

Katelyn Breivik

Flatiron Institute -- Center for Computational Astrophysics

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Education

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| 2018 | Ph.D. in Physics and Astronomy Thesis: Simulating Binary Populations in the Milky Way | Northwestern University |
| 2015 | M.S. in Physics and Astronomy | Northwestern University |
| 2012 | B.S. in Physics with Professional Emphasis, Cum Laude | Utah State University |

Research Experience

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| 2020 - now | Flatiron Institute – Center for Computational Astrophysics Flatiron Research Fellow | New York City, NY |
| 2018 - 2020 | Canadian Institute for Theoretical Astrophysics Postdoctoral Fellow | Toronto, ON |
| 2013 - 2018 | Northwestern University Research Assistant | Evanston, IL |

Honors & Awards

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| 2019 | Jeffrey L. Bishop Fellowship Bi-annually awarded to CITA postdoc: \$3,000 |
| 2017 | Blue Apple Award Best student talk at the 27th Midwest Relativity Meeting |
| 2017 | NSF GK-12 ‘Reach for the Stars’ Fellowship Graduate Teaching Fellowship |
| 2017 | Chambliss Astronomy Achievement Award Honorable Mention, 229th AAS Meeting |
| 2016 | Northwestern Physics & Astronomy Rapid Fire Research 2nd Place |
| 2014 | Illinois Space Grant Consortium Graduate Fellowship Award Amount: \$10,000 |
| 2010 | Undergraduate Teaching Fellowship Utah State University |
| 2010 | Undergraduate Research and Creative Opportunities (URCO) Grant Award Amount: \$2,000 |
| 2008 | Presidential Fellowship - 4 years Utah State University |

Grant and Observing Awards

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| 2021 | Chandra Cycle 23, Co-I Confirmation of the First Helium Star Stripped by a Black Hole |
| 2020 | Chandra Cycle 22, Co-I Probing the dark remnant of 2MASS J0521658+4359220 |
| 2019 | NASA ROSES-2019, Co-I Multi-messenger constraints on close binary evolution in the Milky Way |

Selected Seminars/Colloquia: 24 Total, 3 Scheduled

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| March 2022 | Michigan State University Astronomy Seminar | East Lansing, MI – virtual |
| Feb 2022 | AEI MPG Astrophysics & Cosmological Relativity Seminar | Potsdam, Germany – virtual |
| Jan 2022 | Los Alamos National Lab Astrophysics Seminar | Los Alamos, NM – virtual |
| Jan 2022 | Ohio State University Astronomy Colloquium | Columbus, OH – virtual |
| Nov 2021 | University of Wisconsin Milwaukee CGCA Seminar | Milwaukee, WI – virtual |
| Feb 2021 | University of Oklahoma Colloquium | Norman, OK – virtual |
| Nov 2020 | University of British Columbia Astronomy Colloquium | Vancouver, BC – virtual |
| Nov 2019 | KICP - University of Chicago KICP Seminar | Chicago, IL |
| Oct 2019 | Carnegie Observatories Colloquium | Pasadena, CA |
| Jun 2018 | NASA GSFC Astrophysics Colloquium | Greenbelt, MA |
| Dec 2017 | Caltech TAPIR Seminar | Pasadena, CA |

Selected Conferences and Workshops: 6 Invited, 16 Contributed

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| June 2021 | 24th CAPRA Meeting Invited plenary | Perimeter Institute, virtual |
| May 2021 | 2021 Multiband Gravitational-Wave Science Workshop Invited talk | Carnegie Mellon, virtual |
| Mar 2020 | LISA Sprint Workshop attendee | Flatiron Institute |
| July 2019 | Beginnings and Ends of Double White Dwarfs Invited talk/workshop | DARK Institute, NBI |
| Dec 2018 | Future by the Future Workshop Invited talk | Columbia University |
| Oct 2018 | 2nd COFI Workshop on GWs Invited talk | COFI, Puerto Rico |
| Jan 2018 | The architecture of LISA Science Analysis: Imagining the Future Workshop participant | Keck Institute |
| Oct 2017 | 27th Midwest Relativity Meeting talk; Blue Apple award | Ann Arbor, MI |
| Jan 2017 | AAS 229 Poster, Chambliss Honorable mention | Grapevine, TX |

Membership and Leadership

Member of the American Astronomical Society (AAS) and the LISA Consortium

LISA Science Interpretation Work Package

CO-CHAIR OF SUB-WORK PACKAGE 7.2:

DEMOGRAPHY OF STELLAR MASS COMPACT OBJECTS AND ELECTROMAGNETIC COUNTERPARTS

LISA Consortium

May 2019 - present

Mentoring

Nathalia Torres; co-supervised with Mathieu Renzo

CONNECTING HMXBs AND GRAVITATIONAL WAVE SOURCES

AstroCom NYC; May 2021 - now

Current undergrad @ CUNY BMCC

Sarah Thiele

PREDICTING METALLICITY-DEPENDENT DOUBLE WHITE DWARF POPULATIONS OBSERVABLE BY LISA; ARXIV:2111.13700

UofT SURP; May 2020 - now

Current undergrad @ UBC

Tom Wagg

LEGWORK: A LISA SIGNAL-TO-NOISE RATIO CALCULATOR PYTHON PACKAGE; ARXIV:2111.08717

Harvard Post-bacc; May 2020 - now

Current grad @ UW Seattle

Eesha Das Gupta; co-supervised with Maria Drout

EFFECTS OF RED SUPERGIANT WINDS ON BINARY POPULATIONS

Graduate research; May 2020 - now

Current grad @ University of Toronto

Chirag Chawla; co-supervised with Sourav Chatterjee

POPULATIONS OF COMPACT OBJECT + LUMINOUS COMPANION BINARIES OBSERVABLE BY GAIA; ARXIV:2110.05979

Graduate research; Feb 2019 - now

Current grad @ TIFR Mumbai

Maryam Esmat

CONSTRAINING THE GALACTIC ELECTRON DENSITY WITH MULTI-MESSENGER ASTRONOMY

Senior Thesis; Sep 2020 - June 2021

Current grad @ Johns Hopkins

Amia Ross

POPULATIONS OF DOUBLE NEUTRON STAR BINARIES OBSERVABLE BY LISA AND LIGO

High school intern; Summer 2017

Currently attending Harvard

Michael Bueno; co-supervised with Shane Larson

POPULATIONS OF DOUBLE WHITE DWARF BINARIES OBSERVABLE BY LISA AND GAIA; ARXIV:1710.08370

REU student; Summer 2016

Masters in Physics from Northwestern

Teaching Experience

Guest Lectures

UNIVERSITY OF TORONTO (ST GEORGE AND SCARBOROUGH CAMPUSES)

- Jun 19, 2019: GWs 101 (Summer undergrad research program Astro 101)
- Jan 29, 2019: Introduction to gravitational waves and their detection for upper division undergraduate laboratory course (PHYC 11H3) NORTHWESTERN UNIVERSITY
- May 25, 2017: Introduction to gravitational waves for upper division undergraduate astronomy course (Astron 331)
- Nov 11, 2016: Overview of the atomic model for introductory, concept-based physics course (Phys 103)

NSF GK-12 Graduate Teaching Fellow

2017-2018

NORTHWESTERN/LAKE VIEW HIGH SCHOOL

Created lesson plans on Kepler's Laws designed to bring computational thinking and current astrophysics research to high school classrooms.

Undergraduate Teaching Fellow

2009 - 2011

UTAH STATE UNIVERSITY

- Phys 2210/2220: Introductory Physics for Physical Sciences

Service, Outreach, and Engagement

Referee for ApJ, ApJL, MNRAS, A&A, JOSS; Panel reviewer for NASA, NSF

NYC-wide SDSS-V and Gaia EDR3 Hack Sessions

CO-ORGANIZER

NYC, NY

Jun 2021 - present

Toronto, ON

dotAstronomy TO

SCIENCE ORGANIZING COMMITTEE

Oct 2019

UofT Astro-ph coffee & CITA Blackboard Seminar

CO-ORGANIZER

University of Toronto

Sep 2018 - Aug 2020

CIERA Astronomer Evenings

FOUNDER AND LEAD ORGANIZER

Dearborn Observatory

Jan 2016 - Aug 2018

Physics & Astronomy Graduate Student Council

ASTRONOMY OUTREACH COMMITTEE HEAD, EQUITY AND INCLUSION COMMITTEE MEMBER

Evanston, IL

Dec 2015 - May 2018

General Science Outreach and Education

I'M COMMITTED TO SHARING THE WORK THAT I DO WITH THE PUBLIC. I HAVE INTERACTED WITH OVER 2000 PEOPLE AT MORE THAN 25 EVENTS ACROSS THE TORONTO, CHICAGO, AND SALT LAKE CITY AREAS CAN PROVIDE A FULL LIST ON REQUEST.

2010-Present

Publications: 26 refereed/under review, h-index: 14

First author: 6

- Constraining Galactic structure with the LISA white dwarf foreground** 2020, *ApJ*, 901, 4
Breivik, K., MINGARELLI, C. M. F., LARSON, S. L. *arXiv: 1912.02200*
- COSMIC variance in binary population synthesis** 2020, *ApJ*, 898, 71
Breivik, K., COUGHLIN, S., ZEVIN, M., ET AL. *arXiv: 1911.00903*
- Constraining black hole formation with 2M0521** 2019, *ApJ*, 878, L4
Breivik, K., CHATTERJEE, S., ANDREWS, J. J. *arXiv:1810.08206*
- Characterizing double white dwarf binaries with LISA and Gaia** 2018, *ApJ*, 854L 1
Breivik, K., KREMER, K., BUENO, M., LARSON, S. L., COUGHLIN, S. KALOGERA, V. *arXiv:1710.08370*
- Revealing black holes with Gaia** 2017, *ApJ*, 850, L13
Breivik, K., CHATTERJEE, S., LARSON, S. L. *arXiv:1710.04657*
- Distinguishing between formation channels for binary black holes with LISA** 2016, *ApJ*, 830, L18
Breivik, K., RODRIGUEZ, C. L., LARSON, S. L., KALOGERA, V., RASIO, F. A. *arXiv: 1606.0955*

2nd/3rd author: 12

- LEGWORK: The LISA Evolution and Gravitational Wave Orbit Kit** submitted to *JOSS*
WAGG, T., Breivik, K., DE MINK, S. E.
- LEGWORK: A python package for computing the evolution and detectability of stellar-origin gravitational-wave sources with space-based detectors** accepted in *ApJS*
WAGG, T., Breivik, K., DE MINK, S. E. *arXiv:2111.087179*
- Applying the metallicity-dependent binary fraction to double white dwarf formation: Implications for LISA** submitted to *AAS Journals*
THIELE, S., Breivik, K., SANDERSON, R. E. *arXiv:2111.13700*
- Gaia may detect hundreds of well-characterised stellar black holes** submitted to *AAS Journals*
CHAWLA, C., CHATTERJEE, S., Breivik, K., ANDREWS, J. J., MOORTHY, C. K., SANDERSON, R. E. *arXiv:2110.05979*
- Weighing the darkness II: Astrometric measurement of partial orbits with Gaia** submitted to *AAS Journals*
ANDREWS, J. J., Breivik, K., CHAWLA, C., CHATTERJEE, S., RODRIGUEZ, C. *arXiv:2110.05549*
- Joint constraints on the field-cluster mixing fraction, common envelope efficiency, and globular cluster radii from a population of binary hole mergers via deep learning** 2021, *PRD*, 103, 8
WONG, K. W. K., Breivik, K., KREMER, K., CALLISTER, T. *arXiv:2011.03564*
- Weighing in on black hole binaries with BPASS: LB-1 does not contain a 70M_☉ black hole** 2020, *MNRAS*, 495, 3
ELDRIDGE, J. J., STANWAY, E. R., Breivik, K., CASEY, A. R., STEEGHS, D. T. H., STEVANCE, H. F. *arXiv:1912.03599*
- Eclipses of continuous gravitational waves as a probe of stellar structure** 2020, *PRD*, 101, 024039
MARCHANT, P., Breivik, K., LARSON, S. L., MANDEL, I., BERRY, C. P. L. *arXiv:1912.04268*
- LISA and the existence of a fast-merging double neutron star formation channel** 2020, *ApJ*, 892L, 9A
ANDREWS, J. J., Breivik, K., PANKOW, C., D'ORAZIO, D. J., SAFARZADEH, M. *arXiv:1910.13436*
- Weighing the darkness: astrometric mass measurement of hidden stellar companions using Gaia** 2019, *ApJ*, 886, 68
ANDREWS, J. J., Breivik, K., CHATTERJEE, S. *arXiv:1909.05606*
- LISA sources in Milky Way globular clusters** 2018, *PRL*, 120, 191103
KREMER, K., CHATTERJEE, S., Breivik, K., RODRIGUEZ, C. L., LARSON, S. L., RASIO, F. A. *arXiv:1802.05661*
- Accreting double white dwarf binaries: implications for LISA** 2017, *ApJ*, 846, 2
KREMER, K., Breivik, K., LARSON, S. L., KALOGERA, V. *arXiv:1707.0110*

>= 4th author: 8

- The effect of mission duration on LISA science objectives** 2022, *GReGr*, 54, 3
AMARO SEOANE, P., ARCA SEDDA, M., BABAK, S., ET AL. (INCL Breivik, K) *arXiv:2107.09665*
- Modeling dense star clusters in the Milky Way and beyond with the Cluster Monte Carlo code** 2022, *ApJS*, 258, 2
RODRIGUEZ, C. L., WEATHERFORD, N. C., COUGHLIN, S. C., ET AL. (INCL. Breivik, K.) *arXiv:2106.02643*

Gravitational-Wave signatures from compact object binaries in the Galactic center 2021, *ApJ*, 917, 2
WANG, H., STEPHAN, A. P., NAOZ, S., HOANG, B., **Breivik, K.** *arXiv:2010.15841*

GPU-accelerated periodic source identification in large-scale surveys: measuring P and \dot{P} 2021, *MNRAS*, 503, 2
KATZ, M. L., COOPER, O. R., COUGHLIN, M. W., **Breivik, K.**, LARSON, S. L. *arXiv:2006.06866*

The missing link in gravitational-wave astronomy: Discoveries waiting in the decihertz range 2020, *CQG*, 37, 21
ARCA SEDDA, M., BERRY, C. P. L., JANI, K., ET AL. (INCL. **Breivik, K.**) *arxiv: 1908.11375*

Stars stripped in binaries – the living gravitational wave sources 2020, *ApJ*, 904, 1
GOTBERG, Y., KOROL, V., LAMBERTS, A., ET AL. (INCL. **Breivik, K.**) *arXiv:2006.07382*

The fate of binaries in the Galactic center: the mundane and the exotic 2019, *ApJ*, 878, 58
STEPHAN, A. P., NAOZ, S., GHEZ, A. M., ET AL. (INCL. **Breivik, K.**) *arXiv:1903.00010*

Post-Newtonian dynamics in dense star clusters: BBHs in the LISA band 2019, *PRD*, 99, 063003
KREMER, K., RODRIGUEZ, C. L., AMARO-SEOANE, P., .ET AL. (INCL. **Breivik, K.**) *arXiv:1802.05661*

White papers: 4 total, 1 co-lead

Populations of black holes in binaries *arxiv: 1904.11842*
MACCARONE, T. J., ET AL. (INCL. **Breivik, K.**)

Gravitational wave survey of Galactic ultra compact binaries *arxiv: 1903.05583*
LITTENBERG, T. B., **Breivik, K.**, ET AL.

Stellar multiplicity: an interdisciplinary nexus *arxiv: 1903.05094*
Breivik, K., PRICE-WHELAN, A. M., ET AL.

Multimessenger science opportunities with mHz gravitational waves *arxiv: 1903.04417*
BAKER, J., ET AL. (INCL. **Breivik, K.**)