

Philippe Landry

Gravitational-Wave Physics & Astronomy Center • 800 N State College Blvd, Fullerton, CA 92831
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CURRENT POSITION

POSTDOCTORAL RESEARCHER • CALIFORNIA STATE UNIVERSITY, FULLERTON Sep 2019 - Present
Postdoctoral research associate at the **Gravitational-Wave Physics & Astronomy Center** and member of the National Science Foundation funded **Cosmic Explorer** science case team

RESEARCH INTERESTS

General relativity • Neutron stars • Gravitational waves • Dense-matter equation of state • Relativistic tides • Post-Newtonian theory • Perturbation theory • Compact object populations

EDUCATION

PHD, PHYSICS

UNIVERSITY OF GUELPH • 2017

Advisor: Eric Poisson

Thesis: Tidal response of a rotating neutron star in general relativity

MSC, PHYSICS

UNIVERSITY OF GUELPH • 2014

Advisor: Eric Poisson

Thesis: Tidal deformations of compact bodies in general relativity

BSC (HONS.), PHYSICS

QUEEN'S UNIVERSITY • 2012

Advisor: Kayll Lake

Thesis: McVittie solution with a negative cosmological constant

RESEARCH EXPERIENCE

POSTDOCTORAL SCHOLAR • UNIVERSITY OF CHICAGO Sep 2017 - Aug 2019
Postdoctoral research scholar at the **Enrico Fermi Institute** and associate fellow at the **Kavli Institute for Cosmological Physics**; worked on projects in gravitational-wave astrophysics

GRADUATE RESEARCH ASSISTANT • UNIVERSITY OF GUELPH Sep 2012 - Aug 2017
Contributed to the development of the theory of relativistic tides in binary neutron star systems, including gravitomagnetic and spin effects

UNDERGRADUATE RESEARCHER • QUEEN'S UNIVERSITY Sep 2011 - Apr 2012
Studied the global structure of an exact solution in general relativity for an undergraduate thesis

UNDERGRADUATE RESEARCHER • ROYAL MILITARY COLLEGE OF CANADA May - Aug 2011
Worked on an observational space science project about derelict satellites for **Defence Research & Development Canada** as part of an NSERC undergraduate student research award

AWARDS & FELLOWSHIPS

NSERC POSTDOCTORAL FELLOWSHIP • NSERC Sep 2017 - Aug 2019
Fellowship awarded by the Natural Sciences & Engineering Research Council of Canada for research potential and academic achievement; held at the University of Chicago

DTP/WITP THESIS PRIZE • CANADIAN ASSOCIATION OF PHYSICISTS Jun 2018
Award for best PhD thesis by a graduate of a Canadian university in the field of theoretical physics

ALEXANDER GRAHAM BELL CANADA GRADUATE SCHOLARSHIP • NSERC May '16 - Aug '17
Scholarship awarded for research potential and academic achievement; held at the University of Guelph

DEAN'S SCHOLARSHIP • UNIVERSITY OF GUELPH Sep 2012 - Aug 2017
Scholarship for academic achievement

HARTLE AWARD • GR21 Jul 2016
Award for best student talk in section of GR21 conference at Columbia University

ONTARIO GRADUATE SCHOLARSHIP • PROVINCE OF ONTARIO May 2015 - Apr 2016
Scholarship for academic achievement held at the University of Guelph

BEST STUDENT TALK • 17TH EASTERN GRAVITY MEETING Jun 2014
Award for best student talk at gravity conference at West Virginia University

UNDERGRADUATE STUDENT RESEARCH AWARD • NSERC May - Aug 2011
Research fellowship held at the Royal Military College of Canada

TEACHING, SERVICE & OUTREACH

CO-EDITOR • HUMANS OF LIGO BLOG Jul 2018 - Present
Conduct interviews and curate posts for public outreach blog profiling individual LIGO scientists

SPACE VISUALIZATION LAB PRESENTER • ADLER PLANETARIUM Jan 2018 - Aug 2019
Regular volunteer science presenter for Astronomy Conversations public outreach program

LECTURER • UNDERGRADUATE PHYSICS READING SEMINAR Oct - Dec 2018
Helped design an interest-based non-credit course on computational methods in gravitational-wave astrophysics for advanced undergraduates; delivered two lectures and devised a final assignment

COMMITTEE MEMBER • GUELPH/PERIMETER INSTITUTE FACULTY SEARCH Jan 2016 - Apr 2017
Student representative on the joint University of Guelph/Perimeter Institute search committee for two faculty positions in theoretical physics

SEMINAR SERIES ORGANIZER • UNIVERSITY OF GUELPH Sep 2014 - Apr 2017
Co-founded, coordinated and secured funding for a series of outreach talks delivered by graduate students and aimed at physics undergraduates; also personally delivered a number of talks

COMMITTEE MEMBER • GWPI COORDINATING COMMITTEE Sep 2014 - Apr 2017
Student representative on the graduate program committee for the Guelph-Waterloo Physics Institute and participant in the 2016 institute director search

TEACHING ASSISTANT • UNIVERSITY OF GUELPH

Sep 2012 - Apr 2017

Served as a teaching assistant for undergraduate courses in introductory physics, mechanics and electromagnetism, leading tutorials, supervising laboratories, grading assignments and exams, and occasionally delivering lectures

POSTER SESSION ORGANIZER • UNIVERSITY OF GUELPH

May - Aug 2013

Organized a poster session for undergraduate summer researchers in the College of Physical and Engineering Sciences

SELECTED TALKS

INVITED

- ¹ Insights on neutron-star matter from gravitational waves, hotspots and massive pulsars. **CaJAGWR Seminar**, Caltech (2020).
- ² Neutron star tides and quasi-universal relations. **Merging Visions**, Kavli Institute for Theoretical Physics (2019).
- ³ New developments in gravitational-wave inference of the neutron star equation of state. **IUCAA Seminar**, Inter-University Center for Astronomy & Astrophysics (2019).
- ⁴ Inferring the neutron star equation of state from gravitational waves: a new, non-parametric approach. **Center for Gravitation, Cosmology & Astrophysics Seminar**, University of Wisconsin - Milwaukee (2018).
- ⁵ Tides in spinning neutron star binaries. **Theory Canada 13**, St Francis Xavier University (2018).
- ⁶ Dynamical tidal response of a rotating neutron star. **Canadian Institute for Theoretical Astrophysics Seminar**, University of Toronto (2016).
- ⁷ Photometry of derelict GEO and GPS satellites for rotation rate characterization. **Physics Department Colloquium**, Royal Military College (2011).

PUBLIC

- ⁸ Tides in the solar system and the universe. **Art of Science Lecture Series**, Agitator Art Gallery, Chicago (2019).
- ⁹ Tides: from the seas to the stars. **Lifelong Learning Lecture Series**, Chicago Cultural Center (2018); Sulzer Regional Library, Chicago (2019).
- ¹⁰ Neutron stars: dense, strange and not too bright. **Astronomy on Tap**, Marz Community Brewing, Chicago (2018).
- ¹¹ Gravitational waves and transient astronomy: a discussion of GW170817. **Public Lecture**, University of Chicago (2017).

CONTRIBUTED

- ¹² Constraints on the neutron-star equation of state with gravitational-wave and pulsar observations. **APS April Meeting**, online (2020).
- ¹³ A nonparametric approach to gravitational-wave inference of the neutron star equation of state. **GR22 + Amaldi13**, University of Valencia (2019).
- ¹⁴ Inferring neutron star properties from GW170817 with universal relations. **28th Midwest Relativity Meeting**, University of Wisconsin - Milwaukee (2018); **APS April Meeting**, Denver CO (2019).
- ¹⁵ Rotational-tidal phasing of the binary neutron star waveform. **18th Atlantic General Relativity Meeting**, St Francis Xavier University (2018).
- ¹⁶ Extended I-Love relations for slowly rotating neutron stars. **27th Midwest Relativity Meeting**, University of Michigan (2017); **APS April Meeting**, Columbus OH (2018).
- ¹⁷ Dynamical tidal response of a rotating neutron star. **GR21**, Columbia University; **26th Midwest Relativity Meeting**, Perimeter Institute (2016); **APS April Meeting**, Washington DC (2017).
- ¹⁸ Tidal deformation of a slowly rotating compact body. **International Conference on Black Holes**, University of Toronto; **General Relativity & Gravitation: A Centennial Perspective**, Penn State; **25th Midwest Relativity Meeting**, Northwestern University (2015).
- ¹⁹ Tidal deformation of an irrotational fluid body. **18th Eastern Gravity Meeting**, Rochester Institute of Technology; **Fields Institute Focus Program on General Relativity**, University of Toronto (2015).
- ²⁰ Relativistic theory of surficial Love numbers. **17th Eastern Gravity Meeting**, West Virginia University; **24th Midwest Relativity Meeting**, Oakland University (2014).
- ²¹ Tides in higher-dimensional Newtonian gravity. **16th Eastern Gravity Meeting**, University of Toronto; **23rd Midwest Relativity Meeting**, University of Wisconsin - Milwaukee (2013).

PUBLICATIONS

PEER-REVIEWED

- ¹ **P. Landry**, R. Essick & K. Chatziioannou, Nonparametric constraints on neutron star matter with existing and upcoming gravitational wave and pulsar observations, **Phys. Rev. D** **101**, 123007 (2020), [arXiv:2003.04880](#).
- ² R. Essick, **P. Landry** & D. Holz, Nonparametric inference of neutron star composition, equation of state, and maximum mass with GW170817, **Phys. Rev. D** **101**, 063007 (2020), [arXiv:1910.09740](#).
- ³ B. P. Abbott *et al.* [incl. **P. Landry**] (LIGO Scientific Collaboration and Virgo Collaboration), GW190425: Observation of a Compact Binary Coalescence with Total Mass $\sim 3.4 M_{\odot}$, **Astrophys. J. Lett.** **892**, L3 (2020), [arXiv:2001.01761](#).
- ⁴ B. P. Abbott *et al.* [incl. **P. Landry**] (LIGO Scientific Collaboration and Virgo Collaboration), Model comparison from LIGO-Virgo data on GW170817's binary components and consequences for the merger remnant, **Class. Quantum Grav.** **37**, 045006 (2020), [arXiv:1908.01012](#).
- ⁵ B. Kumar & **P. Landry**, Inferring neutron star properties from GW170817 with universal relations, **Phys. Rev. D** **99**, 123026 (2019), [arXiv:1902.04557](#).

- ⁶ **P. Landry** & R. Essick, Non-parametric inference of the neutron star equation of state from gravitational wave observations, **Phys. Rev. D** **99**, 084049 (2019), [arXiv:1811.12529](#).
- ⁷ M. Lagos, M. Fishbach, **P. Landry** & D. Holz, Standard sirens with a running Planck mass, **Phys. Rev. D** **99**, 083504 (2019), [arXiv:1901.03321](#).
- ⁸ B. P. Abbott *et al.* [incl. **P. Landry**] (LIGO Scientific Collaboration and Virgo Collaboration), Properties of the binary neutron star merger GW170817, **Phys. Rev. X** **9**, 011001 (2019), [arXiv:1805.11579](#).
- ⁹ **P. Landry** & B. Kumar, Constraints on the moment of inertia of PSR J0737-3039A from GW170817, **Astrophys. J. Lett.** **868**, L22 (2018), [arXiv:1807.04727](#).
- ¹⁰ B. P. Abbott *et al.* [incl. **P. Landry**] (LIGO Scientific Collaboration and Virgo Collaboration), GW170817: Measurements of Neutron Star Radii and Equation of State, **Phys. Rev. Lett.** **121**, 161101 (2018), [arXiv:1805.11581](#).
- ¹¹ J. Gagnon-Bischoff, S. Green, **P. Landry** & N. Ortiz, Extended I-Love relations for slowly rotating neutron stars, **Phys. Rev. D** **97**, 064042 (2018), [arXiv:1711.05694](#).
- ¹² **P. Landry**, Tidal deformation of a slowly rotating material body: Interior metric and Love numbers, **Phys. Rev. D** **95**, 124058 (2017), [arXiv:1703.08168](#).
- ¹³ **P. Landry** & E. Poisson, Dynamical response to a stationary tidal field, **Phys. Rev. D** **92**, 124041 (2015), [arXiv:1510.09170](#).
- ¹⁴ **P. Landry** & E. Poisson, Gravitomagnetic response of an irrotational body to an applied tidal field, **Phys. Rev. D** **91**, 104026 (2015), [arXiv:1504.06606](#).
- ¹⁵ **P. Landry** & E. Poisson, Tidal deformation of a slowly rotating material body: External metric, **Phys. Rev. D** **91**, 104018 (2015), [arXiv:1503.07366](#).
- ¹⁶ **P. Landry** & E. Poisson, Relativistic theory of surficial Love numbers, **Phys. Rev. D** **89**, 124011 (2014), [arXiv:1404.6798](#).
- ¹⁷ **P. Landry**, M. Abdelqader & K. Lake, McVittie solution with a negative cosmological constant, **Phys. Rev. D** **86**, 084002 (2012), [arXiv:1207.6350](#).

PREPRINTS

- ¹⁸ R. Essick, I. Tews, **P. Landry**, S. Reddy & D. Holz, Direct astrophysical tests of chiral effective field theory at supranuclear densities, [arXiv:2004.07744](#) (2020).
- ¹⁹ **P. Landry**, Rotational-tidal phasing of the binary neutron star waveform, [arXiv:1805.01882](#) (2018).