

# ZACHARIAH (ZACH) B. ETIENNE

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## Employment

2021– Associate Professor of Physics, University of Idaho  
2021– Adjunct Associate Professor of Physics & Astronomy, West Virginia University  
2019–2021 Associate Professor of Physics & Astronomy, West Virginia University  
2014–2019 Assistant Professor of Mathematics, West Virginia University  
2013–2014 Joint Space–Science Institute Prize Postdoctoral Fellow, NASA Goddard Space Flight Center & University of Maryland  
2010–2013 NSF Astronomy & Astrophysics Postdoctoral Fellow, University of Illinois  
2009–2010 Postdoctoral Research Associate, University of Illinois Numerical Relativity Group

## Education

2003–2009 University of Illinois — Ph.D. Physics  
Stuart L. Shapiro, Ph.D. thesis advisor  
1999–2003 Indiana University — B.S. Physics, *Honors College Degree certification*  
Steven Gottlieb, senior thesis advisor  
1999–2003 Indiana University — B.S. Mathematics  
1999–2003 Indiana University — Minor Astronomy

## Grants

2023–2026 **Institutional Principal Investigator**, *Electromagnetic Signals from Merging Supermassive Black Holes*, NASA Theoretical and Computational Astrophysics Networks (TCAN), **\$1,776,933; \$271,726 to Z. Etienne**. Collaborating institutions: Rochester Institute of Tech., NASA Goddard Space Flight Center, Johns Hopkins U., and U. of Idaho.  
2023–2026 **Principal Investigator**, *Rising to the challenge:  $\sim 1s$  long numerical relativity simulations of BNS mergers and their remnants*, NASA FINESST, **\$150,000**. Future Investigator: Terrence Pierre Jacques.  
2022–2025 **Principal Investigator**, *superB: Numerical Relativity for LISA & 3G Detectors*, NASA Astrophysics Theory Program, **\$409,021**.  
2021–2024 **Principal Investigator**, *Boosting Algorithmic Efficiency: Numerical Relativity in Dynamical, Curvilinear Coordinates*, NSF Gravitational Physics–Theory, **\$174,803**.  
2021–2024 **Co-Principal Investigator**, *Collaborative Research: WoU-MMA: Toward Binary Neutron Star Mergers on a Moving-mesh*, NSF Windows on the Universe: The Era of Multi-Messenger Astrophysics, **\$483,465; \$226,347 to Z. Etienne**.  
2021–2022 **Institutional Principal Investigator**, *COVID Augmentation on “Advancing Computational Methods to Understand the Dynamics of Ejection, Accretion, Winds and Jets in Neutron Star Mergers” award*, NASA COVID, **28,609 to Z. Etienne**.  
2020–2024 **Institutional Principal Investigator**, *Collaborative Research: Measuring G with a Magneto-Gravitational Trap*, NSF Gravitational Physics–Experiment, **\$567,990; \$118,517 to Z. Etienne**.  
2020–2024 **Institutional Principal Investigator**, *Collaborative Research: Frameworks: The Einstein Toolkit ecosystem: Enabling fundamental research in the era of multi-messenger astrophysics*, NSF OAC, **\$2,300,415; \$335,902 to Z. Etienne**.  
2020–2022 **Senior Investigator**, *REU Site: Undergraduate Astrophysics Research in Appalachia at West Virginia University*, NSF Special Programs in Astronomy, **\$339,477**.  
2019–2021 **Co-Principal Investigator**, *Improving accuracy, performance, and robustness of the Spinning, Precessing Effective One-Body–Numerical Relativity Gravitational Wave Approximant*, NSF LIGO Research Support, **\$100,000**.

- 2018–2023 **Institutional Principal Investigator**, *Advancing Computational Methods to Understand the Dynamics of Ejection, Accretion, Winds and Jets in Neutron Star Mergers*, NASA Theoretical and Computational Astrophysics Networks (TCAN), **\$1,590,362; \$295,231 to Z. Etienne. 9.4% of proposals were funded.** Collaborating institutions: Rochester Institute of Tech., NASA Goddard Space Flight Center, Johns Hopkins U., and West Virginia U.
- 2018–2021 **Principal Investigator**, *Boosting Algorithmic Efficiency: Numerical Relativity in Dynamical, Curvilinear Coordinates*, NSF Gravitational Physics–Theory, **\$152,893.**
- 2017–2020 **Institutional Principal Investigator**, *Multi-messenger Source Modeling*, NASA-ISFM, **\$810,000; \$95,848 to Z. Etienne.** Collaborating institutions: NASA Goddard Space Flight Center and West Virginia U.
- 2017–2020 **Co-Principal Investigator**, *MRI: Acquisition of Thorny Flat Next Generation Cluster for High-Performance Computing in West Virginia*, NSF Major Research Instrumentation (MRI), **\$989,408.**
- 2017–2020 **Institutional Principal Investigator**, *Collaborative Research: Measuring G with a Microsphere in a Magneto-Gravitational Trap*, NSF Physics: Gravitational Experiments Solicitation, **\$509,134; \$90,757 to Z. Etienne.** Collaborating institutions: Montana State U. and West Virginia U.
- 2016–2019 **Principal Investigator**, *Speeding Up the Spinning, Precessing Effective One–Body–Numerical Relativity (SEOBNRv3) Code by  $\sim 10,000x$* , NSF LIGO Research Support, **\$99,020.**
- 2015–2020 **Funded Faculty**, *Waves of the Future: Capacity Building for the Rising Tide of STEM in West Virginia*, NSF Experimental Program to Stimulate Competitive Research (EPSCoR), **\$9,668,382;  $\approx$ \$300,000 to Z. Etienne.**
- 2015–2018 **Institutional Principal Investigator**, *Prompt Electromagnetic Signatures of Merging Black Holes*, NASA–Astrophysics Science Division 13–ATP13–0077, **\$439,788; \$87,932 to Z. Etienne. 12.7% of proposals were funded.** Collaborating institutions: NASA Goddard Space Flight Center and West Virginia U.
- 2010–2013 **Principal Investigator**, *General Relativistic, Radiative Magnetohydrodynamic Simulations of Compact Binary Mergers*, NSF AST-1002667, **\$249,000.**

## Awards, Honors, & Fellowships

- 2017 Research highlighted as cover story in Fall 2017 *Neuron* Magazine (West Virginia Science & Research, a division of the West Virginia Higher Education Policy Commission)
- 2016 Presidential Award for Excellence in Collaborative Research (West Virginia University)
- 2013–2014 Joint Space–Science Institute Prize Postdoctoral Fellow (NASA Goddard Space Flight Center and University of Maryland)
- 2010–2013 NSF Astronomy & Astrophysics Postdoctoral Fellowship
- 2007, 2009 APS April Meeting Travel Grant Awards, Topical Group on Gravitation
- 2003–2004 University of Illinois at Urbana-Champaign Distinguished Graduate Fellowship
- 2003–2003 Sigma Pi Sigma (the physics honor society)
- 2003 Indiana University Honors College Grant for Senior Undergraduate Thesis
- 2003 Indiana University Graduate School Grant for Senior Undergraduate Thesis
- 1999–2003 Indiana University Faculty Scholarship
- 1999–2003 Indiana University Honors College Scholarship
- 2001, 2002 REU Student, University of Michigan
- 1999–2000 General Electric STAR Award

## Major Collaborations

- 2022– LISA Consortium Associate Member
- 2018– Member of the Maintainers Group of the Einstein Toolkit
- 2021– WVU Center for Gravitational Waves and Cosmology Affiliate Faculty Member
- 2015–2022 LIGO Scientific Collaboration, Senior Member
- 2016–2021 WVU Center for Gravitational Waves and Cosmology Faculty Member
- 2010–2013 Numerical Relativity & Analytical Relativity (NRAR), University of Illinois *liason*
- 2010–2014 Numerical INJection Analysis 2 (NINJA-2), University of Illinois *liason*
- 2008–2009 Numerical INJection Analysis (NINJA), University of Illinois *liason*

## Teaching Assignments

Spring 2024 PHYS 404/504, *Relativistic Astrophysics*, **3 hours lecture/week**.  
 Spring 2024 PHYS 111, *College Physics*, **3 hours lecture/week**.  
 Spring 2023 PHYS 428/528, *Numerical Methods*, **3 hours lecture/week**.  
 Fall 2022 PHYS 111, *College Physics*, **3 hours lecture/week**.  
 Spring 2022 PHYS 111, *College Physics*, **3 hours lecture/week**.  
 Spring 2021 PHYS 212, *Oscillations and Thermal Physics*, **3 hours lecture/week**.  
 Fall 2020 PHYS 112, *General Physics 2*, **3 hours lecture/week**.  
 Spring 2020 PHYS 212, *Oscillations and Thermal Physics*, **3 hours lecture/week**.  
 Spring 2019 MATH 522, *Numerical Solutions of Partial Differential Equations*, **3 hours lecture/week**.  
 Fall 2018 MATH 521, *Numerical Analysis*, **3 hours lecture/week**.  
 Spring 2018 MATH 522, *Numerical Solutions of Partial Differential Equations*, **3 hours lecture/week**.  
 Fall 2017 MATH 521, *Numerical Analysis*, **3 hours lecture/week**.  
 Spring 2017 MATH 261, *Elementary Differential Equations*, **4 hours lecture/week**.  
 MATH 522, *Numerical Solutions of Partial Differential Equations*, **3 hours lecture/week**.  
 Fall 2016 MATH 521, *Numerical Analysis*, **3 hours lecture/week**.  
 Spring 2016 MATH 156, *Calculus 2*, **4 hours lecture/week**.  
 MATH 522, *Numerical Solutions of Partial Differential Equations*, **3 hours lecture/week**.  
 Fall 2015 MATH 521, *Numerical Analysis*, **3 hours lecture/week**.  
 Spring 2015 MATH 522, *Numerical Solutions of Partial Differential Equations*, **3 hours lecture/week**.  
 Fall 2014 MATH 261, *Elementary Differential Equations*, **4 hours lecture/week**.

## Mentoring

2023 Advisor to four postdoctoral researchers; Graduate advisor to four Ph.D. students (primary advisor to three; co-advisor to one), and four undergraduate researchers.  
 2022 Advisor to two postdoctoral researchers; Graduate advisor to four Ph.D. students (primary advisor to three; co-advisor to one), and six undergraduate researchers.  
 2021 Advisor to one postdoctoral researcher; Graduate advisor to four Ph.D. students (primary advisor to three; co-advisor to one), one postbaccalaureate researcher, and one undergraduate researcher.  
 2020 Advisor to one postdoctoral researcher; Graduate advisor to six Ph.D. students (primary advisor to four; co-advisor to two) and one Master's student  
 2019 Graduate advisor to six Ph.D. students and one Master's student; Capstone advisor to two students (undergraduate senior thesis project).  
 2018 Advisor to one postdoctoral researcher; graduate advisor to four Ph.D. students and two Master's students; Capstone advisor to three students (undergraduate senior thesis project).  
 2017 Advisor to one postdoctoral researcher; graduate advisor to five students (one M.S., four Ph.D.); Capstone advisor to two students (undergraduate senior thesis project).  
 2016 Advisor to one postdoctoral researcher; graduate advisor to five students (one M.S., four Ph.D.); Capstone advisor to two students (undergraduate senior thesis project).  
 2015 Advisor to one postdoctoral researcher; graduate advisor to three students (two M.S.); Capstone advisor to three students (undergraduate senior thesis project).  
 2014 Graduate advisor to two students (one M.S., and one Ph.D.); Capstone advisor to one student (undergraduate senior thesis project).  
 2008–2013 Mentor to six undergraduate students who generate stunning, freely-available visualizations of my simulation data. See, e.g., <http://tinyurl.com/mentormovies>.  
 2004–2013 Annual guest lecturer to five underserved high schools in southern Indiana, introducing students to Einstein's theories of relativity and science as a career. With no major research institutions nearby, most students had never interacted or communicated with a professional scientist before attending these lectures.  
 2008–2012 Mentor to two graduate students, helping them to understand, use, and extend the Illinois Numerical Relativity code to do new science. See, e.g., Farris *et al.* Phys. Rev. D, 84, 024024/1-21 (2011) and **Pub. 139** in the below **Publications** section.

## Service

2022– U. of Idaho Physics Grad Admissions Committee Member  
 2022– U. of Idaho Physics Awards Committee Member  
 2022–2023 U. of Idaho Physics Recruiting & Retention Committee Member  
 2021– U. of Idaho Observatory Committee Member  
 2021–2022 U. of Idaho College of Science Data Science Competition Organizing Committee Member

2021–	U. of Idaho Research Computing Steering Committee Member
2020–2021	Chair, WVU Physics & Astronomy Visibility Committee
2019–2021	WVU Physics & Astronomy Faculty Evaluation Committee Member
2019–2020	WVU Physics & Astronomy Faculty Search Committee Member
2019–2020	Chair, WVU Physics & Astronomy Website Committee
2018	Chair, WVU Mathematics Course Equivalence & Teaching Reassignment Policy Committee
2018–2019	WVU Mathematics Visibility Committee Member
2017–2018	WVU Mathematics Department Strategic Planning Committee Member
2017–2019	WVU Mathematics Department Research Committee Member
2016–2018	WVU Mathematics Department Assessment Committee Member
2016–2017	Co-Organizer, <i>Celebrating Einstein</i> Event
2017	WVU PSCoR grant proposal reviewer
2017	Keynote Address Speaker for West Virginia Health Science and Technology Academy Summer Camp students
2016, 2017	“Cool Talk” guest lecture for West Virginia Health Science and Technology Academy
2015–2021	WVU HPC (High Performance Computing) Faculty Steering Committee
2015–	NSF grant proposal review panelist
2015–	NASA grant proposal review panelist
2015–2020	West Virginia Children’s Discovery Museum volunteer
2014–	Referee for <i>Physical Review D</i> , <i>Physical Review Letters</i> , <i>Classical and Quantum Gravity</i> , and <i>Journal of Computational Physics</i> .
2015	Public lecture at the Chinese Mid-Autumn Research Symposium
2014–2015	Search Committee: WVU Dept. of Mathematics Tenure-Track Faculty Position

## Research Experience

- Compact binary inspirals & mergers: Simulations in fully dynamical spacetimes
  - Black hole–neutron star (Past work: **Pubs. 136, 137, 141, 142, 145, 150, & 152** in below **Publications** section.)
  - White dwarf–neutron star (**Pubs. 143 & 144**); planned follow-up: pulsar planet formation scenarios.
  - Black hole–black hole (**Pubs. 26 27, 59, 101, 131, 133, 134, 135, 139, 140, 142, 145, 147, 148, & 153**).
  - Neutron star–neutron star (**Pubs. 1, 3, 8, 138 & 151**).
- Black hole accretion and electromagnetic counterparts to gravitational wave signals (**Pubs. 60, 101, 130, 132, 137, 139, 141, 142, 145, 150, 152, & 154**)
- New techniques and algorithms for compact object and compact binary simulations (**Pubs. 3, 2, 8, 9, 10, 25, 47, 48, 62, 88, 89, 100, 127, 131, 142, 145, 146, 149, 153, 154, & 155**)
- Gravitational wave astrophysics & data analysis (Short-author list papers: **Pubs. 61, 90, & 126**; LIGO Collaboration papers: **4, 5, 6, 7, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 91, 92, 93, 94, 95, 96, 97, 98, 99, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 128, & 129**)
- Experimental gravity (**Pubs. 28 & 46**)

## Publications

Prefix denotes number of citations (\*: 1–5, \*\*: 6–13, \*\*\*: 14–49, \*\*\*\*: 50–119, \*\*\*\*\*: 120+)

- Refereed Articles in Professional Journals:

### 2023 Short-Author-List Papers

1. \* *Bound Debris Expulsion from Neutron Star Merger Remnants*. Y. Zenati, J. H. Krolik, L. R. Werneck, A. Murguía-Berthier, **Z. B. Etienne**, S. C. Noble, T. Piran. *ApJ* 958 161 (**2023**).
2. *Ameliorating the Courant-Friedrichs-Lewy condition in spherical coordinates: A double FFT filter method for general relativistic MHD in dynamical spacetimes*. L. Ji, V. Mewes, Y. Zlochower, L. Ennoggi, F. G. Lopez Armengol, M. Campanelli, F. Cipolletta, **Z. B. Etienne**. *Phys. Rev. D* 108, 104005 (**2023**).

3. **\*\*** *Addition of tabulated equation of state and neutrino leakage support to Illinois GRMHD.* L. R. Werneck, **Z. B. Etienne**, *et al.* Phys. Rev. D 107, 044037 (2023).

**2022 LIGO Scientific Collaboration Papers (on which Z. B. Etienne appears as co-author)**

4. **\*\*\*\*** *GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run.* The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. Phys. Rev. X 13, 041039 (2023).
5. **\*\*\*\*** *The population of merging compact binaries inferred using gravitational waves through GWTC-3.* The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. Phys. Rev. X 13, 011048 (2023).
6. **\*\*\*\*** *Constraints on the cosmic expansion history from GWTC-3.* The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. Astrophys.J. 949 76 (2023).
7. **\*\*\*** *Search for Gravitational Waves Associated with Fast Radio Bursts Detected by CHIME/FRB during the LIGO–Virgo Observing Run O3a.* The LIGO Scientific, Virgo, KAGRA, and CHIME/FRB Collaborations, **Z. B. Etienne** coauthor. Astrophys.J. 955, 2, 155 (2023).

**2022 Short-Author-List Papers**

8. **\*\*** *Handing off the outcome of binary neutron star mergers for accurate and long-term postmerger simulations* F. G. Lopez Armengol, **Z. B. Etienne**, S. C. Noble, B. J. Kelly, L. R. Werneck, *et al.* Phys. Rev. D 106, 8, 083015 (2022).
9. **\*\*** *Fast hyperbolic relaxation elliptic solver for numerical relativity: Conformally flat, binary puncture initial data* T. Assumpcao, L. R. Werneck, T. Pierre Jacques, **Z. B. Etienne**. Phys. Rev. D 105, 10, 104037 (2022).
10. **\*\*\*** *HARM3D+NUC: A New Method for Simulating the Post-merger Phase of Binary Neutron Star Mergers with GRMHD, Tabulated EOS, and Neutrino Leakage* A. Murguía-Berthier, S. C. Noble, L. F. Roberts, E. Ramirez-Ruiz, L. R. Werneck, M. Kolacki, **Z. B. Etienne**, *et al.* ApJ 919, 2, 95 (2022).

**2022 LIGO Scientific Collaboration Papers (on which Z. B. Etienne appears as co-author)**

11. **\*\*\*** The KAGRA, LIGO Scientific, and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for continuous gravitational wave emission from the Milky Way center in O3 LIGO-Virgo data.* Phys. Rev. D 106, 4, 042003 (2022).
12. **\*\*\*** The KAGRA, Virgo, and LIGO Scientific Collaborations, **Z. B. Etienne** coauthor. *First joint observation by the underground gravitational-wave detector KAGRA with GEO 600.* PTEP 2022 6, 063F01 (2022).
13. **\*\*\*** The KAGRA, Virgo, and LIGO Scientific Collaborations, **Z. B. Etienne** coauthor. *Search for gravitational waves from Scorpius X-1 with a hidden Markov model in O3 LIGO data.* Phys. Rev. D 106, 6, 062002 (2022).
14. **\*\*\*\*** The LIGO Scientific, KAGRA, and Virgo Collaborations, **Z. B. Etienne** coauthor. *All-sky search for continuous gravitational waves from isolated neutron stars using Advanced LIGO and Advanced Virgo O3 data.* Phys. Rev. D 106, 10, 102008 (2022).
15. **\*\*\*** The LIGO Scientific, KAGRA, and Virgo Collaborations, **Z. B. Etienne** coauthor. *Narrowband Searches for Continuous and Long-duration Transient Gravitational Waves from Known Pulsars in the LIGO–Virgo Third Observing Run.* ApJ 932, 2, 133 (2022).
16. **\*\*\*\*** The KAGRA, Virgo, and LIGO Scientific Collaborations, **Z. B. Etienne** coauthor. *All-sky search for gravitational wave emission from scalar boson clouds around spinning black holes in LIGO O3 data.* Phys. Rev. D 105, 10, 102001 (2022).
17. **\*\*\*** The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search of the early O3 LIGO data for continuous gravitational waves from the Cassiopeia A and Vela Jr. supernova remnants.* Phys. Rev. D 105, 8, 082005 (2022).
18. **\*\*\*\*** The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. *Searches for Gravitational Waves from Known Pulsars at Two Harmonics in the Second and Third LIGO–Virgo Observing Runs.* ApJ 935, 1, 1 (2022).
19. **\*\*\*** The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. *Search for Gravitational Waves Associated with Gamma-Ray Bursts Detected by Fermi and Swift during the LIGO–Virgo Run O3b.* ApJ 928, 2, 186 (2022).
20. **\*\*\*** The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. *All-sky, all-frequency directional search for persistent gravitational waves from Advanced LIGO’s and Advanced Virgo’s first three observing runs.* Phys. Rev. D 105, 12, 122001 (2022).

21. \*\*\*The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. *Search for Substellar-Mass Binaries in the First Half of Advanced LIGO's and Advanced Virgo's Third Observing Run.* Phys. Rev. Lett. 129, 6, 061104 (2022).
22. \*\*\*The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. *Search for continuous gravitational waves from 20 accreting millisecond x-ray pulsars in O3 LIGO data.* Phys. Rev. D 105, 022002 (2022).
23. \*\*\*\*The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. *Search for intermediate-mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo.* Astron. Astrophys. 659, A84 (2022).
24. \*\*\*\*The LIGO Scientific, KAGRA, and Virgo Collaborations, **Z. B. Etienne** coauthor. *Constraints on dark photon dark matter using data from LIGO's and Virgo's third observing run.* Phys. Rev. D 105, 6, 063030 (2022).

### 2021 Short-Author-List Papers

25. \*L. R. Werneck, **Z. B. Etienne**, E. Abdalla, B. Cuadros-Melgar, C. E. Pellicer, *NRPycritCol & SFcollapse1D: an open-source, user-friendly toolkit to study critical phenomena.* Class. Quant. Grav. 38, 24, 245005 (2021).
26. \*S. Habib, A. Ramos-Buades, E. A. Huerta, S. Husa, R. Haas, **Z. B. Etienne**, *Initial Data and Eccentricity Reduction Toolkit for Binary Black Hole Numerical Relativity Waveforms.* Class. Quant. Grav. 38 125007 (2021).
27. \*\*B. J. Kelly, **Z. B. Etienne**, J. Golomb, J. D. Schnittman, J. G. Baker, S. C. Noble, G. Ryan, *Electromagnetic Emission from a Binary Black Hole Merger Remnant in Plasma: Field Alignment and Plasma Temperature.* Phys. Rev. D 103, 063039 (2021).
28. \*\*\*C. W. Lewandowski, T. D. Knowles, **Z. B. Etienne**, B. D'Urso, *High sensitivity accelerometry with a feedback-cooled magnetically levitated microsphere.* Phys. Rev. Applied 15, 014050 (2021).

### 2021 LIGO Scientific Collaboration Papers (on which Z. B. Etienne appears as co-author)

29. \*\*\*The KAGRA, Virgo, and LIGO Scientific Collaborations, **Z. B. Etienne** coauthor. *All-sky search for long-duration gravitational-wave bursts in the third Advanced LIGO and Advanced Virgo run.* Phys. Rev. D 104, 10, 102001 (2021).
30. \*\*\*\*The KAGRA, Virgo, and LIGO Scientific Collaborations, **Z. B. Etienne** coauthor. *All-sky search for continuous gravitational waves from isolated neutron stars in the early O3 LIGO data.* Phys. Rev. D 104, 8, 082004 (2021).
31. \*\*\*\*The KAGRA, Virgo, and LIGO Scientific Collaborations, **Z. B. Etienne** coauthor. *All-sky search for continuous gravitational waves from isolated neutron stars in the early O3 LIGO data.* Phys. Rev. D 104, 8, 082004 (2021).
32. \*\*\*The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. *Searches for Continuous Gravitational Waves from Young Supernova Remnants in the Early Third Observing Run of Advanced LIGO and Virgo.* ApJ 921, 1, 80 (2021).
33. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for Lensing Signatures in the Gravitational-Wave Observations from the First Half of LIGO–Virgo's Third Observing Run* ApJ 923, 1, 14 (2021).
34. \*\*\*The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. *Constraints from LIGO O3 Data on Gravitational-wave Emission Due to R-modes in the Glitching Pulsar PSR J0537–6910* ApJ 922, 1, 71 (2021).
35. \*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for Gravitational Waves Associated with Gamma-Ray Bursts Detected by Fermi and Swift During the LIGO–Virgo Run O3a.* ApJ 915, 2, 86 (2021).
36. \*\*\*\*The LIGO Scientific, KAGRA, and Virgo Collaborations, **Z. B. Etienne** coauthor. *Observation of Gravitational Waves from Two Neutron Star–Black Hole Coalescences.* ApJL 915, L5 (2021).
37. \*\*\*\*KAGRA, LIGO Scientific, and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for anisotropic gravitational-wave backgrounds using data from Advanced LIGO and Advanced Virgo's first three observing runs.* Phys. Rev. D 104, 022005 (2021).
38. \*\*\*\*The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. *Constraints on Cosmic Strings Using Data from the Third Advanced LIGO–Virgo Observing Run.* Phys. Rev. Lett. 126, 241102 (2021).

39. \*\*\*\*\* KAGRA, LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Upper limits on the isotropic gravitational-wave background from Advanced LIGO and Advanced Virgo's third observing run.* Phys. Rev. D 104, 022004 (2021).
40. \*\*\*The LIGO Scientific, Virgo, and KAGRA Collaborations, **Z. B. Etienne** coauthor. *Diving below the spin-down limit: Constraints on gravitational waves from the energetic young pulsar PSR J0537-6910.* ApJ 913, L27 (2021).
41. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run.* Phys. Rev. X 11, 021053 (2021).
42. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Tests of general relativity with binary black holes from the second LIGO-Virgo gravitational-wave transient catalog.* Phys. Rev. D 103, 122002 (2021).
43. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Population Properties of Compact Objects from the Second LIGO-Virgo Gravitational-Wave Transient Catalog.* ApJL 913 (2021).
44. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *A Gravitational-wave Measurement of the Hubble Constant Following the Second Observing Run of Advanced LIGO and Virgo.* ApJ 909 (2021).
45. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *All-sky search in early O3 LIGO data for continuous gravitational-wave signals from unknown neutron stars in binary systems.* Phys. Rev. D 103, 064017 (2021).

#### 2020 Short-Author-List Papers

46. \*C. W. Lewandowski, T. D. Knowles, **Z. B. Etienne**, B. D'Urso, *Active Optical Table Tilt Stabilization.* Rev. Sci. Instruments 91, 076102 (2020).
47. \*\*P. Chang, **Z. B. Etienne**, *General Relativistic Hydrodynamics on a Moving-mesh I: Static Spacetimes.* MNRAS 496, 1:206-214 (2020).
48. \*\*\*V. Mewes, Y. Zlochower, M. Campanelli, T. W. Baumgarte, **Z. B. Etienne**, F. G. Lopez Armengol, F. Ciolletta, *Numerical relativity in spherical coordinates: A new dynamical spacetime and general relativistic MHD evolution framework for the Einstein Toolkit.* Phys. Rev. D 101, 104007 (2020).

#### 2020 LIGO Scientific Collaboration Papers (on which Z. B. Etienne appears as co-author)

49. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GW190521: A Binary Black Hole Merger with a Total Mass of  $150M_{\odot}$ .* Phys. Rev. Lett. 125 (2020).
50. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Properties and astrophysical implications of the 150 Msun binary black hole merger GW190521.* ApJL 900:L13 (2020).
51. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Gravitational-wave constraints on the equatorial ellipticity of millisecond pulsars.* ApJL 902:L21 (2020).
52. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GW190814: Gravitational Waves from the Coalescence of a  $23M_{\odot}$  Black Hole with a  $2.6M_{\odot}$  Compact Object.* ApJL 896:L44 (2020).
53. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GW190412: Observation of a Binary-Black-Hole Coalescence with Asymmetric Masses.* Phys. Rev. D 102, 043015 (2020).
54. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GW190425: Observation of a Compact Binary Coalescence with Total Mass  $\sim 3.4M_{\odot}$ .* ApJL 892:L3 (2020).
55. \*\*\*The Fermi Gamma-ray Burst Monitor Team; and the LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *A Joint Fermi-GBM and LIGO/Virgo Analysis of Compact Binary Mergers From the First and Second Gravitational-wave Observing Runs.* ApJ 893:100 (2020).
56. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *A guide to LIGO-Virgo detector noise and extraction of transient gravitational-wave signals.* Class. Quantum Grav. 37 055002 (2020).
57. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *An Optically Targeted Search for Gravitational Waves emitted by Core-Collapse Supernovae during the First and Second Observing Runs of Advanced LIGO and Advanced Virgo.* Phys. Rev. D 101, 084002 (2020).
58. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Model comparison from LIGO-Virgo data on GW170817's binary components and consequences for the merger remnant.* Class. Quantum Grav. 37 045006 (2020).

#### 2019 Non-LIGO Papers (excludes three 2020 Decadal White Papers)

59. \*\*\*P. E. Nelson, **Z. B. Etienne**, S. T. McWilliams, V. Nguyen. *Induced Spins from Scattering Experiments of Initially Nonspinning Black Holes*. Phys. Rev. D, Phys. Rev. D, 100, 124045 (2019).
60. \*\*\*\*\*O. Porth, K. Chatterjee, R. Narayan, C. F. Gammie, Y. Mizuno, P. Anninos, J. G. Baker, M. Bugli, C. Chan, J. Davelaar, L. Del Zanna, **Z. B. Etienne**, et al. (EHT Collaboration paper). *The Event Horizon General Relativistic Magnetohydrodynamic Code Comparison Project*. ApJ Supp. 243, 2 (2019).
61. E. A. Huerta, et al. *Enabling real-time multi-messenger astrophysics discoveries with deep learning*. Nature Rev. Phys. 1, 10 (2019).
62. \*Z. J. Silberman, T. R. Adams, J. A. Faber, **Z. B. Etienne**, I. Ruchlin. *Numerical generation of vector potentials from specified magnetic fields*. J. Comp. Phys., 379 (2019).

**2019 LIGO Scientific Collaboration Papers (on which Z. B. Etienne appears as co-author)**

63. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Binary Black Hole Population Properties Inferred from the First and Second Observing Runs of Advanced LIGO and Advanced Virgo*. ApJ 882, L24 (2019).
64. \*\*\*\*\*The DES, LIGO Scientific, and Virgo Collaborations, **Z. B. Etienne** coauthor. *Low-latency Gravitational-wave Alerts for Multimessenger Astronomy during the Second Advanced LIGO and Virgo Observing Run*. ApJ 875, 161 (2019).
65. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *First Measurement of the Hubble Constant from a Dark Standard Siren using the Dark Energy Survey Galaxies and the LIGO/Virgo Binary-Black-hole Merger GW170814*. ApJ 876, L7 (2019).
66. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Narrow-band search for gravitational waves from known pulsars using the second LIGO observing run*. Phys. Rev. D 99, 122002 (2019).
67. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Searches for Gravitational Waves from Known Pulsars at Two Harmonics in 2015-2017 LIGO Data*. ApJ 879, 10 (2019).
68. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for Eccentric Binary Black Hole Mergers with Advanced LIGO and Advanced Virgo during their First and Second Observing Runs*. ApJ 883, 149 (2019).
69. \*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for gravitational-wave signals associated with gamma-ray bursts during the second observing run of Advanced LIGO and Advanced Virgo*. ApJ 886, 75 (2019).
70. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for gravitational waves from Scorpius X-1 in the second Advanced LIGO observing run with an improved hidden Markov model*. Phys. Rev. D 100, 122002 (2019).
71. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for intermediate mass black hole binaries in the first and second observing runs of the Advanced LIGO and Virgo network*. Phys. Rev. D 100, 064064 (2019).
72. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *All-Sky Search for Short Gravitational-Wave Bursts in the Second Advanced LIGO and Advanced Virgo Run*. Phys. Rev. D 100, 024017 (2019).
73. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for sub-solar mass ultracompact binaries in Advanced LIGO's second observing run*. Phys. Rev. Lett. 123, 161102 (2019).
74. \*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *All-sky search for long-duration gravitational-wave transients in the second Advanced LIGO observing run*. Phys. Rev. D 99, 104033 (2019).
75. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Directional limits on persistent gravitational waves using data from Advanced LIGO's first two observing runs*. Phys. Rev. D 100, 062001 (2019).
76. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Tests of General Relativity with the Binary Black Hole Signals from the LIGO-Virgo Catalog GWTC-1*. Phys. Rev. D 100, 104036 (2019).
77. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for the isotropic stochastic background using data from Advanced LIGO's second observing run*. Phys. Rev. D 100, 061101 (2019).
78. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *All-sky search for continuous gravitational waves from isolated neutron stars using Advanced LIGO O2 data*. Phys. Rev. D 100, 024004 (2019).



79. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Tests of General Relativity with GW170817*. Phys. Rev. Lett 123, 011102 (2019).
80. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GWTC-1: A Gravitational-Wave Transient Catalog of Compact Binary Mergers Observed by LIGO and Virgo during the First and Second Observing Runs*. Phys. Rev. X 9, 031040 (2019).
81. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for Gravitational Waves from a Long-lived Remnant of the Binary Neutron Star Merger GW170817*. ApJ 875, 2 (2019).
82. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Searches for Continuous Gravitational Waves from 15 Supernova Remnants and Fomalhaut b with Advanced LIGO*. ApJ 875, 2 (2019).
83. \*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for Transient Gravitational-wave Signals Associated with Magnetar Bursts during Advanced LIGO's Second Observing Run*. ApJ 874, 2 (2019).
84. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Constraining the p-Mode-g-Mode Tidal Instability with GW170817*. Phys. Rev. Lett. 122, 061104 (2019).
85. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Properties of the binary neutron star merger GW170817*. Phys. Rev. X 9, 011001 (2019).
86. \*\*\*The Fermi Gamma-ray Burst Monitor Team; LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *A Fermi Gamma-Ray Burst Monitor Search for Electromagnetic Signals Coincident with Gravitational-wave Candidates in Advanced LIGO's First Observing Run*. ApJ 871, 1 (2019).
87. \*\*\*The ANTARES, IceCube, LIGO Scientific, and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for Multimessenger Sources of Gravitational Waves and High-energy Neutrinos with Advanced LIGO during Its First Observing Run, ANTARES, and IceCube*. ApJ 870, 2 (2019).

#### 2018 Short-Author-List Papers

88. \*\*\*\*I. Ruchlin, **Z. B. Etienne**, T. W. Baumgarte. *SENR/NRPy+: Numerical Relativity in Singular Curvilinear Coordinate Systems*. Phys. Rev. D 97, 064036 (2018).
89. \*\*\*V. Mewes, Y. Zlochower, M. Campanelli, I. Ruchlin, **Z. B. Etienne**, T. W. Baumgarte. *Numerical relativity in spherical coordinates with the Einstein Toolkit*. Phys. Rev. D 97, 084059 (2018).
90. \*\*T. D. Knowles, C. Devine, D. A. Buch, S. A. Bilgili, T. R. Adams, **Z. B. Etienne**, S. T. McWilliams. *Improving performance of SEOBNRv3 by  $\sim 300x$* . Class. Quantum Grav. 35 155003 (2018).

#### 2018 LIGO Scientific Collaboration Papers (on which Z. B. Etienne appears as co-author)

91. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for sub-solar mass ultracompact binaries in Advanced LIGO's first observing run*. Phys. Rev. Lett. 121, 231103 (2018).
92. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GW170817: Measurements of neutron star radii and equation of state*. Phys. Rev. Lett. 121, 161101 (2018).
93. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Prospects for observing and localizing gravitational-wave transients with Advanced LIGO, Advanced Virgo and KAGRA*. Living Rev. Relativity 21, 1 (2018).
94. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GW170817: Implications for the Stochastic Gravitational-Wave Background from Compact Binary Coalescences*. Phys. Rev. Lett. 120, 091101 (2018).
95. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *A Search for Tensor, Vector, and Scalar Polarizations in the Stochastic Gravitational-Wave Background*. Phys. Rev. Lett. 120, 201102 (2018).
96. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Full Band All-sky Search for Periodic Gravitational Waves in the O1 LIGO Data*. Phys. Rev. D 97, 102003 (2018).
97. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Constraints on cosmic strings using data from the first Advanced LIGO observing run*. Phys. Rev. D 97, 102002 (2018).
98. \*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *All-sky search for long-duration gravitational wave transients in the first Advanced LIGO observing run*. Class. Quantum Grav. 35 065009 (2018).
99. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *First search for nontensorial gravitational waves from known pulsars*. Phys. Rev. Lett. 120, 031104 (2018).

#### 2017 Short-Author-List Papers

100. \*\***Z. B. Etienne**, M.-B. Wan, M. C. Babiuc, S. T. McWilliams, A. Choudhary. *GiRaFFE: an open-source general relativistic force-free electrodynamics code*. *Class. Quantum Grav.* 34, 215001 (2017).
101. \*\*\***B. J. Kelly**, J. G. Baker, **Z. B. Etienne**, B. Giacomazzo, J. Schnittman. *Prompt Electromagnetic Transients from Binary Black Hole Mergers*. *Phys. Rev. D* 96, 123003 (2017).

**2017 LIGO Scientific Collaboration Papers (on which Z. B. Etienne appears as co-author)**

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103. \*\*\*\*\*LIGO Scientific, Virgo, Fermi-GBM, INTEGRAL, and many more Collaborations, **Z. B. Etienne** coauthor. *Multi-messenger Observations of a Binary Neutron Star Merger*. *ApJ* 848:L12 (2017).
104. \*\*\*\*\*LIGO Scientific, Virgo, Fermi-GBM, and INTEGRAL Collaborations, **Z. B. Etienne** coauthor. *Gravitational Waves and Gamma-rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A*. *ApJ* 848:L13 (2017).
105. \*\*\*\*LIGO Scientific, Virgo, Fermi-GBM, and INTEGRAL Collaborations, **Z. B. Etienne** coauthor. *Upper Limits on Gravitational Waves from Scorpius X-1 from a Model-Based Cross-Correlation Search in Advanced LIGO Data*. *ApJ* 847:47 (2017).
106. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GW170608: Observation of a 19 Solar-mass Binary Black Hole Coalescence*. *ApJ Letters* 851:L35 (2017).
107. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for Post-merger Gravitational Waves from the Remnant of the Binary Neutron Star Merger GW170817*. *ApJ Letters* 851:L16 (2017).
108. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *On the Progenitor of Binary Neutron Star Merger GW170817*. *ApJ Letters* 850:L40 (2017).
109. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Estimating the Contribution of Dynamical Ejecta in the Kilonova Associated with GW170817*. *ApJ Letters* 850:L39 (2017).
110. \*\*\*\*\*The ANTARES, IceCube, Pierre Auger, LIGO Scientific, and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for High-energy Neutrinos from Binary Neutron Star Merger GW170817 with ANTARES, IceCube, and the Pierre Auger Observatory*. *ApJ Letters* 850:L35 (2017).
111. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *A gravitational-wave standard siren measurement of the Hubble constant*. *Nature* 551, 85–88 (2017).
112. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GW170814: A Three-Detector Observation of Gravitational Waves from a Binary Black Hole Coalescence*. *Phys. Rev. Lett.* 119, 141101 (2017).
113. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *First low-frequency Einstein@Home all-sky search for continuous gravitational waves in Advanced LIGO data*. *Phys. Rev. D* 96, 122004 (2017).
114. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *All-sky search for periodic gravitational waves in the O1 LIGO data*. *Phys. Rev. D* 96, 062002 (2017).
115. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *First narrow-band search for continuous gravitational waves from known pulsars in advanced detector data*. *Phys. Rev. D* 96, 122006 (2017).
116. \*\*\*\*ANTARES Collaboration, IceCube Collaboration, and the LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for high-energy neutrinos from gravitational wave event GW151226 and candidate LVT151012 with ANTARES and IceCube*. *Phys. Rev. D* 96, 022005 (2017).
117. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for intermediate mass black hole binaries in the first observing run of Advanced LIGO*. *Phys. Rev. D* 96, 022001 (2017).
118. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *GW170104: Observation of a 50-Solar-Mass Binary Black Hole Coalescence at Redshift 0.2*. *Phys. Rev. Lett.* 118, 221101 (2017).
119. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for gravitational waves from Scorpius X-1 in the first Advanced LIGO observing run with a hidden Markov model*. *Phys. Rev. D* 95, 122003 (2017).
120. \*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Search for Gravitational Waves Associated with Gamma-Ray Bursts during the First Advanced LIGO Observing Run and Implications for the Origin of GRB 150906B*. *ApJ* 841:89 (2017).
121. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Effects of waveform model systematics on the interpretation of GW150914*. *Class. Quantum Grav.* 34, 104002 (2017).

122. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *First Search for Gravitational Waves from Known Pulsars with Advanced LIGO*. ApJ 839:12 (2017).
123. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Directional Limits on Persistent Gravitational Waves from Advanced LIGO's First Observing Run*. Phys. Rev. Lett. 118, 121102 (2017).
124. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Upper Limits on the Stochastic Gravitational-Wave Background from Advanced LIGO's First Observing Run*. Phys. Rev. Lett. 118, 121101 (2017).
125. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *All-sky search for short gravitational-wave bursts in the first Advanced LIGO run*. Phys. Rev. D 95, 042003 (2017).

#### 2015–2016 Short-Author-List Papers

126. \*\*\*C. Devine, **Z. B. Etienne**, S. T. McWilliams. *Optimizing spinning time-domain gravitational waveforms for Advanced LIGO data analysis*. Class. Quantum Grav., 33, 125025/1-15 (2016).
127. \*\*\*\*\***Z. B. Etienne**, V. Paschalidis, R. Haas, P. Moesta, and S. L. Shapiro. *IllinoisGRMHD: An Open-Source, User-Friendly GRMHD Code for Dynamical Spacetimes*. Class. Quantum Grav., 32, 175009/1-33 (2015).

#### 2015–2016 LIGO Scientific Collaboration Papers (on which Z. B. Etienne appears as co-author)

128. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Improved Analysis of GW150914 Using a Fully Spin-Precessing Waveform Model*. Phys. Rev. X 6, 041014 (2016).
129. \*\*\*\*\*The LIGO Scientific and Virgo Collaborations, **Z. B. Etienne** coauthor. *Properties of the Binary Black Hole Merger GW150914*. Phys. Rev. Lett. 116, 241102 (2016).

#### 2014 Short-Author-List Papers

130. \*\*\*\*R. Gold, V. Paschalidis, **Z. B. Etienne**, and S. L. Shapiro. *Accretion disks around binary black holes of unequal mass: GRMHD simulations of postdecoupling and merger*. Phys. Rev. D, 90, 104030/1-15 (2014).
131. \*\*\***Z. B. Etienne**, J. G. Baker, V. Paschalidis, B. J. Kelly, and S. L. Shapiro. *Improved Moving Puncture Gauge Conditions for Compact Binary Evolutions*. Phys. Rev. D 90, 064032/1-25 (2014).

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132. \*\*\*\*R. Gold, V. Paschalidis, **Z. B. Etienne**, and S. L. Shapiro. *Accretion disks around binary black holes of unequal mass: GRMHD simulations near decoupling*. Phys. Rev. D, 89, 064600/1-28 (2014).
133. \*\*\*\*Aasi et al. (the NINJA-2, LIGO, and VIRGO Collaborations). *The NINJA-2 project: Detecting and characterizing gravitational waveforms modelled using numerical binary black hole simulations*. Class. Quantum Grav., 31, 115004/1-52 (2014).
134. \*\*\*\*\*I. Hinder, A. Buonanno, M. Boyle, **Z. B. Etienne**, J. Healy, et al. (the NRAR Collaboration). *Error-analysis and comparison to analytical models of numerical waveforms produced by the NRAR Collaboration*. Class. Quantum Grav., 31, 025012/1-47 (2013).
135. Ajith et al. (the NINJA-2 Collaboration). *Addendum to "The NINJA-2 catalog of hybrid post-Newtonian/numerical-relativity waveforms for non-precessing black-hole binaries"*. Class. Quantum Grav., 30, 199401/1-2 (2013).
136. \*\*\*\*V. Paschalidis, **Z. B. Etienne**, and S. L. Shapiro. *General relativistic simulations of binary black hole-neutron stars: Precursor electromagnetic signals*. Phys. Rev. D, 88, 021504(R)/1-6 (2013).
137. \*\*\*\***Z. B. Etienne**, V. Paschalidis, and S. L. Shapiro. *General relativistic simulations of black hole-neutron star mergers: Effects of tilted magnetic fields*. Phys. Rev. D, 86, 084026/1-6 (2012).
138. \*\*\*\*V. Paschalidis, **Z. B. Etienne**, and S. L. Shapiro. *Importance of cooling in triggering the collapse of hypermassive neutron stars*. Phys. Rev. D, 86, 064032/1-13 (2012).
139. \*\*\*\*B. D. Farris, R. Gold, V. Paschalidis, **Z. B. Etienne**, and S. L. Shapiro. *Binary black hole mergers in magnetized disks: simulations in full general relativity*. Phys. Rev. Lett., 109, 221102/1-5 (2012).
140. Ajith et al. (the NINJA-2 Collaboration). *The NINJA-2 catalog of hybrid post-Newtonian/numerical-relativity waveforms for non-precessing black-hole binaries*. Class. Quantum Grav., 29, 124001/1-27 (2012).
141. \*\*\*\***Z. B. Etienne**, Y. T. Liu, V. Paschalidis, and S. L. Shapiro. *General Relativistic Simulations of Black Hole-Neutron Star Mergers: Effects of magnetic fields*. Phys. Rev. D, 85, 064029/1-30 (2012).

142. \*\*\*\***Z. B. Etienne**, V. Paschalidis, Y. T. Liu, and S. L. Shapiro *Relativistic magnetohydrodynamics in dynamical spacetimes: Improved electromagnetic gauge condition for adaptive mesh refinement grids*. Phys. Rev. D, 85, 024013/1-10 (2012).
143. \*\*\*\*V. Paschalidis, **Z. B. Etienne**, Y. T. Liu, and S. L. Shapiro *Merger of binary white dwarf–neutron stars: Simulations in full general relativity*. Phys. Rev. D, 84, 104032/1-24 (2011).
144. \*\*\*V. Paschalidis, **Z. B. Etienne**, Y. T. Liu, and S. L. Shapiro *Head-on collisions of binary white dwarf–neutron stars: Simulations in full general relativity*. Phys. Rev. D, 83, 064002/1-23 (2011).
145. \*\*\*\***Z. B. Etienne**, Y. T. Liu, and S. L. Shapiro *Relativistic magnetohydrodynamics in dynamical spacetimes: A new adaptive mesh refinement implementation*. Phys. Rev. D, 82, 084031/1-21 (2010).
146. \*\*\*Y. T. Liu, **Z. B. Etienne**, and S. L. Shapiro *Evolution of near-extremal-spin black holes using the moving puncture technique*. Phys. Rev. D, 80, 121503/1-5 (2009).
147. \*\*\*\*\*Aylott et al. (the NINJA Collaboration). *Testing gravitational-wave searches with numerical relativity waveforms: Results from the first Numerical INjection Analysis (NINJA) project*. Class. Quantum Grav., 26, 165008/1-51 (2009).
148. \*\*\*\*Cadonati et al. (the NINJA Collaboration). *Status of NINJA: the Numerical INjection Analysis project*. Class. Quantum Grav., 26, 114008/1-13 (2009).
149. \*T. W. Baumgarte, **Z. B. Etienne**, Y. T. Liu, K. Matera, N. Ó. Murchadha, S. L. Shapiro, & K. Taniguchi. *Equilibrium initial data for moving puncture simulations: the stationary 1 + log slicing*. Class. Quantum Grav., 26, 085007/1-17 (2009).
150. \*\*\*\*\***Z. B. Etienne**, Y. T. Liu, S. L. Shapiro and T. W. Baumgarte. *Relativistic simulations of black hole–neutron star mergers: Effects of black hole spin*. Phys. Rev. D, 79, 044024/1-26 (2009).
151. \*\*\*\*\*Y. T. Liu, S. L. Shapiro, **Z. B. Etienne** and K. Taniguchi. *General relativistic simulations of magnetized binary neutron stars*. Phys. Rev. D, 78, 024012/1-20 (2008).
152. \*\*\*\*\***Z. B. Etienne**, J. A. Faber, Y. T. Liu, S. L. Shapiro, T. W. Baumgarte, and K. Taniguchi. *Fully general relativistic simulations of black hole–neutron star mergers*. Phys. Rev. D, 77, 084002/1-22 (2008).
153. \*\*\*\***Z. B. Etienne**, J. A. Faber, Y. T. Liu, S. L. Shapiro, and T. W. Baumgarte. *Filling the holes: Evolving excised binary black hole initial data with puncture techniques*. Phys. Rev. D, 76, 101503/1-5 (2007).
154. \*\*\*J. A. Faber, T. W. Baumgarte, **Z. B. Etienne**, S. L. Shapiro, and K. Taniguchi. *Relativistic hydrodynamics in the presence of puncture black holes*. Phys. Rev. D, 76, 104021/1-21 (2007).
155. \*\*\***Z. B. Etienne**, Y. T. Liu, and S. L. Shapiro. *General Relativistic Simulations of Slowly and Differentially Rotating Magnetized Neutron Stars*. Phys. Rev. D, 74, 044030/1-21 (2006).
156. V. S. Morozov, **Z. B. Etienne**, M.C. Kandes, A. D. Krisch, M. A. Leonova, D. W. Sivers, V. K. Wong, K. Yonehara, V. A. Anferov, H. O. Meyer, P. Schwandt, E. J. Stephenson, & B. von Przewoski. *First Spin Flipping of a Stored Spin-1 Polarized Beam*. Phys. Rev. Lett., 91, 214801/1-4 (2003).
157. B. V. Przewoski, V. A. Anferov, H. O. Meyer, P. Schwandt, E. J. Stephenson, V. S. Morozov, **Z. B. Etienne**, M. C. Kandes, M. A. Leonova, D. W. Sivers, & K. Yonehara. *Vector and tensor polarization lifetimes for a stored deuteron beam*. Phys. Rev. E, 68, 046501 (2003).
158. B. B. Blinov, **Z. B. Etienne**, A. D. Krisch, M. A. Leonova, W. Lorenzon, V. S. Morozov, C. C. Peters, V. K. Wong, K. Yonehara, V. A. Anferov, P. Schwandt, E. J. Stephenson, B. von Przewoski, & H. Sato. *99.6% Spin-Flip Efficiency in the Presence of a Strong Siberian Snake*. Phys. Rev. Lett., 88, 014801/1-4 (2001).

- Chapters in Professional Books:

- **Z. B. Etienne**, V. Paschalidis, and S. L. Shapiro. *Advanced Models of Black Hole–Neutron Star Binaries and Their Astrophysical Impact*, in C. F. Sopuerta (Ed.), *Gravitational Wave Astrophysics: Proceedings of the Third Session of the Sant Cugat Forum on Astrophysics*, Vol 40, pp 59–74 (2014). Springer.

- Other: Papers in Conference Proceedings:

- **Z. B. Etienne**, Y. T. Liu, V. Paschalidis, and S. L. Shapiro. *Numerical Relativity Simulations of Magnetized Black Hole–Neutron Star Mergers*, in R. T. Jantzen, K. Rosquist, R. Ruffini (Eds.) *Proceedings of the 13th Marcel Grossmann Meeting* (2015). World Scientific, Singapore. Not refereed.

## Distinguished Talks

- 2023 *Advancing Multimessenger Astrophysics with Next-Generation Black Hole and Neutron Star Binary Merger Simulations*
- Invited Seminar (virtual), University of Virginia, Charlottesville, VA.
  - Physics Colloquium, Brigham Young University, Provo, UT.
  - Invited PPPL Seminar, Princeton University, Princeton, NJ.
  - Invited Seminar, University of Jena, Jena, Germany.
  - Invited AstroCoffee Seminar, Frankfurt Institute of Advanced Studies, Frankfurt, Germany.
  - Invited Seminar for REU students, Rochester Institute of Technology, Rochester, NY.
- When Black Holes Collide! Gravitational Waves and Other Tales from the Horizon*
- Spacepoint Sci-Fi Lecture Series Talk, Panida Theatre, Sandpoint, ID.
  - Invited Talk, APS Meeting Northwest Section, Nampa, ID.
- 2022 *Advancing Multimessenger Astrophysics with Next-Generation Black Hole and Neutron Star Binary Merger Simulations*
- Invited Talk (virtual), Albert Einstein Institute, Potsdam, Germany.
  - Invited Talk (virtual), University of Lisbon, Lisbon, Portugal.
  - Physics and Astronomy Department Colloquium, Washington State University, Pullman, WA.
- NRPy+ / BlackHoles@Home*
- Numerical Relativity Community Call, held virtually.
- Ripples from the Darkness: Black Hole Mergers and Acquisitions*
- Invited Seminar: Department of Agricultural Economics and Rural Sociology, University of Idaho, Moscow, ID
- New Techniques in Numerical Relativity*
- Invited Talk (virtual): INT-20-1b: The r-process and the nuclear EOS after aLIGO's third observing run, University of Washington, Seattle, WA
- 2021 *BlackHoles@Home Status Report*
- Invited Talk, American Astronomical Society January Meeting, NASA Physics of the Cosmos Invited Session, held virtually
- NRPy+, a Python-Based Code Generation Package for Numerical Relativity... and Beyond!*
- Invited Talk, SIAM Conference on Computational Science and Engineering "Applications of Code Generation and HPC to Complex Dynamical Systems" Minisymposium, held virtually
  - Invited Talk, APS April Meeting "Applications of Code Generation and High Performance Computing to Astrophysical Systems", held virtually
- Advancing Multimessenger Astrophysics with Next-Generation Black Hole and Neutron Star Binary Merger Simulations*
- U. of Idaho/Washington State University Joint Physics Colloquium, Moscow, ID.
  - Mathematics, Astronomy, Physics, and Computation Seminar, National University of Còrdoba, Còrdoba, Argentina
  - U. of Idaho Physics Colloquium, Moscow, ID.
  - Northern Arizona University Department of Mathematics and Statistics Colloquium, Flagstaff, AZ.

- 2020 *Advancing Multimessenger Astrophysics with Next-Generation Black Hole and Neutron Star Binary Merger Simulations*
- Interdisciplinary Center for Theoretical Study Seminar, U. of Science and Technology of China, Hefei.
  - Fundamental Theory Seminar, Penn State University.
- When black holes and neutron stars collide: Simulating the most extreme events in the Universe*
- WVU Planetarium Invited Talk
  - Tri-State Astronomers Club, Hagerstown Invited Talk
  - Cornell Astronomical Society Invited Talk
- BlackHoles@Home Status Report*
- ICERM Advances in Computational Relativity Workshop Invited Talk, Brown University
- 2019 *The BlackHoles@Home Project: Black Hole Binaries on the Desktop Computer*
- Invited press conference at the 2019 April American Physical Society Meeting
  - Accepted talk at 2019 GR22 Conference in Valencia, Spain
- Advancing Multimessenger Astrophysics with Next-Generation Black Hole and Neutron Star Binary Merger Simulations*
- West Virginia University Physics & Astronomy Department Colloquium
  - Beijing Normal University Astronomy Department Seminar
- NRPy+: A new tool for numerical relativity*
- Invited talk at 2019 Einstein Toolkit Workshop, King's College London
- NRPy+: Enabling general relativistic binary black hole simulations on your laptop!*
- Invited talk at U. of Chinese Academy of Sciences, School of Physics Research Seminar, Beijing
- BlackHoles@Home/NRPy+: Numerical Relativity in Singular Curvilinear Coordinates*
- Invited talk at SIAM CSE Numerical Relativity Mini-Symposium, Spokane, Washington
- Porting General Relativity to Python, for the Benefit of Astrophysics*
- Invited talk Morgantown Codes (local group of professional software developers) Meeting, Morgantown, West Virginia
- 2018 *When Neutron Stars Collide! Gravitational Waves, Gamma-Ray Bursts, and the Ring on Your Finger*
- The 21st Eastern Gravity Meeting Public Talk, Long Island University-Brooklyn.
  - Invited Seminar for REU students, Center for Computational Relativity and Gravitation, Rochester Institute of Technology
- SENr/NRPy+, BlackHoles@Home, ... and Beyond! Numerical Relativity in Singular, Curvilinear Coordinate Systems*
- Invited Talk, NCSA Workshop: Deep Learning for Multimessenger Astrophysics: Real-time Discovery at Scale, National Center for Supercomputing Applications, Urbana, IL.
- Colliding Black Holes!*
- Invited Public Talk, Blackwater Falls Astronomy Weekend, Blackwater Falls State Park, West Virginia

*NRPy+: A new Python-based code-generation package for numerical relativity... and beyond!*

- Invited Talk, European Einstein Toolkit Workshop, Lisbon, Portugal.

*NRPy+ Tutorial*

- Invited tutorial, Numerical Relativity beyond General Relativity, Benasque, Spain
- Invited tutorial, Einstein Toolkit Workshop 2018, Georgia Institute of Technology

2017 *Gravitational Waves, Colliding Neutron Stars, and You*

- Invited Special Colloquium on GW170817, West Virginia University Department of Physics & Astronomy

*When Black Holes Collide! Gravitational Waves and Other Tales from the Horizon*

- Public Talk, 2017 *Celebrating Einstein* event at West Virginia University.
- Invited Seminar for REU students, Center for Computational Relativity and Gravitation, Rochester Institute of Technology

*Electromagnetic Counterparts to Gravitational Wave Detections: Bridging the Gap between Theory and Observation*

- Invited Seminar, Shanghai Astronomical Observatory.
- Invited Seminar, Zhejiang University of Technology.
- Invited Colloquium, Kavli Institute for Astronomy and Astrophysics.
- Invited Seminar, Center for Computational Relativity and Gravitation, Rochester Institute of Technology.
- Invited Seminar, Relativistic Astrophysics seminar, Montana State University.

*SENR: A Super-Efficient Numerical Relativity Code for the Age of Gravitational Wave Astrophysics*

- Selected Talk, American Physical Society April Meeting, Washington, DC.
- Selected Talk, 20th Eastern Gravity Meeting, Penn State University.

2016 *SENR: A Super-Efficient Numerical Relativity Code for the Age of Gravitational Wave Astronomy*

- Selected Talk, 2016 Joint Space–Science Institute Workshop: “Astrophysics in the Era of Gravitational Wave and Multimessenger Observations”.

2015 *An Overview of IllinoisGRMHD*

- Invited Talk, 2015 Einstein Toolkit Workshop.

*Numerical Relativity’s Contribution to Theoretical Astrophysics, and Its Path Forward*

- Invited Talk, 2015 American Physical Society April Meeting.
- Colloquium, National Radio Astronomy Observatory, Green Bank, WV.
- Invited Talk, 2015 American Physical Society Mid-Atlantic Section Meeting.

*GRMHD modeling of the most luminous outbursts in the Universe*

- Invited Talk, University of Trento.

*West Virginia University LSC New Senior Member Application Presentation*

- Invited Talk, 2015 LIGO Scientific Collaboration Pasadena Meeting.

2014 *A Man, a Plan, a Code, a New Technique (or Two), ... Panama?*

- Invited Talk, Rochester Institute of Technology Center for Computational Relativity and Gravitation.

*Modeling of Black Hole–Neutron Star Systems and Their Astrophysical Impact*

- Plenary Talk, Sant Cugat Forum on Astrophysics, Sant Cugat, Barcelona, Spain

*Throwing in the Kitchen Sink: Adding Mixed-Type PDEs to Better Solve Einstein’s Equations*

- Invited Talk, Applied Analysis Seminar, West Virginia University Department of Mathematics.

2013 *Can Black Hole–Neutron Star Binary Mergers Produce Gamma-Ray Bursts?*

- Invited Talk, Joint Space–Science Institute Mini-Symposium, University of Maryland.
- Seminar, Theoretical AstroPhysics Including Relativity and Cosmology (TAPIR), California Institute of Technology.
- Seminar, General Relativity Theory Seminar, University of Maryland.
- Colloquium, Shanghai–Jiaotong University Center for Astrophysics, Shanghai, China.
- Colloquium, Shanghai Astronomical Observatory, Shanghai, China.
- Seminar, Center for Gravitation, Cosmology & Astrophysics Seminar, University of Wisconsin–Milwaukee
- Colloquium, Computational Data Mining and Analysis Center, Virginia Tech

2013 *Solving the Einstein–Maxwell Equations to Model the Most Energetic Outbursts in the Universe*

- Colloquium, Department of Mathematics, West Virginia University

2012 *Simulations of Magnetized Neutron Star–Black Hole Binaries in Full General Relativity*

- Invited Talk, 13th Marcel Grossmann Meeting, Stockholm, Sweden.
- Selected Talk, KITP Conference: Rattle and Shine: Gravitational Wave and Electromagnetic Studies of Compact Binary Mergers, Santa Barbara, California.

2011 *Numerical Simulations of Binary Systems with Matter Companions.*

- Invited Talk, 2011 APS April Meeting, Anaheim, California.

2010 *Fully General Relativistic Simulations of Black Hole–Neutron Star Mergers: A Current Overview.*

- Invited Talk, Numerical Relativity Data Analysis (NRDA) Conference, Perimeter Institute, Waterloo, Ontario.
- Seminar, Peking University, National Observatory, and Institute of High Energy Physics Joint Seminar, Beijing, China.
- Colloquium, Shanghai Astronomical Observatory, Shanghai, China.

2009 *Simulations of Black Hole–Neutron Star Binary Mergers: Gravitational Waves and Gamma-Ray Bursts.*

- Seminar, Center for Gravitation & Cosmology, University of Wisconsin–Milwaukee.