

Jongheum Jung

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Research Interest

Ultracold Quantum Gas, Condensed Matter Physics, Quantum Simulation and Information, Complex Quantum System.

Education

B. S. in Physics, Seoul National University

Mar. 2017 – Feb. 2023

Academic gap

mandatory military service

- Cumulative GPA: **4.26 / 4.3** (130 credits) | Major GPA: **straight A⁺** (81 credits)
- *Summa Cum Laude*, ranked **1st** out of 50 graduating students in physics and astronomy department
- Completed Graduate Courses: Quantum Mechanics 1, Quantum Mechanics 2, Statistical Mechanics, Laser Physics, Condensed Matter Physics 2, Atomic Physics

Publications

- [P1] **Chaos-assisted turbulence in spinor Bose-Einstein condensates**
J. H. Jung[†], J. Kim[†], J. Lee, and Y. Shin, in progress ([†]co-first authors)
- [P2] **Hydrodynamic behavior of a spin-driven turbulent Bose-Einstein condensate**
J. Lee, J. Kim, **J. H. Jung**, and Y. Shin, in progress
- [P3] **Random spin textures in turbulent spinor Bose-Einstein condensates** [\[paper\]](#)
J. H. Jung, J. Lee, J. Kim, and Y. Shin, Physical Review A **108**, 043309 (2023)
- [P4] **Spin-driven stationary turbulence in spinor Bose-Einstein condensates** [\[paper\]](#)
D. Hong, J. Lee, J. Kim, **J. H. Jung**, K. Lee, S. Kang, and Y. Shin, Physical Review A **108**, 013318 (2023)
- [P5] **Half-quantum vortex generation in a two-component Bose-Einstein condensate by an oscillatory magnetic obstacle** [\[paper\]](#)
J. H. Jung and Y. Shin, Physical Review A **107**, 053304 (2023)
- [P6] **Minimum critical velocity of a Gaussian obstacle in a Bose-Einstein condensate** [\[paper\]](#)
H. Kwak, **J. H. Jung**, and Y. Shin, Physical Review A **107**, 023310 (2023)
- [P7] **Spin and mass currents near a moving magnetic obstacle in a two-component Bose-Einstein condensate** [\[paper\]](#)
J. H. Jung, H. J. Kim, and Y. Shin, Journal of the Korean Physical Society **78**, 19–26 (2021)

Conferences

- [C1] **Characterization of Spin-Driven Stationary Turbulence in Spinor Bose-Einstein Condensates**
J. H. Jung, J. Lee, J. Kim, D. Hong, and Y. Shin, APS Division of Atomic, Molecular and Optical Physics Meeting Abstracts (2023)
- [C2] **Energy dissipation in a binary superfluid gas by a moving magnetic obstacle**
J. H. Kim, D. Hong, K. Lee, J. Lee, **J. H. Jung**, and Y. Shin, APS Division of Atomic, Molecular and Optical Physics Meeting Abstracts (2022)

Research Experiences

Quantum Gas Lab, Seoul National University

Mar. 2019 – Present

Advisor: Professor Yong-il Shin

Seoul, Korea

- Spin-Driven Turbulent System in Spin-1 Bose-Einstein Condensates
 - * **Published Paper:** [P3] and [P4] in Publications section.

- * Onset of turbulence due to chaotic spin dynamics in a driven spinor BEC [P1]: Conducted research through single-mode approximation and experiments. → Aimed for *Physical Review Letters*.
- * Influence of turbulent viscosity on the hydrodynamic behavior of a spin-driven turbulent Bose-Einstein condensate [P2] → Aimed for *Physical Review Letters*.

- Experimental Setup

- * Assembled a mount of tapered amplifier with thermoelectric coolers.
- * Building 589nm lasers : using external cavity diode laser with 1178nm wavelength and doubling a frequency by periodically poled lithium niobate.
- * Designed two-dimensional Magneto-Optical Trap (2D MOT) for ytterbium atoms.
- * Applying 2D MOT system with permanent magnets into a rubidium machine.

- Critical Vortex Shedding in Bose-Einstein Condensates

- * **Published Paper:** [P5], [P6], and [P7] in Publications section.

Award and Scholarships

Doctoral Study Abroad Scholarship, Korea Foundation for Advanced Studies Sep. 2023
– 13,000 USD per year granted for US graduate study.

Certificate of Achievement, QHack Coding Challenges Feb. 2022
– Ranked TOP 10 out of 800 teams.

The Presidential Science Scholarship Mar. 2017 – Sep. 2022
– Awarded by the president of Republic of Korea.

Dean's List: 4 semesters 2017–2018
– Awarded by College of Natural Sciences, Seoul National University: 2017-1, 2017-2, 2018-1, 2018-2.

Gold Medal, The 46th International Physics Olympiad (IPhO) Jul. 2016

Teaching

Teaching from Optics to Modern Physics Oct. 2023 - Present
– Instructing students enrolled in high school for the gifted at Femtos Educational Institute.

Mentoring Program at College of Natural Sciences, Seoul National University Jul. 2019
– Assisted undergraduate students in understanding Thermal and Statistical Physics.

Tutoring the national team for the International Physics Olympiad Jun. 2017 - Jul. 2017
– Instructed on experimental techniques, evaluated mock tests, and gave comments.

Teaching Assistant for Winter school of Korean Physics Olympiad Jan. 2017
– Developed electromagnetic problems and provided problem-solving techniques to students attending the Winter school.

Extracurricular Activities

Quantum Hackathon Korea 2022 Quantum Information Research Support Center
Topic: Innovative dynamical decoupling (DD) application and randomized compiling Jun. 2022

Military service Ground Operations Command
Programmed Integrated Analysis System to detect tunnels dug by North Korea Oct. 2020 – Apr. 2022

Skills and Scores

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| • Software Adobe Illustrator | • Language Korean (Native), English (Fluent) |
| • Programming Python, Matlab, Qt C++ | – IBT TOFEL 108 (R: 30, L: 27, S: 26, W: 25) |
| • GRE Physics 990 (97%) | – My Best Score 111 (R: 30 L: 27 S: 26 W: 28) |