Katelyn **Breivik**

Flatiron Institute -- Center for Computational Astrophysics

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Education

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

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

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

Selected Seminars/Colloquia: 19 Total, 4 Scheduled

Apr 2021	**Vanderbilt University** Astro Seminar	*Nashville, TN – virtual*
Mar 2021	**Texas Tech University** Colloquium	*Lubbock, TX – virtual*
Mar 2021	**Carnegie Mellon University/University of Pittsburgh** CMU/Pitt Astro Lunch	*Pittsburgh, PA – virtual*
Feb 2021	**University of Oklahoma** Colloquium	*Norman, OK – virtual*
Dec 2020	**CITA** CITA Seminar	*Toronto, ON – virtual*
Nov 2020	**University of British Columbia** Astronomy Colloquium	*Vancouver, BC – virtual*
Dec 2019	**Rochester Institute of Technology** Astro Colloquium	*Rochester, NY*
Nov 2019	**KICP - University of Chicago** KICP Seminar	*Chicago, IL*
Oct 2019	**Carnegie Observatories** Colloquium	*Pasadena, CA*
Apr 2019	**CfA | Harvard & Smithsonian** Galaxies and Cosmology Seminar	*Cambridge, MA*
Jun 2018	**NASA GSFC** Astrophysics Colloquium	*Greenbelt, MA*
Mar 2018	**NASA MSFC** Astrophysics Seminar	*Huntsville, AL*
Dec 2017	**Caltech** TAPIR Seminar	*Pasadena, CA*

Selected Conferences and Workshops: 6 Invited, 16 Contributed

June 2021	**24th CAPRA Meeting** Invited talk	*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 — *LISA Consortium*

Co-Chair of sub-work package 7.2: — *May 2019 - present*

Demography of stellar mass compact objects and electromagnetic counterparts

Mentoring

Nathalia Torres — *AstroCom NYC; May 2021 - now*

Connecting HMXBs and gravitational wave sources — *Current undergrad @ CUNY BMCC*

Sarah Thiele — *UofT SURP; May 2020 - now*

Predicting metallicity-dependent double white dwarf populations observable by LISA — *Current undergrad @ UBC*

Eesha Das Gupta; co-supervised with Maria Drout — *Graduate research; May 2020 - now*

Effects of red supergiant winds on binary populations — *Current grad @ University of Toronto*

Chirag Chawla; Co-supervised with Sourav Chatterjee — *Graduate research; Feb 2019 - now*

Populations of compact object + luminous companion binaries observable by Gaia — *Current grad @ TIFR Mumbai*

Maryam Esmat — *Senior Thesis; Sep 2020 - June 2021*

Constraining the Galactic electron density with multi-messenger astronomy — *Current grad @ Johns Hopkins*

Julianne Cronin; Co-supervised with Shane Larson — *Undergrad research; 2017-2018*

Populations of over-contact M dwarf binaries observable by LISA — *B.S. from Northwestern 2020*

Amia Ross — *High school intern; Summer 2017*

Populations of double neutron star binaries observable by LISA and LIGO — *Currently attending Harvard*

Michael Bueno; Co-supervised with Shane Larson — *REU student; Summer 2016*

Populations of double white dwarf binaries observable by LISA and Gaia; arXiv:1710.08370 — *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.

Graduate Teaching Assistant — *2012 - 2013*

University of Georgia

- Phys 1252: Introductory Physics for Engineers, Astr 1010: Introductory Astronomy

Undergraduate Teaching Assistant: General Physics and Astronomy Labs — *2010 - 2012*

Utah State University

- Phys 2110/2120: Introductory Physics for Life Sciences, Phys 1040: Introductory Astronomy, Observatory operator

Service, Outreach, and Engagement

Referee for ApJ, ApJL, MNRAS, A&A

dotAstronomy TO — *Toronto, ON*

Science Organizing Committee — *Oct 2019*

UofT Astro-ph coffee — *University of Toronto*

Co-Organizer — *Sep 2018 - Aug 2020*

CITA Blackboard Seminar — *CITA*

Co-Organizer — *Sep 2018 - Aug 2020*

CIERA Astronomer Evenings — *Dearborn Observatory*

Founder and Lead Organizer 2016-2018; current organizer: Eve Chase — *Jan 2016 - Aug 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: 21 refereed/in review, 4 white papers

First author: 6

Constraining Galactic structure with the LISA white dwarf foreground — *2020, ApJ, 901, 4*

Breivik, K., Mingarelli, C. M. F., Larson — *arXiv: 1912.02200*

COSMIC variance in binary population synthesis — *2020, ApJ, 898, 71B*

Breivik, K., Coughlin, S. C., Zevin, M. + 4 co-authors — *arXiv: 1911.00903*

Constraining black hole formation with 2M0521 — *2019, ApJ, 878L, 4*

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, 850L, 13*

Breivik, K., Chatterjee, S., Larson, S. L. — *arXiv:1710.04657*

Distinguishing between formation channels for binary black holes with LISA — *2016, ApJ, 830L, 18*

Breivik, K., Rodriguez, C. L., Larson, S. L., Kalogera, V., Rasio, F. A. — *arXiv: 1606.0955*

2nd/3rd author: 8

Weighing the darkness II: Astrometric Measurement of Partial Orbits with Gaia — *under review in AAS Journals*

Andrews, J. J., **Breivik, K.**, Chatterjee, S.

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 — *under review in PRD*

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 70$M_\odot$ 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: 7

Modeling Dense Star Clusters in the Milky Way and Beyond with the Cluster Monte Carlo Code — *submitted to ApJ*

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 — *submitted to ApJ*

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., 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., Kupfer, T., **Breivik, K.**, Ludwig, B., Drout, M. R. *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. Ma., Morris, M. R., Ciurlo, A., Do, T., **Breivik, K.** + 3 co-authors *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., **Breivik, K.** + 7 co-authors *arXiv:1802.05661*

White papers: 4 total, 1 co-lead

Populations of Black Holes in Binaries

Maccarone, T. J., et al., (incl **Breivik, K.**) *arxiv: 1904.11842*

Gravitational Wave Survey of Galactic Ultra Compact Binaries

Littenberg, T. B., **Breivik, K.**, et al. *arxiv: 1903.05583*

Stellar multiplicity: an interdisciplinary nexus

Breivik, K., Price-Whelan, A. M., D'Orazio, D. J., Hogg, D. W. et al. *arxiv: 1903.05094*

Multimessenger science opportunities with mHz gravitational waves

Baker, J., et al. (incl. **Breivik, K.**) *arxiv: 1903.04417*