

# Andrew C. Loheac

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*E-mail:* loheac@live.unc.edu

- EDUCATION**
- University of North Carolina at Chapel Hill** 2014 - present  
Doctor of Philosophy in Physics Chapel Hill, NC  
*Research Advisor:* Dr. Joaquín Drut
- Rochester Institute of Technology** 2010 - 2014  
Bachelor of Science in Physics, *summa cum laude* (GPA: 4.00) Rochester, NY  
Minor in Computer Science  
*Senior Thesis:* Investigation of O<sub>2</sub> Interactions with the Au(001) Single Crystal Facet
- RESEARCH EXPERIENCE**
- Graduate Research Assistant* July 2014 - present  
Dept. of Physics and Astronomy, University of North Carolina, Chapel Hill, NC  
*Advisor:* Dr. Joaquín Drut
- Currently studying thermodynamics of polarized and unpolarized one- and three-dimensional Fermi gases in weakly to strongly coupled regimes across large temperature scales using a variety of analytic and numerical techniques.
  - Developing new high-order perturbative expansion techniques for studying the properties of interacting quantum matter.
  - Leading development of *Scimitar*, an application developed in Python which is designed for the management and submission of large numerical simulation jobs that explore vast parameter spaces.
- Undergraduate Researcher* April 2013 - June 2014  
X-Ray and Surface Science Laboratory  
School of Physics and Astronomy, Rochester Institute of Technology, Rochester, NY  
*Advisor:* Dr. Michael S. Pierce
- Studied CO and O<sub>2</sub> interactions and surface reconstructions on the Au(001) single crystal facet using X-ray diffraction techniques.
  - Conducted experiments at the Advanced Photon Source at Argonne National Laboratory in November 2013 (worked at beamline 33-BM characterizing the Au(001) surface reconstruction) and June 2014 (worked at beamline 8-ID applying X-ray photon correlation spectroscopy methods).
- Computational Astronomy and Physics REU Program* May 2013 - August 2013  
Dept. of Physics and Astronomy, University of North Carolina, Chapel Hill, NC  
*Advisors:* Dr. Joaquín E. Drut, Dr. Eric R. Anderson
- Studied the high temperature thermodynamics of one-dimensional systems of strongly coupled fermions through the calculation of a high-order virial expansion using a quantum Monte Carlo method.
- Undergraduate Researcher* January 2011 - January 2013  
Laboratory for Complex Systems and Granular Materials  
School of Physics and Astronomy, Rochester Institute of Technology, Rochester, NY  
*Advisor:* Dr. Scott V. Franklin

- Developed parallelized molecular dynamics simulations for modeling the rheology of geometrically cohesive granular materials using spherocylinder-based geometries under Nvidia’s CUDA C++ platform.

## PUBLICATIONS

1. M. D. Hoffman, P. D. Javernick, [A. C. Loheac](#), W. J. Porter, E. R. Anderson, and J. E. Drut. *Universality in one-dimensional fermions at finite temperature: Density, pressure, compressibility, and contact*. Physical Review A **91**, 033618 (2015).
2. L. Rammelmüller, W. J. Porter, [A. C. Loheac](#), and J. E. Drut. *Few-fermion systems in one dimension: Ground- and excited-state energies and contacts*. Physical Review A **92**, 013631 (2015).
3. [Andrew C. Loheac](#), Jens Braun, Joaquín E. Drut, and Dietrich Roscher. *Thermal equation of state of polarized fermions in one dimension via complex chemical potentials*. Physical Review A **92**, 063609 (2015).
4. [Andrew Loheac](#), Andi Barbour, Vladimir Komanicky, Chenhui Zhu, John Collini, Anthony Ruffino, Yihua Liu, Hoydoo You, and Michael S. Pierce. *Interaction of Molecular Oxygen with Hexagonally Reconstructed Au (001) Surface*. The Journal of Physical Chemistry C **120** (40), 23001 (2016).
5. M. D. Hoffman, [A. C. Loheac](#), W. J. Porter, and J. E. Drut. *Thermodynamics of one-dimensional  $SU(4)$  and  $SU(6)$  fermions with attractive interactions*. Phys. Rev. A **95**, 033602 (2016).
6. [Andrew C. Loheac](#) and Joaquín E. Drut. *Third-order perturbative lattice and complex Langevin analyses of the finite-temperature equation of state of nonrelativistic fermions in one dimension*. Phys. Rev. D **95**, 094502 (2017).

## PRESENTATIONS AND POSTERS

1. RIT 2011 Summer Undergraduate Research Symposium, “Geometry vs. motility: flocking in self-propelled triangular organisms”. August 12, 2011.
2. RIT 2012 Summer Undergraduate Research Symposium, “High performance simulation of sheared staple rheology using CUDA C++”. August 10, 2012.
3. Theodore Marschall, Andrew Loheac, Scott Franklin, Stephen Teitel, March 2013 American Physical Society Meeting. “Compression and Shear Driven Jamming of Frictionless U-Shaped Particles in Two Dimensions”. March 21, 2013.
4. Joint Poster Session of the NCSU and UNC Computational Astronomy and Physics REU Programs, “Thermodynamics of Strongly Coupled Matter”. June 28, 2013.
5. North Carolina Museum of Natural Sciences Public Outreach Presentation, “Fermions: A Different Kind of Matter”. July 6, 2013.
6. Computational Astronomy and Physics REU Program Presentations, “Thermodynamics of Strongly Coupled Matter”. July 31, 2013.
7. RIT School of Physics and Astronomy Colloquium Series, “Thermodynamics of Strongly Coupled Matter”. September 17, 2013.
8. 8th Undergraduate Research Day and Open House, Syracuse University, “Thermodynamics of Strongly Coupled Matter”. November 9, 2013.
9. Andrew Loheac, Michael S. Pierce, Andi Barbour, Vladimir Komanicky, Chenhui Zhu, Hoydoo You. March 2014 American Physical Society Meeting, “The Physical Character of the Au (001) Surface Reconstruction in the Presence of CO and O<sub>2</sub>”. March 5, 2014.

10. RIT School of Physics and Astronomy Capstone Presentations, “Investigation of O<sub>2</sub> Interactions with the Au (001) Single Crystal Facet”. May 13, 2014.
11. The 35th International Symposium on Lattice Field Theory, “Equation of state of non-relativistic matter from automated perturbation theory and complex Langevin”. June 22, 2017.

**COMPUTER SKILLS**

*Programming Languages:* C/C++, Python, Mathematica, LaTeX, MATLAB, Java, PHP, HTML, CSS.

*Libraries and Frameworks:* SciPy, NumPy, GNU Scientific Library, Boost, wxPython, CUDA, OpenMP, OpenACC, MPI.

*Software:* JetBrains CLion, JetBrains PyCharm, Adobe Photoshop, gnuplot, LabVIEW, Eclipse, PBS, gdb, Valgrind, Visual Studio.

**CREDENTIALS AND HONORS**

- NSF 2014 Graduate Research Fellowship (*\$44,000/yr*) Jun 2014 - present
- RIT School of Physics and Astronomy Research Scholar May 2014
- RIT Outstanding Undergraduate Scholar Award Dec 2013
- Member of the American Physical Society Dec 2013 - present
- RIT Physics Faculty and Alumni Endowed Scholarship (*\$1,500*) May 2013
- Nominated for the 2013 Barry M. Goldwater Scholarship Dec 2012
- Elected to Sigma Pi Sigma (National Physics Honors Society) May 2011
- RIT Presidential Scholarship (*\$13,000/yr*) Sep 2010 - May 2014
- New York State Board of Regents Scholarship for Academic Excellence (*\$1,500/yr*) Sep 2010 - May 2014
- RIT Honors Program (*\$1,000/yr*) Sep 2010 - May 2014
- RIT College of Science Dean’s List Fall 2010 - Spring 2014
- CompTIA A+ IT Technician Certification Sep 2008