Yaqi Hou

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Education

08/2016 - 05/2021 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

Academic position

Graduate Research Assistant **May, 2018 - Present**

- Numerically and analytically investigated thermaldynamics 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 physcis, led lab session as *Teaching Assistant* (Fall 2018)
- PhD qualification exam recitation - statistical physics, led recitation session as *Instructor* (Spring 2019)

Research experience

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

- Developed a new method to calculate virial coefficient of interacting quantum system, implemented in Python with multiprocessing parallel and cython optimization; The new method is able to explore high order coefficients which are inaccessible to conventional method.

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.

Thermaldynamics of Quantum Matter at Finite Temperature **May, 2017 - Dec, 2018**

- Applied and improved hybrid Quantum Monte Carlo (hQMC) method implemented in Fortran.
- Calculated equation of state for interacting Fermionic systems.
- 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 propagration, 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).

Technical Skills

(**proficient**/intermediate/basic)

Programming Language: **Python**, **Fortran**, MatLab, C, Lua, E-Lisp
Frameworks and Libraries: **Scipy**, **Numpy**, Matplotlib, Cython, pyTorch, pyQt, sqlite, ACML, OpenMP, MPI
Support Skills: Linux, Emacs, Git, LaTeX

Publications

3. *Semiclassical approximation to virial coefficients beyond the leading order.*
Hou, Y., & Drut, J. E. arXiv preprint arXiv:1908.00174 (2019).

2. *Leading-and next-to-leading-order semiclassical approximation to the first seven virial coefficients of spin-1/2 fermions across spatial dimensions.*
Hou, Y., Czejdo, A. J., DeChant, J., Shill, C. R., & Drut, J. E. Physical Review A, 100, 063627 (2019).

1. *Thermal conductivity and thermoelectric performance of $Sr_xBa_{1-x}Nb_2O_6$ ceramics at high temperatures.*
Li, Y., Liu, J., **Hou, Y.**, Zhang, Y., Zhou, Y., Su, W., Zhu, Y., Li, J. & Wang, C. Scripta Materialia, 109, 80-83 (2015).