

# JUSTIN CHRISTOPHER FENG

## CURRICULUM VITAE

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CENTRA, Instituto Superior Técnico - U. Lisboa, Av. Rovisco Pais 1, 1049-001 Lisboa, PORTUGAL

## APPOINTMENTS

### Postdoctoral Researcher

CENTRA, Instituto Superior Técnico (U. Lisbon)

Feb 2019 – Present    Lisbon, Portugal

- CENTRA seminar organizer & chair, 2019-2021

### Adjunct Faculty

St. Edward's University

Aug 2018 – Dec 2018    Austin, Texas

- Taught introductory astronomy & physics courses

### Research Affiliate - Postdoctoral Fellow

The University of Texas at Austin

Sep 2017 – Jan 2019    Austin, Texas

### Graduate Research Assistant

The University of Texas at Austin

Summer 2016, 2017    Austin, Texas

- Conducted dissertation research

### Assistant Instructor

The University of Texas at Austin

Aug 2011 – May 2017    Austin, Texas

- Taught introductory physical science courses
- Provided lectures for graduate general relativity course
- Wrote publicly available notes on tensors for undergraduates, taught crash course in GR to undergraduates

### Teaching Assistant

The University of Texas at Austin

Aug 2009 – Jul 2011, Spring 2015

- Served as head TA for Waves and Optics course (Spring 2015)
- Sole TA for lower division Electricity & Magnetism course
- Taught lab sections for introductory mechanics

### Undergraduate Research Assistant

Cooray group, University of California, Irvine

Jun – Aug 2007, Jun – Aug 2008

## EDUCATION

### Doctor of Philosophy in Physics

The University of Texas at Austin

Sep 2009 – Dec 2017

Title: *Temporal insights from the end of space*

Advisor: Richard A. Matzner

### Bachelor of Science in Physics

University of California, Irvine

Sep 2004 – Jun 2009

w/ Minor in Mathematics

Honors: Sigma Pi Sigma

## RESEARCH INTERESTS

General relativity  
Physics Informed Neural Networks  
Relativistic positioning systems  
Modified gravity  
Wormholes / Exotic causal structures

## ACTIVITIES

- Referee for the following journals:  
*Classical and Quantum Gravity*  
*European Physical Journal Plus*  
*Communications in Theoretical Physics*  
*Physica Scripta*
- Organizing committee member  
XIII Black Holes Workshop, Dec 2020, Lisbon, Portugal

## SKILLS

Julia, SciML, Mathematica, LaTeX, git  
Fortran, C, Linux, Html

## CODES

PoMiN (2018)  
<https://github.com/justincfeng/PoMiN>  
cereal.jl (2021)  
<https://github.com/justincfeng/cereal.jl>  
squirrel.jl (2021)  
<https://github.com/justincfeng/squirrel.jl>

# TALKS, LECTURES, WORKSHOPS, & CONFERENCES

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- **Seminar:** DIME, University of Genoa, *The Weiss Variation: Applications in mechanics, field theory and gravity*, Nov. 29 2021, Genoa, Italy
- **Lecture:** 10th School of Astrophysics and Gravitation IST, *Tensors in physics*, Sep. 04 2021, Lisbon, Portugal
- **Participant:** GWverse meeting in Lisbon, Sep. 2021, Lisbon, Portugal
- **Seminar:** CENTRA - Instituto Superior Técnico, *Self-collision of a portal wormhole*, Jul. 22 2021 (Delivered Online)
- **Seminar:** Università di Bologna, *Generalized coupling theories and the MEMe model*, May 28 2021 (Delivered Online)
- **Talk:** XIII Black Holes Workshop, *Topology and self interaction of smoothed portals*, December 2020 (Delivered Online)
- **Talk:** PONT 2020, *The MEMe model*, December 2020 (Delivered Online)
- **Seminar:** Relativity Seminar, University of Texas at Austin, *Portals*, Mar. 6 2020
- **Talk:** XII Black Holes Workshop, *Electrovortical formalism and plasma equilibria in black hole spacetimes*, December 2019, Guimaraes, Portugal
- **Seminar:** Yukawa Institute for Theoretical Physics, *New class of generalized coupling theories*, Dec. 2 2019, Kyoto, Japan
- **Talk:** JGRG 29 (U. Kobe), *MEMe: a generalized coupling theory* November 2019, Kobe, Japan
- **Seminar:** University of Lisbon (FCUL), *New class of generalized coupling theories*, Nov. 13 2019, Lisbon, Portugal
- **Talk:** GR22/Amaldi13, *Can solutions of the almost-Killing equation yield approximate Killing vectors?* July 2019, Valencia, Spain
- **Seminar:** CENTRA - Instituto Superior Técnico, *Weiss Variation in General Relativity*, May 16 2019, Lisbon, Portugal
- **Talk:** Astronomy Students Association, UT Austin, *General Relativity: Einstein's Theory of Gravity*, Jan. 31 2018
- **Seminar:** Okinawa Institute of Science and Technology *Temporal insights from the end of space*, Nov. 14 2017, Okinawa, Japan
- **PhD Defense Talk:** University of Texas at Austin, *Temporal insights from the end of space*, Aug. 15 2017
- **Talk:** Theory Group Brown Bag, UT Austin, *Path integral defines operator ordering*, Mar. 30 2017
- **Talk:** Whizkey Seminar, UT Austin, *A nontrivial Hamiltonian for GR?*, Apr. 6 2015
- **Talk:** Whizkey Seminar, UT Austin, *Functional Homotopy Methods for Evaluating Path Integrals*, Dec. 5 2014
- **Participant:** SIGRAV Graduate School, XI Edition, Jun. 2014, Como, Italy
- **Participant:** 27th Texas Symposium for Relativistic Astrophysics, Dec. 2013, Dallas, TX.
- **Talk:** 7th Gulf Coast Gravity Meeting (U. Mississippi), *Rigid Surfaces in General Relativity*, April 2013, Oxford MS
- **Lectures (contributed five):** An Informal Introduction to GR (Seminar), UT Austin: *Tensors; Special Relativity; Curvature; Einstein Field Equations; ADM Formulation of GR*, Fall 2012
- **Talk:** Whizkey Seminar, UT Austin, *De Sitter space*, Mar. 25 2012
- **Qualifying Exam Talk:** University of Texas at Austin, *Variations of Area in Geometrodynamics*, Nov. 17 2011
- **Participant:** 6th Gulf Coast Gravity Meeting (Florida Atlantic U.), May 2011, Boca Raton, FL.
- **Talk:** Whizkey Seminar, UT Austin, *Twistors*, Oct. 30 2011
- **Lectures (contributed four):** Differential Geometry Seminar, UT Austin: *Semi/Pseudo Riemannian Manifolds; Mappings; (Cartan) Structural Equations Part I; (Cartan) Structural Equations Part II*, Summer 2011
- **Participant:** ESQG Workshop (NORDITA), Jul. 2010, Stockholm, Sweden
- **Poster:** APS April Meeting, Denver, CO, *Modeling Inflation with CMB and 21 cm Anisotropy Measurements* (2009)

# PUBLICATION LIST

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- [1] Justin C. Feng, Shinji Mukohyama, and Sante Carloni. Junction conditions and sharp gradients in generalized coupling theories. Mar 2022. [arxiv:2203.00011](#).
- [2] Justin C. Feng, Filip Hejda, and Sante Carloni. Relativistic location algorithm in curved spacetime. Jan 2022. [arxiv:2201.01774](#).
- [3] Justin C. Feng and Sumanta Chakraborty. Weiss variation for general boundaries. Nov 2021. [arxiv:2111.06897](#).
- [4] Justin C. Feng, José P. S. Lemos, and Richard A. Matzner. Self-collision of a portal wormhole. *Phys. Rev. D*, 103:124037, Jun 2021.
- [5] Miguel Duarte, Justin Feng, Edgar Gasperín, and David Hilditch. High order asymptotic expansions of a good–bad–ugly wave equation. *Classical and Quantum Gravity*, 38(14):145015, Jun 2021.
- [6] Justin C. Feng, Shinji Mukohyama, and Sante Carloni. Minimal exponential measure model in the post-Newtonian limit. *Phys. Rev. D*, 103:084055, Apr 2021.
- [7] Sumanta Chakraborty and Justin C. Feng. Perturbations of the almost Killing equation and their implications. *Phys. Rev. D*, 103:084020, Apr 2021.
- [8] Chinmoy Bhattacharjee and Justin C. Feng. On Beltrami states near black hole event horizon. *Physics of Plasmas*, 27(7):072901, 2020.
- [9] Justin C. Feng and Sante Carloni. New class of generalized coupling theories. *Phys. Rev. D*, 101:064002, Mar 2020.
- [10] Justin C. Feng. Note on gravity at the boundary of an AdS vacuum. Feb 2020. [arxiv:2002.08342](#).
- [11] Justin C. Feng, Edgar Gasperín, and Jarrod L. Williams. Almost-Killing equation: Stability, hyperbolicity, and black hole Gauss law. *Phys. Rev. D*, 100:124034, Dec 2019.
- [12] Chinmoy Bhattacharjee, Justin C. Feng, and S. M. Mahajan. Black hole in a superconducting plasma. *Phys. Rev. D*, 99:024027, Jan 2019.
- [13] Justin C. Feng. Some globally conserved currents from generalized Killing vectors and scalar test fields. *Phys. Rev. D*, 98:104035, Nov 2018.
- [14] Chinmoy Bhattacharjee, Justin C Feng, and David J Stark. Surveying the implications of generalized vortical dynamics in curved spacetime. *Monthly Notices of the Royal Astronomical Society*, page sty2277, 2018.
- [15] Ignazio Ciufolini, Richard A. Matzner, Justin C. Feng, Antonio Paolozzi, David P. Rubincam, Erricos C. Pavlis, John C. Ries, Giampiero Sindoni, and Claudio Paris. A new laser-ranged satellite for General Relativity and space geodesy: IV. Thermal drag and the LARES 2 space experiment. *The European Physical Journal Plus*, 133(8):333, Aug 2018.
- [16] Justin C. Feng. Volume average regularization for the Wheeler-DeWitt equation. *Phys. Rev. D*, 98:026024, Jul 2018.
- [17] Justin Feng, Mark Baumann, Bryton Hall, Joel Doss, Lucas Spencer, and Richard Matzner. PoMiN: A Post-Minkowskian N -body Solver. *The Astrophysical Journal*, 859(2):130, 2018.
- [18] Justin C. Feng and Richard A. Matzner. From path integrals to the Wheeler-DeWitt equation: Time evolution in spacetimes with a spatial boundary. *Phys. Rev. D*, 96:106005, Nov 2017.
- [19] Justin C. Feng and Richard A. Matzner. The Weiss variation of the gravitational action. *General Relativity and Gravitation*, 50(8):99, Jul 2018.
- [20] Justin Christopher Feng. *Temporal insights from the end of space*. PhD thesis, 2017.

# NOTES & MISCELLANEOUS ARTICLES

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- M1 Justin C. Feng, *The Poor Man's Introduction to Tensors*, 40 pages (2017) [https://justincfeng.github.io/Tensors\\_Poor\\_Man.pdf](https://justincfeng.github.io/Tensors_Poor_Man.pdf)
- M2 Justin C. Feng, *Self-collision of a portal wormhole*, Wolfram Community post, staff picks (2021) <https://community.wolfram.com/groups/-/m/t/2286081>