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Yale-NUS College
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PROFESSIONAL APPOINTMENTS

- 2018– **Assistant professor** Yale-NUS College, Division of Science (Physics)
- 2017–2019 **Director of curriculum and instruction** Say STEM Camp, Rice University
- 2016–2018 **Postdoctoral research fellow** University of Toronto, Department of Physics
- 2015–2016 **Physicist** AOSense, Inc., Inertial Sensors Division, Sunnyvale, CA
- 2011–2015 **Postdoctoral research associate** Rice University
Department of Physics & Astronomy and Rice Quantum Institute

EDUCATION

- 2011 **Ph. D. in Physics**, Princeton University
- 2006 **B. S. with Honors in Physics**, California Institute of Technology

TEACHING EXPERIENCE

At Yale-NUS College

- 2022 *YSC3221: Introduction to Electrodynamics*
- 2019, 2022 *YSC4223: Physics in Curved Spacetime*
- 2018–2022 *YCC2137: Scientific Inquiry 2* (9 total sections)
Deep Inquiry 1 (Experimentation) Track Lead in 2019, 2020
- 2020, 2021 *YSC2246: Experimental Methods in Physical Sciences*
Co-Taught with S. Presolski in 2020
- 2021 *YSC2251: Science Skills Workshop*
- 2020 *YSC3224: Statistical Thermodynamics*
- 2019 *YSC2214: Introduction to Optics & Imaging*

Elsewhere

- 2018-2019 Director of curriculum and instruction, *Say STEM Camp, Tapia Center*, Rice University
- 2017 Instructor, *Phy 326: Advanced Physics Laboratory*, University of Toronto
- 2016–2017 Lead physics instructor, curriculum development, *Say STEM Camp, Tapia Center*, Rice University
- 2015 Guest lecturer, *Physics 202: Modern Physics*, Rice University

- 2013–2015 Guest lecturer, *Physics 311/312: Introduction To Quantum Physics I/II*, Rice University
- 2010–2011 Assistant for instruction, *ISC 231: An Integrated, Quantitative Introduction to the Natural Sciences, Laboratory Section*, Princeton University
- 2009–2010 Instructor, *Physics & Science Reasoning*, Princeton University Preparatory Program
- 2005 Teaching assistant, *Ph 6: Physics Laboratory*, California Institute of Technology
- 2005 Teaching assistant, *Ph 5: Analog Electronics*, California Institute of Technology

STUDENTS MENTORED

Capstone students Yale-NUS College

- | | |
|--------------------------|--|
| M. Zirdi Syukur '23 | Design and construction of Bitter-type electromagnets for preparing ultracold quantum gases |
| Pranshu Dave '23 | Laser system for making a magneto-optical trap of lithium |
| Reni Chng Wuang Leng '22 | We're Running on Sunshine: Methods of Communicating the Physics of Solar Energy (co-supervised with A. Aberle at NUS) |
| Mahir Amer '22 | Low-cost bio-dosimetry using <i>C. elegans</i> (co-supervised with J. Gruber in Life Sciences) |
| Rishav Koirala '21 | Design and characterization of a Bitter-type Zeeman slower and external cavity diode lasers for laser cooling and trapping lithium atoms in a magneto-optical trap |
| Vanessa Koh '19 | Holographic generation of arrays of isolated optical traps using digital-micromirror device spatial light modulator (co-supervised with W. Li at CQT) |

Experimental physics research 1 graduate, 20 undergraduate, 3 secondary school

Physics advising 7 students (5 at Yale-NUS College, 2 at University of Toronto)

Pre-major advising Yale-NUS College

9 students 2022-23, 9 students 2021-22, 9 students 2020-21, 10 students 2019-20, 4 students 2018-19

PUBLICATIONS

Peer reviewed (*undergraduate student authors)

11. *Microscopic theory of thermalization in one dimension with nonlinear bath coupling*
A. Rodin, **B. A. Olsen**, M. Choi*, and A. Tan*
Physical Review Research **4**, 033057 (2022) [doi:10.1103/PhysRevResearch.4.033057](https://doi.org/10.1103/PhysRevResearch.4.033057)
10. *Probing open- and closed-channel p-wave resonances*
D. J. M. Ahmed-Braun, K. G. Jackson, S. Smale, C. J. Dale, **B. A. Olsen**, S. J. J. M. F. Kokkelmans, P. S. Julianne, and J. H. Thywissen
Physical Review Research **3**, 033269 (2021), [doi:10.1103/PhysRevResearch.3.033269](https://doi.org/10.1103/PhysRevResearch.3.033269)
9. *Observation of a Transition Between Dynamical Phases in a Quantum Degenerate Fermi Gas*
S. Smale, P. He, **B. A. Olsen**, K. G. Jackson, H. Sharum, S. Trotzky, J. Marino, A. M. Rey, and

- J. H. Thywissen
 Science Advances **5**, eaax1568, (2019) [doi:10.1126/sciadv.aax1568](https://doi.org/10.1126/sciadv.aax1568)
8. *Observation of Quantum-Limited Spin Transport in Strongly Interacting Two-Dimensional Fermi Gases*
 C. Luciuk, S. Smale, F. Böttcher, H. Sharum, **B. A. Olsen**, S. Trotzky, T. Enss, and J. H. Thywissen
 Physical Review Letters **118**, 130405 (2017) [doi:10.1103/PhysRevLett.118.130405](https://doi.org/10.1103/PhysRevLett.118.130405)
 7. *1D to 3D Crossover of a Spin-Imbalanced Fermi Gas*
 M. C. Revelle, J. A. Fry, **B. A. Olsen**, and R. G. Hulet
 Physical Review Letters **117**, 235301 (2016) [doi:10.1103/PhysRevLett.117.235301](https://doi.org/10.1103/PhysRevLett.117.235301)
 6. *Phase diagram of a strongly interacting spin-imbalanced Fermi gas*
B. A. Olsen, M. C. Revelle, J. A. Fry, D. E. Sheehy, and R. G. Hulet
 Physical Review A **92**, 063616 (2015) [doi:10.1103/PhysRevA.92.063616](https://doi.org/10.1103/PhysRevA.92.063616)
 5. *Spin-velocity correlations of optically pumped atoms*
 R. Marsland III*, B. H. McGuyer, **B. A. Olsen**, and W. Happer
 Physical Review A **86**, 023404 (2012) [doi:10.1103/PhysRevA.86.023404](https://doi.org/10.1103/PhysRevA.86.023404)
 4. *Cusp kernels for velocity-changing collisions*
 B. H. McGuyer, R. Marsland III*, **B. A. Olsen**, and W. Happer
 Physical Review Letters **108**, 183202 (2012) [doi:10.1103/PhysRevLett.108.183202](https://doi.org/10.1103/PhysRevLett.108.183202)
 3. *Optical pumping and spectroscopy of Cs vapor at high magnetic field*
B. A. Olsen, B. Patton, Y.-Y. Jau, and W. Happer
 Physical Review A **84**, 063410 (2011) [doi:10.1103/PhysRevA.84.063410](https://doi.org/10.1103/PhysRevA.84.063410)
 2. *Transfer of spin angular momentum from Cs vapor to nearby Cs salts through laser-induced spin currents*
 K. Ishikawa, B. Patton, **B. A. Olsen**, Y.-Y. Jau, and W. Happer
 Physical Review A **83**, 063410 (2011) [doi:10.1103/PhysRevA.83.063410](https://doi.org/10.1103/PhysRevA.83.063410)
 1. *Temperature-insensitive laser frequency locking near absorption lines*
 N. Kostinski, **B. A. Olsen**, R. Marsland III*, B. H. McGuyer, and W. Happer
 Review of Scientific Instruments **82**, 033114 (2011) [doi:10.1063/1.3574221](https://doi.org/10.1063/1.3574221)

In review

2. *Minimal model of drag in one-dimensional crystals*
 H. Mahalingam, Z. W. Yap*, **B. A. Olsen**, A. Rodin, [arXiv:2209.06065](https://arxiv.org/abs/2209.06065)
1. *Emergent s-wave interactions between identical fermions in quasi-one-dimensional geometries*
 K. G. Jackson, C. J. Dale, J. Maki, K. G. S. Xie, **B. A. Olsen**, D. J. M. Ahmed-Braun, S. Zhang, and J. H. Thywissen, [arXiv:2206.10415](https://arxiv.org/abs/2206.10415)

GRANTS, AWARDS, & PRESS

- 2022 **Finalist: Yale-NUS College Junior Faculty Teaching Award**
- 2022–2025 **Academic Research Fund Tier 2** Ministry of Education, Singapore
Photoswitchable DTE Ligands for Spatiotemporal Catalytic Control
 Co-PI: SGD\$465,000 (of total SGD\$1,273,543)
- 2022 **Teaching Engagement Grant** Yale-NUS College
Experiential learning aids in advanced physics electives using tangible elements
 PI: SGD\$3,660

- 2021–2024 **Quantum Engineering Programme** National Research Foundation of Singapore, DSO National Laboratories, Singapore
Quantum Assisted Navigation and Magnetic Sensing
Co-PI: SGD\$300,000 (of total SGD\$7,802,627)
- 2021–2024 **Internal Seed Grant** Yale-NUS College
Many-body quantum spin dynamics of Fermi and Bose gases of lithium
PI: SGD\$179,232
- 2021–2022 **Shared Equipment Grant** Yale-NUS College
High-power laser sources for experimental sciences at Yale-NUS
PI: SGD\$96,594
- 2020–2022 **Student Research Special Pocket Research Grant (x3)** Yale-NUS College
Direct-current electromagnet field simulations/design, Automated image acquisition and compositing system, Automated laboratory monitoring system
PI: SGD\$4,500
- 2019 **Eleanor P. Eells Award for Program Excellence**
American Camp Association, for Say STEM Camp at Rice University ([Citation Link](#))
- 2019 **Inspiring Programs in STEM Award**
INSIGHT Into Diversity, for Say STEM Camp at Rice University ([Citation link](#))
- 2019–2020 **Shared Equipment Grant** Yale-NUS College
Optical frequency reference for experimental tsciences at Yale-NUS
PI: SGD\$96,000
- 2017 **Article: STEM Camps Showcase PBL**
National Science Teachers Association Reports, September, 2017 ([Article link](#))

PRESENTATIONS

Seminars & Colloquia (16 total) Selected recent:

- Nov 2022 Hamilton College, Clinton, NY
- Nov 2022 Wellesley College, Wellesley, MA
- Nov 2022 Lewis & Clark College, Portland, OR
- Apr 2022 Rose-Hulman Institute of Technology, Terre Haute, IN
- Feb 2022 Bucknell University, Lewisburg, PA

Contributed Conference Presentations (21 total) Selected recent:

- Sep 2022 Institute of Physics Singapore, NTU, Singapore (with 4 undergraduate student poster presenters)
- Jun 2022 APS DAMOP, Orlando, FL
- Jun 2020 APS Virtual DAMOP, Portland, OR
- Sep 2019 Workshop on dynamics and interactions in quantum gases, Institut Menorquí d'Estudis, Menorca, Spain
- Mar 2019 Fundamental Physics Using Atoms Workshop, OIST, Okinawa, Japan
- Feb 2018 TUCAN Meeting, McMaster University, Hamilton, ON, Canada (Apr 2018),