Zachary Nasipak — Curriculum Vitae

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Academic Employment

- **NASA Postdoctoral Fellow**, *Supervisor: John G. Baker* — 01/2021 - present
  USRA/ORAU appointment at NASA Goddard Space Flight Center — *Greenbelt, MD*
- **Postdoctoral Fellow**, *Supervisor: Brendan Hassett* — 09/2020 - 12/2020
  Institute for Computational & Experimental Research in Mathematics — *Providence, RI*

Education

- **University of North Carolina at Chapel Hill**
  Ph.D., Physics (Advisor: Charles R. Evans) — Conferred: 04 August 2020
  Thesis: Numerical and analytical models of extreme-mass-ratio orbits in Kerr spacetime
  M.S., Physics (Advisor: Charles R. Evans) — Conferred: 14 May 2017
  Project: The scalar self-force for generic extreme-mass-ratio orbits in a Kerr spacetime

- **Vassar College**
  B.A., Physics and Astronomy, Mathematics Minor — Conferred: 31 May 2015
  Thesis: Constraining maverick dark matter through direct detection experiments

Peer-Reviewed Publications

1. *Resonant self-force effects in extreme-mass-ratio binaries: A scalar model*
   Z. Nasipak and C. R. Evans
   Phys. Rev. D **104**, 084011 (2021), arXiv:2105.15188
2. *Repeated faint quasinormal bursts in extreme-mass-ratio inspiral waveforms: Evidence from frequency-domain scalar self-force calculations on generic Kerr orbits*
   Z. Nasipak, T. Osburn, and C. R. Evans
   Phys. Rev. D **100**, 064008 (2019), arXiv:1905.13237
3. *The Baryonic Collapse Efficiency of Galaxy Groups in the RESOLVE and ECO Surveys*
   K. D. Eckert, S. J. Kannappan, C. del P. Lagos, A. D. Baker, A. A. Berlind, D. V. Stark, A. J. Moffett, **Z. Nasipak**, and M. A. Norris
   Astrophys. J **849**, 1 (2017), arXiv:1709.07462
4. *Effect of measurement conditions on sound scattered from a pyramid diffuser in a free field*
   K. A. Riegel, D. T. Bradley, M. Morgan, **Z. Nasipak**, and I. Kowalok
   Proc. Mtgs. Acoust **22**, 015003 (2014); published in 2016
5. *Numerical prediction of sound scattering from surfaces with fractal geometry: A preliminary investigation*
   D. Bradley, E. O. Snow, K. A. Riegel, **Z. D. Nasipak**, and A. S. Terenzi
   Proc. Mtgs. Acoust **12**, 015010 (2011); published in 2014

Additional Papers and Publications

- *Adiabatic evolution due to the conservative scalar self-force during orbital resonances*
  Z. Nasipak
  Submitted to Phys. Rev. D, arXiv:2105.15188
- *Self-Force Regularisation Parameters Package*
  A. Heffernan, Data curator: **Z. Nasipak**
  Zenodo:6282572
- *Advancing the Landscape of Multimessenger Science in the Next Decade*
  K. Engel, T. Lewis, *et al.*
  arXiv:2203.10074

- *KerrGeodesics Mathematica package*
  N. Warburton, M. van de Meent, **Z. Nasipak**, T. Osburn, C. R. Evans, Leo Stein, & Phillip Lynch
  bhptoolkit.org/KerrGeodesics

Invited Talks

- **Astrophysical and Cosmological Relativity Seminar** — Feb 2022
  Max Planck Institute for Gravitational Physics, AEI — *(virtual) Potsdam, Germany*
  The effect of resonances on extreme-mass-ratio inspirals
- **Self-Force Group Meeting** — July 2021
  Southampton Theory Astrophysics & Gravity Research Centre — *(virtual) Southampton, UK*
  Orbital $r\theta$-resonances in EMRIs
- **Science & Exploration Directorate Director's Seminar** — March 2021
  NASA Goddard Space Flight Center — *(virtual) Greenbelt, Maryland, USA*
  Orbital resonances in extreme-mass-ratio black hole binaries

Contributed Talks

- **25th Capra Meeting on Radiation Reaction** — June 2022
  Post-1/2 adiabatic corrections from the conservative self-force during $r\theta$-resonances — *Dublin, Ireland*
- **American Physical Society April Meeting** — Apr 2022
  Dissipation due to the (not-so) conservative self-force for resonant extreme-mass-ratio inspirals — *New York, NY, USA*
- **LISA Community Call** — Nov 2021
  Orbital resonances in extreme-mass-ratio inspirals — *(virtual)*
- **24th Capra Meeting on Radiation Reaction** — June 2021
  Transient resonances in EMRIs: A scalar model — *(virtual) Waterloo, Ontario, Canada*
- **23rd Capra Meeting on Radiation Reaction** — June 2020
  Calculating the scalar self-force during $r\theta$-resonances — *(virtual) Austin, TX, USA*
- **American Physical Society April Meeting** — April 2020
  Calculating the scalar self-force during $r\theta$-resonances — *(virtual) Washington, D.C., USA*
- **22nd Capra Meeting on Radiation Reaction** — June 2019
  Quasinormal bursts and the resonant self-force — *Rio de Janeiro, Brazil*
- **21st Capra Meeting on Radiation Reaction** — June 2018
  Scalar self-force for generic bound orbits on a Kerr background — *Potsdam, Germany*
- **American Physical Society April Meeting** — April 2018
  Calculating the scalar self-force for generic orbits in Kerr — *Colombus, OH, USA*
- **20th Capra Meeting on Radiation Reaction** — June 2017
  Scalar self-force for generic, bound orbits on Kerr — *Chapel Hill, NC, USA*
- **American Physical Society April Meeting** — Jan 2017
  Scalar self-force for generic bound orbits on Kerr — *Washington, D.C., USA*

Teaching Experience

Teaching Assistant, University of North Carolina at Chapel Hill

- *PHYS 721: Graduate Quantum Mechanics* — Fall 2019
- *PHYS 701: Graduate Classical Mechanics* — Fall 2019
- *PHYS 724: Graduate Statistical Mechanics* — Spring 2018
- *PHYS 118: Introductory Physics: Mechanics & Special Relativity* — Fall 2015

Physics & Astronomy Tutor

- Private tutor — 2016-19
- Academic Support Program for Student Athletes — 2016-18

Mentoring and Leadership Roles

2019-present: Assistant mentor to PhD student
2017-2018: Assistant mentor to high school student, now at MIT
2017-2018: President of the Physics and Astronomy Graduate Student Association
2016-2017: Graduate Representative for Physics and Astronomy Graduate Recruiting
2016-2017: Senior Graduate Student Pre-Candidacy Mentoring Team Leader

Science Outreach

Invited Talks

- Astronomy on Tap Triangle — 07 May 2019
  Talk title: Gravitational Waves & the New Era of Astronomy — *Durham, NC*
- Teen Cosmos Collective at Museum of Life and Science — 07 Nov 2018
  Talk title: Black Holes & Seeing the Hidden Universe — *Durham, NC*
- Teen Science Cafe at Morehead Planetarium and Science Center — 11 May 2018
  Talk title: Black Holes and Gravitational Waves — *Chapel Hill, NC*

Volunteer Activities

- UNC Science Expo — 06 April 2019
  Performed public physics demos at UNC — *Chapel Hill, NC*
- North Carolina Astronomy Days — Jan 2018, 2019
  Performed public astronomy demos at NC Museum of Natural Sciences — *Raleigh, NC*
- Letters to a Pre-Scientist — 2016-Present
  Served as science pen pal to middle school students — *USA*

Awards & Fellowships

- **NASA Postdoctoral Fellowship** — 2020 - present
  Universities Space Research Association
- **NC Space Grant Graduate Research Fellowship** — 2017, 18
  NASA/North Carolina Space Grant Consortium
- **Doctoral Merit Assistantship** — 2016
  University of North Carolina at Chapel Hill
- **Shearin Fellowship** — 2015
  Department of Physics and Astronomy, UNC at Chapel Hill
- **Lucy Kellogg English Prize** — 2015
  Department of Physics and Astronomy, Vassar College
- **Robert Bradford Newman Student Award Recipient** — 2013 - 14
  Newmand Fund
- **Tananbaum Fellowship** — 2013 - 14
  Vassar College
- **Frances D. Fergusson Scholarship** — 2012 - 15
  Vassar College

Professional Memberships

- American Physical Society
- Sigma Xi, the Scientific Honor Society
- Phi Beta Kappa (Honor) Society

Additional Skills & Experience

Referee Experience

- Referee for the Physical Review

Conference Organization

- Discussion session co-chair, 25th Capra Meeting, Dublin, Ireland, 2022
- Session chair, 24th Capra Meeting, (virtual) Waterloo, Ontario, Canada, 2021
- Local organizing committee member, 20th Capra Meeting, Chapel Hill, NC, 2017

Computational Skills

- Highly proficient in Mathematica
- Proficient in Python, C/C++
- Working knowledge of GNU Bash and MATLAB
- Extensive experience executing programs on high performance computing clusters, primarily on UNC's *Longleaf* (6000+ cores) and *Dogwood* (11000+ cores) clusters
- Highly proficient in LaTeX typesetting with experience in Beamer
- Proficient in Microsoft PowerPoint, Microsoft Word, Apple Keynote, and Apple Pages for designing written and visual presentations