

# Reuben R. W. Wang, PhD Candidate

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## Education

- 2019 – current     **Ph.D., JILA, University of Colorado Boulder** Physics.  
Advisor: *Prof. John L. Bohn*.  
Research: *Collective dynamics of nondegenerate dipolar gases*.
- 2019 – 2022     **M.S., University of Colorado Boulder** Physics.  
GPA: 4.0/4.0
- 2017 – 2018     **U.G., Massachusetts Institute of Technology** Physics.  
GPA: 4.9/5.0
- 2015 – 2019     **B.Eng., Singapore University of Technology and Design** EPD.  
Grade: *Summa Cum Laude*.




## Research Experience

- 2019 – current     **Graduate Research Assistant, JILA**.  
Theoretical research in atomic and molecular physics under the supervision of professor John Bohn, focusing on collective dynamics in nondegenerate dipolar gases and ultracold molecule-molecule interactions.
- 2017 – 2018     **Undergraduate Research Assistant, MIT**.  
Theoretical research in X-Ray Scattering under the supervision of professor 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 professor Dario Poletti. Wrote propriety numerical solvers in C++ to simulate a dissipative, periodically driven Bose-Hubbard dimer system which showcased clear signatures of period doubling.
- 2015 – 2016     **Undergraduate Research Assistant, SUTD**.  
Experimental research under professor Cheah Chin Wei to synthesize ferroelectric  $\text{KNbO}_3$  and CNT/graphene nanofibers using electrospinning for photocatalytic dye degradation.

## Teaching Experience

- 2022     **Teaching Assistant, Classical Mechanics and Math Methods 2 (PHYS3210)**, CU Boulder.  
Graduate teaching assistant, held weekly office hours for undergraduate students.
- 2018     **Instructor, The Quantum World (IAP course)**, SUTD.  
Devised and conducted a 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 open access and 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).  
Wrote and 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.*.
- 2017  **Electrical Engineer (Lights & Hardware)**, Praxis+.  
Designed, rigged-up and wired in excess 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 propriety design on the Charles river (Massachusetts).

## Awards and Achievements

### Scholarships








- 2019  **Graduate Student Fellowship**, UCB.
- 2016  **Global Leadership 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.

## Research Publications

### Journal Articles





- 1 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
- 2 Wang, R. R. W., & Bohn, J. L. (2023). Anisotropic acoustics in dipolar fermi gases. *Phys. Rev. A*, *107*, 033321.  doi:10.1103/PhysRevA.107.033321
- 3 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
- 4 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
- 5 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
- 6 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>
- 7 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

- 8 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](https://doi.org/10.1103/PhysRevA.102.033336)
- 9 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](https://doi.org/10.1103/PhysRevE.97.020202)




## Preprints

- 1 Polloreno, A. M., Wang, R. R. W., & Tezak, N. A. (2023). A note on noisy reservoir computation. arXiv: 2302.10862 [cs.LG]

## Talks

- 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*”, on the thermal conduction in non-degenerate ultracold dipolar gases. Authors: Reuben R. W. Wang and John L. Bohn.
-  **March Meeting (Chicago, IL), APS.**  
Conference talk titled “*Anisotropic sound propagation in dilute dipolar gases*”, on linear wave propagation in non-degenerate ultracold dipolar gases. Authors: Reuben R. W. Wang and John L. Bohn.
- 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.

## Skills

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| Languages  |  Reading, writing and speaking competencies for English, Mandarin Chinese.                  |
| Software   |  Python, MATLAB, Mathematica, C++, $\LaTeX$ , SOLIDWORKS.                                   |
| Experience |  Academic research, $\LaTeX$ typesetting and publishing, mechanical design and fabrication. |

## References

Available on Request