

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> Thesis Advisor: Tucker Carrington, Jr. Thesis: Theoretical/computational study of the vibration and rotation of the van der Waals complexes C_2H_2-Kr and C_2H_2-Xe

Research Experience

September 2021- present	Postdoctoral Scholar <i>Institute for Nuclear Theory, University of Washington, Seattle, WA USA</i>
July 2019	Visiting Researcher <i>Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany</i>
May-August 2012, May-September 2013, May-August 2014	<i>Department of Physics, Engineering Physics and Astronomy, Queen's University at Kingston</i> Summer research with DEAP-3600 experiment holding NSERC Undergraduate Student Research Awards

Publications

Peter B. Rau and Gabriela G. Salaben. Non-equilibrium effects on stability of hybrid stars with first-order phase transitions. *Physical Review D* (in press).

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

Agnieszka Sorensen, Kshitij Agarwal, Kyle W. Brown et al. Dense nuclear matter equation of state from heavy-ion collisions. arXiv: 2301.13253.

Invited Talks

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

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

Conference Talks

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

Honors and Awards

January 2020,	Boochever Fellowship in Theoretical Physics for Spring 2020 and
August 2017	Fall 2017 Semesters, 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	Undergraduate Student Research Awards, Natural Sciences and
2013, April 2014	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>Mentor, Louis Stokes Alliance for Minority Participation in STEM, University of Washington</i> 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.
August 2014- May 2021	<i>Teaching assistant, Department of Physics, Cornell University</i> 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
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Skills

Programming: C/C++, Python, Mathematica