Reuben R. W. Wang, Ph.D. Candidate

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Education

2019 – current — **Ph.D., JILA, University of Colorado Boulder** Physics.
Advisor: *Prof. John L. Bohn.*
Research: *Heat death of an ultracold dipolar gas.*

2019 – 2022 — **M.S., University of Colorado Boulder** Physics.

2017 – 2018 — **U.G., Massachusetts Institute of Technology** Physics.

2015 – 2019 — **B.Eng. (Summa Cum Laude), Singapore University of Technology and Design** EPD.

Research Experience

2019 – current — **Graduate Research Assistant,** JILA.
Theoretical research in atomic and molecular physics with advisor Prof. John Bohn, with a focus on collective dynamics in nondegenerate dipolar gases and ultracold collisions. See publication list below.

2017 – 2018 — **Undergraduate Research Assistant,** MIT.
Theoretical research in X-Ray Scattering under the supervision of Prof. Riccardo Comin to perform numerical simulations for spectroscopy of quantum materials.

2017 — **Undergraduate Research Assistant,** SUTD-MIT IDC.
Theoretical research in quantum many-body open systems supervised by Prof. Dario Poletti. Wrote proprietary numerical solvers in C++ to simulate a dissipative, periodically driven Bose-Hubbard dimer system which showcased clear signatures of period doubling [10].

2015 – 2016 — **Undergraduate Research Assistant,** SUTD.
Experimental research under Prof. Cheah Chin Wei to synthesize ferroelectric $KNbO_3$ and CNT/graphene electrospun nanofibers for studies on photocatalytic dye degradation.

Teaching Experience

2022 — **Graduate Teaching Assistant, *Classical Mechanics 2* (*PHYS3210*),** CU Boulder.
Held weekly office hours for undergraduate students.

2018 — **Instructor, *The Quantum World* (*mini course*),** SUTD.
Devised and conducted a 4 day workshop to teach introductory concepts on quantum mechanics and quantum computation, targeted at engineering students with no prior knowledge of quantum theory. All workshop materials are openly available on my personal website.

2017 — **Teaching Assistant, *Engineering in the Physical World* (*10.008*),** SUTD.
Undergraduate teaching assistant, facilitating in-class learning and engagement amongst students during weekly recitation sessions. Held office hours for students.

2016/2018 — **Teaching Assistant, *Advanced Mathematics 2* (*10.004*),** SUTD.
Undergraduate teaching assistant, facilitating in-class learning and engagement amongst students during weekly recitation sessions. Held office hours for students.

Technical Experience

2019 — **Robotics Engineer (Optimization Algorithms),** Bifrost (Singapore).
Designed optimization algorithms for path finding and optimal pose determination in an automated robotic pick-and-place system for pallet sorting, a proof of principle system for proprietary synthetic data based AI technologies at *Bifrost Pte. Ltd.*.

Technical Experience (continued)

2017 **Electrical Engineer (Lights & Hardware),** Praxis+.
Designed, rigged-up and wired in access of 6000 LED lights to programmable circuit boards with high voltage power supplies for *Phosphene*, an arts and technology installation displayed at the *Singapore Night Festival 2017*.

2016 **Mechanical Engineer (Drivetrain Design & Fabrication),** MIT.
Designed a drivetrain system for a manned electric powered boat using the 3D modelling software *SOLIDWORKS*. Fabricated the drivetrain which was used to propel a boat of proprietary design on the Charles river (Massachusetts).

Talks

2023 **ITAMP Luncheon Seminar (Cambridge, MA)**, ITAMP.
"*Thermalization in nondegenerate gases from quantum dipolar collisions*".

AMO-QIS Invited Seminar (New York, NY), Columbia University.
"*Thermalization in nondegenerate gases from quantum dipolar collisions*".

DAMOP (Spokane, WA), APS.
Conference talk titled "*Viscous damping of trapped hydrodynamic Fermi gases*".

2022 **CU-Prime (Boulder, CO),** CU Boulder.
Science communication talk catered to undergraduate students, entitled "*Tinkering with Bell Pairs: the 2022 Physics Nobel Prize*". The CU-Prime series is focused on communicating current research topics in STEM in a jargon-free way to undergraduate students at CU Boulder.

DAMOP (Orlando, FL), APS.
Conference talk titled "*Anisotropic Thermal Conduction in Ultracold Dipolar Gases*"

March Meeting (Chicago, IL), APS.
Conference talk titled "*Anisotropic sound propagation in dilute dipolar gases*".

2019 **Current Issues in Game Theory & Social Dynamics,** SUTD.
Invited speaker to give a talk entitled "*quantum information processing for decision modelling and games*" to researchers in the field of game theory and social dynamics. Organized by professor Zsombor Méder.

Awards and Achievements

Scholarships

2019 **Graduate Student Fellowship**, UCB.
2016 **Global Leadership Program Scholarship**, SUTD-MIT.
2015 **Undergraduate Merit Scholarship**, SUTD.

Awards

2019 **Honors List (Senior Year)**, SUTD.
2018 **Laurel (Technology and Design) Award**, SUTD.
2017 **Honors List (Sophomore & Junior Years)**, SUTD.
2016 **Honors List (Freshman Year)**, SUTD.

Skills

Mentorship — Mentoring and team leadership: trained by the **Center for the Improvement of Mentored Experiences in Research** (CIMER).
Software — MATLAB, Mathematica, Python, C++, LaTeX, SOLIDWORKS.
Experience — Academic research and writing, mechanical design and fabrication.
Languages — Reading, writing and speaking competencies for English and Mandarin Chinese.

Research Publications

Journal Articles

1. Wang, R. R. W., & Bohn, J. L. (2023a). Viscous dynamics of a quenched trapped dipolar fermi gas. *Phys. Rev. A*, *108*, 013322. doi:10.1103/PhysRevA.108.013322
2. Li, H., Halperin, E., Wang, R. R. W., & Bohn, J. L. (2023). Out-of-time-order correlator for the van der waals potential. *Phys. Rev. A*, *107*, 032818. doi:10.1103/PhysRevA.107.032818
3. Wang, R. R. W., & Bohn, J. L. (2023b). Anisotropic acoustics in dipolar fermi gases. *Phys. Rev. A*, *107*, 033321. doi:10.1103/PhysRevA.107.033321
4. Wang, R. R. W., & Bohn, J. L. (2022a). Thermoviscous hydrodynamics in nondegenerate dipolar bose gases. *Phys. Rev. A*, *106*, 053307. doi:10.1103/PhysRevA.106.053307
5. Wang, R. R. W., & Bohn, J. L. (2022b). Thermal conductivity of an ultracold paramagnetic bose gas. *Phys. Rev. A*, *106*, 023319. doi:10.1103/PhysRevA.106.023319
6. Patscheider, A., Chomaz, L., Natale, G., Petter, D., Mark, M. J., Baier, S., … Ferlaino, F. (2022). Determination of the scattering length of erbium atoms. *Phys. Rev. A*, *105*, 063307. doi:10.1103/PhysRevA.105.063307
7. Li, J.-R., Tobias, W. G., Matsuda, K., Miller, C., Valtolina, G., De Marco, L., … Bohn, J. L. et al. (2021). Tuning of dipolar interactions and evaporative cooling in a three-dimensional molecular quantum gas. *Nature Physics*, *17*(10), 1144–1148. Retrieved from https://doi.org/10.1038/s41567-021-01329-6
8. Wang, R. R. W., & Bohn, J. L. (2021). Anisotropic thermalization of dilute dipolar gases. *Phys. Rev. A*, *103*, 063320. doi:10.1103/PhysRevA.103.063320
9. Wang, R. R. W., Sykes, A. G., & Bohn, J. L. (2020). Linear response of a periodically driven thermal dipolar gas. *Phys. Rev. A*, *102*, 033336. doi:10.1103/PhysRevA.102.033336
10. Wang, R. R. W., Xing, B., Carlo, G. G., & Poletti, D. (2018). Period doubling in period-one steady states. *Phys. Rev. E*, *97*, 020202. doi:10.1103/PhysRevE.97.020202

Preprints

1. Bohn, J. L., & Wang, R. R. W. (2023). Probability distributions of atomic scattering lengths. arXiv: 2309.15236 [physics.atom-ph]. Retrieved from https://arxiv.org/abs/2309.15236
2. Polloreno, A. M., Wang, R. R. W., & Tezak, N. A. (2023). A note on noisy reservoir computation. arXiv: 2302.10862 [cs.LG]. Retrieved from https://arxiv.org/abs/2302.10862
3. Wang, R. R. W., & Bohn, J. L. (2023c). Prospects for thermalization of microwave-shielded ultracold molecules. arXiv: 2310.17812 [cond-mat.quant-gas]. Retrieved from https://arxiv.org/abs/2310.17812

References

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