46. L. Thomas, K. Chatziioannou, **V. Varma**, S. Field.  
*Optimizing Neural Network Surrogate Models: Application to Black Hole Merger Remnants.*  
*Physical Review D*, 111, 104029 (2025), [arxiv:2501.16462](#).
45. U. Deka, G. Prabhu, A. Shaikh, S. Kapadia, **V. Varma**, S. Field.  
*Surrogate modeling of gravitational waves microlensed by spherically symmetric potentials.*  
*Physical Review D*, 111, 104042 (2025), [arxiv:2501.02974](#).
44. L. Zertuche, L. Stein, K. Mitman, S. Field, **V. Varma**, M. Boyle, et al.  
*High-Precision Ringdown Surrogate Model for Non-Precessing Binary Black Holes.*  
*Physical Review D*, 112, 024077 (2025), [arxiv:2408.05300](#).
43. K. Rink, R. Bachhar, T. Islam, N. Rifat, K. Gonzalez-Quesada, S. Field, G. Khanna, S. Hughes, **V. Varma**.  
*Gravitational wave surrogate model for spinning, intermediate mass ratio binaries based on perturbation theory and numerical relativity.*  
*Physical Review D*, 110, 124069 (2024), [arxiv:2407.18319](#).

42. D. Sun, M. Boyle, K. Mitman, M. Scheel, L. Stein, S. Teukolsky, **V. Varma**.  
*Optimizing post-Newtonian parameters and fixing the BMS frame for numerical-relativity waveform hybridizations.*  
*Physical Review D*, 110, 104076 (2024), [arxiv:2403.10278](#).
41. H. Zhu, et al. (incl. **V. Varma**).  
*Black Hole Spectroscopy for Precessing Binary Black Hole Coalescences.*  
*Physical Review D*, 111, 064052 (2025), [arxiv:2312.08588](#).
40. S. Miller, M. Isi, K. Chatziioannou, **V. Varma**, I. Mandel.  
*GW190521: tracing imprints of spin-precession on the most massive black hole binary.*  
*Physical Review D*, 109, 024024 (2024), [arxiv:2310.01544](#).
39. T. Islam, A. Vajpeyi, F. Shaik, C. Haster, **V. Varma**, S. Field, et al.  
*Analysis of GWTC-3 with fully precessing numerical relativity surrogate models.*  
*Physical Review D*, 112, 044001 (2025), [arxiv:2309.14473](#).
38. M. Boschini, D. Gerosa, **V. Varma**, et al.  
*Extending black-hole remnant surrogate models to extreme mass ratios.*  
*Physical Review D*, 108, 084015 (2023), [arxiv:2307.03435](#).
37. J. Yoo, K. Mitman, **V. Varma**, et al.  
*Numerical relativity surrogate model with memory effects and post-Newtonian hybridization.*  
*Physical Review D*, 108, 064027 (2023), [arxiv:2306.03148](#).
36. M. Isi, W. Farr and **V. Varma**.  
*The directional isotropy of LIGO-Virgo binaries.*  
*Astrophysical Journal*, 962, 19 (2024), [arxiv:2304.13254](#).
35. S. Ma, **V. Varma**, L. Stein, F. Foucart, et al.  
*Numerical simulations of black hole-neutron star mergers in scalar-tensor gravity.*  
*Physical Review D*, 107, 124051 (2023), [arxiv:2304.11836](#).
34. A. Shaikh, **V. Varma**, H. Pfeiffer, A. Ramos-Buades and M. van de Meent.  
*Defining eccentricity for gravitational wave astronomy.*  
*Physical Review D*, 108, 104007 (2023), [arxiv:2302.11257](#).
33. M. Walker, **V. Varma**, G. Lovelace, and M. Scheel.  
*Numerical-relativity surrogate modeling with nearly extremal black-hole spins.*  
*Classical and Quantum Gravity*, 40, 055003 (2023), [arxiv:2208.02927](#).
32. T. Islam, S. Field, S. Hughes, G. Khanna, **V. Varma**, M. Giesler, M. Scheel, L. Kidder, and H. Pfeiffer.  
*Surrogate model for gravitational wave signals from non-spinning, comparable- to large-mass-ratio black hole binaries built on black hole perturbation theory waveforms calibrated to numerical relativity.*  
*Physical Review D*, 106, 104025 (2022), [arxiv:2204.01972](#).  
[Editors' Suggestion](#).
31. J. Yoo, **V. Varma**, M. Giesler, M. Scheel, C. Haster, et al.  
*Targeted large mass ratio numerical relativity surrogate waveform model for GW190814.*  
*Physical Review D*, 106, 044001 (2022), [arxiv:2203.10109](#).
30. B. Gadre, M. Pürrer, S. Field, S. Ossokine, and **V. Varma**.  
*A fully precessing higher-mode surrogate model of effective-one-body waveforms.*  
*Physical Review D*, 110, 124038 (2024), [arxiv:2203.00381](#).

29. **V. Varma**, S. Biscoveanu, T. Islam, F. Shaik, C. Haster, M. Isi, et al.  
*Evidence of large recoil velocity from a black hole merger signal.*  
*Physical Review Letters*, 128, 191102 (2022), [arxiv:2201.01302](#).  
 Editors' Suggestion and Featured in Physics.  
*In press:* New Scientist, Discover Magazine, Science News, Indian Express,  
 Scientias, Sciences et Avenir, CNET, Big Think, Daily Express.
28. **V. Varma**, S. Biscoveanu, M. Isi, W. Farr, and S. Vitale.  
*Hints of spin-orbit resonances in the binary black hole population.*  
*Physical Review Letters*, 128, 031101 (2022), [arxiv:2107.09693](#).  
*In press:* Cornell, Ars Technica, Universe Today.
27. **V. Varma**, M. Isi, S. Biscoveanu, W. Farr, and S. Vitale.  
*Measuring binary black hole orbital-plane spin orientations.*  
*Physical Review D*, 105, 024045 (2022), [arxiv:2107.09692](#).
26. S. Biscoveanu, M. Isi, **V. Varma**, and S. Vitale.  
*Measuring the spins of heavy binary black holes.*  
*Physical Review D*, 104, 103018 (2021), [arxiv:2106.06492](#).
25. S. Ma, M. Giesler, **V. Varma**, M. Scheel, and Y. Chen.  
*Universal features of gravitational waves emitted by superkick binary black hole systems.*  
*Physical Review D*, 104, 084003 (2021), [arxiv:2107.04890](#).
24. S. Biscoveanu, M. Isi, S. Vitale, and **V. Varma**.  
*A new spin on LIGO-Virgo binary black holes.*  
*Physical Review Letters*, 126, 171103 (2021), [arxiv:2007.09156](#).  
*In press:* Cornell.
23. S. Ma, M. Giesler, M. Scheel, and **V. Varma**.  
*Extending superposed harmonic initial data to higher spin.*  
*Physical Review D*, 103, 084029 (2021), [arxiv:2102.06618](#).
22. Y. Huang, C. Haster, S. Vitale, **V. Varma**, F. Foucart, and S. Biscoveanu.  
*Statistical and systematic uncertainties in extracting the source properties of neutron star - black hole binaries with gravitational waves.*  
*Physical Review D*, 103, 083001 (2021), [arxiv:2005.11850](#).
21. T. Islam, **V. Varma**, J. Lodman, S. Field, G. Khanna, et al.  
*Eccentric binary black hole surrogate models for the gravitational waveform and remnant properties: comparable mass, nonspinning case.*  
*Physical Review D*, 103, 064022 (2021), [arxiv:2101.11798](#).
20. **V. Varma**, M. Mould, D. Gerosa, M. Scheel, L. Kidder, and H. Pfeiffer.  
*Up-down instability of binary black holes in numerical relativity.*  
*Physical Review D*, 103, 064003 (2021), [arxiv:2012.07147](#).
19. A. Taylor and **V. Varma**.  
*Gravitational wave peak luminosity model for precessing binary black holes.*  
*Physical Review D*, 102, 104047 (2020), [arxiv:2010.00120](#).
18. L. Reali, M. Mould, D. Gerosa, and **V. Varma**.  
*Mapping the asymptotic inspiral of precessing binary black holes to their merger remnants.*  
*Classical and Quantum Gravity*, 37, 225005 (2020), [arxiv:2005.01747](#).

17. **V. Varma**, M. Isi, and S. Biscoveanu.  
*Extracting the gravitational recoil from black hole merger signals.*  
*Physical Review Letters*, 124, 101104 (2020), [arxiv:2002.00296](#).  
**In press:** Cornell, Inside Science.
16. K. Barkett, Y. Chen, M. Scheel, and **V. Varma**.  
*Gravitational waveforms of binary neutron star inspirals using PN Tidal Splicing.*  
*Physical Review D*, 102, 024031 (2020), [arxiv:1911.10440](#).
15. F. Shaik, J. Lange, S. Field, R. O’Shaughnessy, **V. Varma**, L. Kidder, H. Pfeiffer, and D. Wysocki.  
*Impact of subdominant modes on the interpretation of gravitational-wave signals from heavy binary black hole systems.*  
*Physical Review D*, 101, 124054 (2020), [arxiv:1911.02693](#).
14. N. Rifat, S. Field, G. Khanna, and **V. Varma**.  
*A Surrogate Model for Gravitational Wave Signals from Comparable- to Large-Mass-Ratio Black Hole Binaries.*  
*Physical Review D*, 101, 081502 (R) (2020), [arxiv:1910.10473](#).  
**In press:** Quanta magazine.
13. T. Islam, A. Mehta, A. Ghosh, **V. Varma**, P. Ajith, and B. Sathyaprakash.  
*Testing the “no-hair” nature of binary black holes using the consistency of multipolar gravitational radiation.*  
*Physical Review D*, 101, 024032 (2020), [arxiv:1910.14259](#).
12. **V. Varma**, S. Field, M. Scheel, J. Blackman, et al.  
*Surrogate models for precessing binary black hole simulations with unequal masses.*  
*Physical Review Research*, 1, 033015 (2019), [arxiv:1905.09300](#).
11. M. Boyle, et al. (incl. **V. Varma**).  
*The SXS Collaboration catalog of binary black hole simulations.*  
*Classical and Quantum Gravity*, 36, 195006 (2019), [arxiv:1904.04831](#).
10. A. Mehta, P. Tiwari, N. J. McDaniel, C. Mishra, **V. Varma**, and P. Ajith.  
*Including mode mixing in a higher-multipole model for gravitational waveforms from nonspinning black-hole binaries.*  
*Physical Review D*, 100, 024032 (2019), [arxiv:1902.02731](#).
9. **V. Varma**, S. Field, M. Scheel, J. Blackman, L. Kidder, and H. Pfeiffer.  
*Surrogate model of hybridized numerical relativity binary black hole waveforms.*  
*Physical Review D*, 99, 064045 (2019), [arxiv:1812.07865](#).
8. **V. Varma**, L. Stein, and D. Gerosa.  
*The binary black hole explorer: on-the-fly visualizations of precessing binary black holes.*  
*Classical and Quantum Gravity*, 36, 095007 (2019), [arxiv:1811.06552](#).
7. **V. Varma**, D. Gerosa, L. Stein, F. Hebert, and H. Zhang.  
*High-accuracy mass, spin, and recoil predictions of generic black-hole merger remnants.*  
*Physical Review Letters*, 122, 011101 (2019), [arxiv:1809.09125](#).  
**In press:** Caltech, OleMiss.
6. **V. Varma**, M. Scheel, and H. Pfeiffer.  
*Comparison of binary black hole initial data sets.*  
*Physical Review D*, 98, 104011 (2018), [arxiv:1808.08228](#).

5. **V. Varma** and M. Scheel.  
*Constructing a boosted, spinning black hole in the damped harmonic gauge.*  
*Physical Review D*, 98, 084032 (2018), [arxiv:1808.07490](#).
4. A. Mehta, C. Mishra, **V. Varma**, and P. Ajith.  
*Accurate inspiral-merger-ringdown gravitational waveforms for non-spinning black-hole binaries including the effect of subdominant modes.*  
*Physical Review D*, 96, 124010 (2017), [arxiv:1708.03501](#).
3. **V. Varma** and P. Ajith.  
*Effects of nonquadrupole modes in the detection and parameter estimation of black hole binaries with nonprecessing spins.*  
*Physical Review D*, 96, 124024 (2017), [arxiv:1612.05608](#).
2. **V. Varma**, P. Ajith, S. Husa, J. Bustillo, M. Hannam, and M. Pürrer.  
*Gravitational-wave observations of binary black holes: Effect of nonquadrupole modes.*  
*Physical Review D*, 90, 124004 (2014), [arxiv:1409.2349](#).
1. **V. Varma**, R. Fujita, A. Choudhary, and B. Iyer.  
*Comparison of post-Newtonian templates for extreme mass ratio inspirals.*  
*Physical Review D*, 88, 024038 (2013), [arxiv:1304.5675](#).

UNREFEREED  
PAPERS

4. A. Abac, et al. (incl. **V. Varma**).  
*The Science of the Einstein Telescope.*  
[arxiv:2503.12263](#).
3. V. Kalogera, et al. (incl. **V. Varma**).  
*The Next Generation Global Gravitational Wave Observatory: The Science Book.*  
[arxiv:2111.06990](#).
2. E. Barausse, et al. (incl. **V. Varma**).  
*Prospects for Fundamental Physics with LISA.*  
[arxiv:2001.09793](#).
1. B. Sathyaprakash, et al. (incl. **V. Varma**).  
*Extreme gravity and fundamental physics.*  
[arxiv:1903.09221](#).

COMPUTING  
SKILLS

**Languages:** Expert in Python. Proficient in C/C++, Mathematica and MATLAB.

**Operating systems:** Mac OS, Linux/\*nix. Experience with working on high performance supercomputers.

**Contributions:** Most contributions can be found at [github.com/vijayvarma392](https://github.com/vijayvarma392).

- Developer and maintainer of PyPI packages [surfinBH](#), [binaryBHexp](#), [gwsurrogate](#), and [gw\\_eccentricity](#).
- Member of the Simulating eXtreme Spacetimes (SXS) collaboration, contributor to the Spectral Einstein Code ([SpEC](#)).
- Member of the LIGO scientific collaboration, contributor to the LIGO Algorithm Library - [LALSuite](#).