Tran Duong Anh-Tai

Quantum Systems Unit, Okinawa Institute of Science and Technology, Japan. Email: tai.tran@oist.jp

Education

2019 – current	PhD in Physics - Okinawa Institute of Science and Technology, Japan (to be submitted)
2014-2018	BSc in Physics Teacher Education - Ho Chi Minh City University of Education, Vietnam Finished 3rd in the class of 180; GPA: 3.76/4.0

Research Experience

PhD Research, Okinawa Institute of Science and Technology (Busch's Unit)

During my PhD, I have focused on theoretical studies of strongly correlated mixtures of few-body ultracold bosonic gases. My numerical tools are based on ab-initio approaches to the solution of the many-body Schrödinger equation of indistinguishable particles. My dissertation includes three projects:

- Project 1: Quantum chaos in interacting Bose-Bose mixtures.
- Project 2: Engineering impurity Bell states through coupling with a quantum bath
- Project 3: Quantum correlations in a three-species mixture of ultracold bosons confined harmonically

Teaching Experience and others

- Teaching a mini course on high-performance computing cluster
- Teaching numerical approach to the Gross-Pitaevskii equation in the Ultracold Quantum Gases course
- Organizing the weekly group meetings and talks by visitors in the Quantum Systems Unit

Research Visits and Internships

April-July 2023	Visiting researcher in García-March's lab, Polytechnic University of Valencia, Spain
April-May 2022	Visiting researcher at Ho Chi Minh City University of Education, Vietnam
May-July 2017	Research Intern in Q-Han Park's lab, Department of Physics, Korea University, Korea

Publications

- **T. D. Anh-Tai,** T. Fogarty, S. María-García, T. Busch, M. A. García-March. (2024). Engineering impurity Bell states through coupling with a quantum bath. arXiv preprint arXiv:2406.06966.
- **T. D. Anh-Tai**, L. M. Khang, N. D. Vy, T. D. H. Truong, V. N. T. Pham (2024). A revisit on the hydrogen atom induced by a uniform static electric field. to be published in *Canadian Journal of Physics*.
- D. T. Hoang, F. Metz, A. Thomasen, **T. D. Anh-Tai**, T. Busch, and T. Fogarty (2024). Variational quantum algorithm for ergotropy estimation in quantum many-body batteries. *Physical Review Research* 6, no. 1, 013038.
- **T. D. Anh-Tai**, M. Mikkelsen, T. Busch, and T. Fogarty. (2023). Quantum chaos in interacting Bose-Bose mixtures. *SciPost Physics*, 15, no. 2, 048.

- T. D. H. Truong, H. H. Nguyen, H. B. Le, H. M. Tran, N. D. Vy, **T. D. Anh-Tai**, V. N. T. Pham (2022). Soft parameters in Coulomb potential of noble atoms for nonsequential double ionization: Classical ensemble model and simulations. *Computer Physics Communications, 276,* 108372.
- T. D. H. Truong, **T. D. Anh-Tai**, H. H. Nguyen, N. H. Nha, D. H. Dung, and V. N. T. Pham (2022). Intensity dependence of Coulomb-repulsion effect in strong-field nonsequential double ionization. *Acta Physica Polonica, A.* 141, no. 6.
- **T. D. Anh-Tai**, D. T. Hoang, T. D. H. Truong, C. D. Nguyen, L. N. Uyen, D. H. Dung, N. D. Vy, V. N. T. Pham (2021). Analytical study of the sth-order perturbative corrections to the solution to a one-dimensional harmonic oscillator perturbed by a spatially power-law potential $V_{per} = \lambda x^{\alpha}$. *AIP Advances, 11*(8), 085310. (Selected in Mathematical Physics collection)
- V. N. T. Pham, **T. D. Anh-Tai**, H. H. Huy, N. H. Tung, N. D. Vy, T. Yamakoshi (2018). A procedure for high-accuracy numerical derivation of the thermodynamic properties of ideal Bose gases. *European Journal of Physics*, *39*(5), 055103.

Conference Presentations and Invited Talks

- "Quantum Simulation of Novel Phenomena with Ultracold Atoms and Molecules", Yukawa Institute for Theoretical Physics, Kyoto University, April 2024 (Poster)
- "Ultracold Atom Japan", Okinawa Institute of Science and Technology, April 2024 (Poster)
- "Computational Approaches to Quantum Many-Body Systems", Saitama, October 2023 (Oral)
- Seminar "Quantum chaos in interacting Bose-Bose mixtures", Department of Quantum Optics, University of Valencia, April 2023
- "Quantum Transport with Ultracold Atoms", Max Planck Institute for the Physics of Complex Systems, October 2022 (Online)

Software

- Programming languages: MATLAB, FORTRAN, high-performance programming
- DevOps: SLURM, bash, GNU Make
- Developed highly parallelized MATLAB-based solvers for numerical solutions of the many-body Schrödinger equation of indistinguishable particles using the improved Configuration Interactions scheme

Referees

Prof. Thomas Busch (PhD supervisor)	Quantum Systems Unit, Okinawa Institute of Science and Technology Email: thomas.busch@oist.jp
Prof. Miguel Ángel García-March	Department of Applied Mathematics, Polytechnic University of Valencia Email: garciamarch@mat.upv.es
Assoc. Prof. Vinh N. T. Pham	Postgraduate Office, Ho Chi Minh City University of Education Email: vinhpnt@hcmue.edu.vn