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
- Jury member for M.S. defense, João Rato (Jan 2021)
- Jury member for PhD defense, Rui André (Sep 2021)
- Published 7 peer-reviewed articles in leading journals

Adjunct Faculty

St. Edward's University

Aug 2018 – Dec 2018 Austin, Texas

- Instructor for introductory astronomy & physics courses in math department

Research Affiliate - Postdoctoral Fellow

The University of Texas at Austin

Sep 2017 – Jan 2019 Austin, Texas

- Published 8 peer-reviewed articles in leading journals

Graduate Research Assistant

The University of Texas at Austin

Summer 2016, 2017 Austin, Texas

- Conducted dissertation research
- Supervised undergraduate research of following students: Josey Hanish, Joel Doss, Alex Buchanan, Blake Duschatko, Avery Pawelek, Bryton Hall, & Lucas Spencer

Assistant Instructor

The University of Texas at Austin

Aug 2011 – May 2017 Austin, Texas

- Taught Introductory Physical Science courses on Mechanics & Heat, and Electricity & Magnetism
- Provided lectures for graduate general relativity course
- Taught crash course in GR to undergraduates
- Supervised undergraduate research
- Wrote publicly available notes on tensors for 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

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

- **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-collison 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

[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

M1 Justin C. Feng, *The Poor Man's Introduction to Tensors*, 40 pages (2017) 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