

# Peter B. Rau

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## Education

June 2014- August 2021	Doctor of Philosophy (Physics) Master of Science (Physics) <i>Cornell University, Ithaca, NY USA</i> Advisor: Ira Wasserman Thesis: Neutron Star Oscillations, Magnetic Fields, and Superfluidity
September 2010- April 2014	Bachelor of Science (Physics, Honors) <i>Queen's University at Kingston, Kingston, ON Canada</i>

## Research Experience

September 2021- present	Postdoctoral Scholar <i>Institute for Nuclear Theory, University of Washington, Seattle, WA USA</i>
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## Publications

**Peter B. Rau** and Armen Sedrakian. Two first-order phase transitions in hybrid compact stars: Higher-order multiplet stars, reaction modes, and intermediate conversion speeds. *Physical Review D* **107**, 103042 (2023).

**Peter B. Rau** and Ira Wasserman. Magnetohydrodynamic stability of magnetars in the ultrastrong field regime II: the crust. *Monthly Notices of the Royal Astronomical Society* **520**, 1173 (2023).

**Peter B. Rau** and Armen Sedrakian. Unstable modes of hypermassive compact stars driven by viscosity and gravitational radiation. *Monthly Notices of the Royal Astronomical Society* **509**, 1854 (2021).

**Peter B. Rau** and Ira Wasserman. Magnetohydrodynamic stability of magnetars in the ultrastrong field regime I: the core. *Monthly Notices of the Royal Astronomical Society* **506**, 4632 (2021).

**Peter B. Rau** and Armen Sedrakian. Oscillations of hypermassive compact stars with gravitational radiation and viscosity. *The Astrophysical Journal Letters* **902**, L41 (2020).

**Peter B. Rau** and Ira Wasserman. Relativistic finite temperature multifluid hydrodynamics in a neutron star core from a variational principle. *Physical Review D* **102**, 063011 (2020).

**Peter B. Rau** and Ira Wasserman. Compressional modes in two-superfluid neutron stars with leptonic buoyancy. *Monthly Notices of the Royal Astronomical Society* **481**, 4427 (2018).

## Preprints

**Peter B. Rau** and Gabriela G. Salaben. Non-equilibrium effects on stability of hybrid stars with first-order phase transitions. arXiv: 2309.08540.

## Conference and Invited Talks

“Numerical simulations of Hall magnetohydrodynamics in neutron star crusts with Landau-quantized electrons”. Minneapolis, Minnesota, APS April Meeting 2023, 18 April 2023.

“Magnetohydrodynamic stability and evolution of magnetars”. Theoretical Physics Colloquium, Arizona State University (Remote), 29 March 2023.

“Oscillations and stability of hybrid stars with first order phase transitions”. Banff, Alberta, CSQCD IX, 4 August 2022.

“Hall MHD in magnetar crusts with Landau-quantized electrons”. Pasadena, California, AAS 240, 15 June 2022.

“Landau quantization in magnetar crusts: heating and domain formation”. Seattle, Washington, JINA-INT Workshop on neutron star cooling, 18 February 2022.

“Magnetohydrodynamic Stability of Magnetar Cores and Crusts”. S@INT Seminar, Institute for Nuclear Theory (Remote), 15 July 2021.

“Magnetohydrodynamic stability of magnetars with ultra-strong fields”. APS April Meeting (Remote), 20 April 2021.

“Relativistic multifluid hydrodynamics for finite temperature neutron star cores from a variational principle”. APS April Meeting (Remote), 18 April 2020.

“Normal modes of two superfluid neutron stars with leptonic buoyancy”. New York, New York, CSQCD VII, 15 June 2018.

## Other Research Experience

May-August 2012,	<i>Department of Physics, Engineering Physics and</i>
May-September 2013,	<i>Astronomy, Queen’s University at Kingston</i>
May-August 2014	Summer research with DEAP-3600 experiment holding NSERC Undergraduate Student Research Awards

## Honors and Awards

January 2020	Boochever Fellowship in Theoretical Physics for Spring 2020 Semester, Cornell University
August 2017	Boochever Fellowship in Theoretical Physics for Fall 2017 Semester, Cornell University
June 2014	Medal in Physics, Queen’s University Prince of Wales Prize Honourable Mention, Queen’s University
November 2013	Dean's Special Award, Queen's University
September 2013	Susan Near Prize in Physics, Queen's University
September 2012	Cave Scholarship in Experimental Physics, Queen’s University Novelis Scholarship, Queen’s University
April 2012, April 2013, April 2014	Undergraduate Student Research Awards, Natural Sciences and Engineering Research Council of Canada (NSERC)
September 2010	W.W. King Scholarship, Queen’s University Principal’s Scholarship, Queen’s University

## Teaching and Mentorship

June- August 2022, June-August 2023	<i>Louis Stokes Alliance for Minority Participation in STEM</i>
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August 2014-  
May 2021

Mentored an undergraduate from an unrepresented background, guiding them through a research project of my own development. Participated in candidate selection/interview process, mentoring workshops.

*Teaching assistant, Department of Physics, Cornell University*

Physics 2207 (Introductory mechanics for non-physics majors, one semester, 2014)

Physics 2208 (Introductory electromagnetism for non-physics majors, two semesters, 2015 and 2018)

Physics 2213 (Introductory electromagnetism for engineers, two semesters, 2015-16)

Physics 2214 (Waves and quantum mechanics for engineers, one semester, 2018)

Physics 2217 (Introductory electromagnetism for physics majors, two semesters, 2019)

Physics 2218 (Waves and thermal physics for physics majors, two semesters, 2020-21)

## **Institutional Service**

February 2022-  
present

Member of the organizing group for the S@INT seminar series at the INT

## **Skills**

Programming: C/C++, Python, Mathematica