

Yaqi Hou

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EDUCATION

08/2016 - 05/2022 PhD Candidate in Physics (GPA: 4.0) **Univ. of North Carolina - Chapel Hill**, NC, USA
08/2013 - 07/2014 International Visiting Student in Physics **Duke University**, Durham, NC, USA
09/2011 - 06/2015 B.S. in Physics (GPA: 3.71) **Taishan College, Shandong University**, Jinan, P.R. China

RESEARCH EXPERIENCE

Automated-algebra method for virial coefficient calculation Aug 2019 - Present

- Developed a new and scalable method in Python and Cython to calculate virial coefficient of interacting quantum system, deployed in a large cluster Open Science Grid (OSG)
- Achieved unprecedented accuracy for fourth and fifth order coefficients; Estimated even higher order coefficients for the first time

Energy of Bosonic Droplets from Quantum Noise Jul 2018 - May 2019

- Extracted ground-state energy of N-body boson droplets from quantum noise using the cumulant expansion.

Thermodynamics of Quantum Matter at Finite Temperature May 2017 - Dec 2018

- Applied and improved hybrid Quantum Monte Carlo (hQMC) method implemented in Fortran.
- Extracted ground-state energy of N-body boson droplets from quantum noise using the cumulant expansion.

Numerical Simulation of Acoustic Field Mar 2015 - Jun 2015

- Simulated acoustic field propagation, implemented in C, using Finite Difference Time Domain (FDTD) method and spectrum method; VTK used for visualization.

Flow of Granular Material in 2D Hopper Sep 2013 - May 2014

- Analyzed image data in MatLab to detect, track and analysis granular particles flowing in a 2D hopper.
 - Conducted small-scale Discrete Element Method (DEM) simulation, implemented in python (side project).
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OTHER EXPERIENCE

COVID-19 Event Extraction from Twitter Challenge Jun 2020 - Sep 2020

- W-NUT 2020 Shared task 3: extracted text spans from a given tweet for filling pre-designed slots based on pretrained language model BERT.

Ebay Machine Learning Challenge Aug 2020 - Feb 2021

- To categorize listing products into the same group according to attributes texts and product images with unsupervised model

Quantum Matter Map Jun 2020 - Ongoing

- Extracted and categorized physics concept from unstructured texts such as literature abstracts with Natural Language Processing (NLP)
 - To predict missing link and relations among literatures and concepts in analogue to knowledge graph
 - To host public website offering user-friendly interface to access results and accept user input to support a background online machine learning model
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TECHNICAL SKILLS

Programming Language: **Python**, Fortran, MatLab, C, Lua, Emacs-Lisp

Frameworks and Libraries: Numpy, pyTorch, Matplotlib, Scipy, Cython, PyQt, pandas, sqlite, OpenMP, MPI

Support Skills: **Linux**, **Emacs**, **Git**, **L^AT_EX**, HTcondor

ACADEMIC POSITION

Graduate Research Assistant May, 2018 - Present

- Numerically and analytically investigated thermodynamics of Fermionic and Bosonic systems at finite temperature.
- Improved conventional Quantum Monte Carlo method to larger-scale system.
- Developed a brand new method to calculate high order virial coefficients.

Graduate Teaching Assistant Jun, 2016 - May, 2019

- PHYS 114 - General Physics for non-physics major, led workshop as *Teaching Assistant* (Fall 2016, Summer 2017)
- PHYS 118 - General Physics for physics major, led workshop as *Teaching Assistant* (Spring 2017 - Spring 2018)

- PHYS 331 - Introductory numerical techniques in physics, led lab session as *Teaching Assistant* (Fall 2018)
- PhD qualification exam recitation - statistical physics, led recitation session as *Instructor* (Spring 2019)

SELECTED PUBLICATIONS

4. *Fourth- and Fifth-Order Virial Coefficients from Weak Coupling to Unitarity*
Y. Hou and J. E. Drut, Phys. Rev. Lett. **125**, 050403
3. *Virial coefficients of trapped and un-trapped three-component fermions with three-body forces in arbitrary spatial dimensions*
A. J. Czejdo, J. E. Drut, **Y. Hou**, J. R. McKenney, K. J. Morrell, Phys. Rev. A **101**, 063630
2. *Virial expansion of attractively interacting Fermi gases in one, two, and three dimensions, up to fifth order*
Y. Hou, J. E. Drut, Physical Review A **102**, 033319
1. *Leading-and next-to-leading-order semiclassical approximation to the first seven virial coefficients of spin-1/2 fermions across spatial dimensions*
Y. Hou, A. J. Czejdo, J. DeChant, C. R. Shill, J. E. Drut, Physical Review A **100**, 063627