

Hyeonjae Kim

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Research Officer at the Agency for Defense Development

Education

Kyungpook National University (KNU)	Daegu, Republic of Korea
Bachelor of Science in Physics	Mar. 2020 – Feb. 2024
Overall GPA: 4.11/4.3 Major GPA (71 credits): 4.19/4.3	

Research Experiences

Agency for Defense Development (ADD)	Daejeon, Republic of Korea
Research Officer (Supervisors: Dr. Sin Hyuk Yim, Dr. Sangkyung Lee)	Jun. 2024 – May 2027 (expected)

Research in atomic physics and quantum sensing, with a focus on optically pumped magnetometers

- Designed and implemented an automated absorption spectroscopy system with spectral profile modeling to characterize rubidium vapor cell properties
- Developed and optimized a zero-field optically pumped magnetometer system for characterizing magnetic fields and noise from portable sensor components
- Conducted magnetic anomaly detection using a drone-mounted all-optical pulsed atomic magnetometer and quantitatively analyzed the measured residual anomaly maps
- Modeled spin-exchange optical pumping and spin dynamics toward SERF operation in hybrid-alkali vapors

Novel Applied Nano Optics Lab	Daegu, Republic of Korea
Research Intern (Advisor: Prof. Junyeob Yeo)	Jun. 2021 – Jun. 2022

Project: Fabrication of a flexible photo-electrochemical cell using laser

High Energy Physics Lab (Moon Lab)	Daegu, Republic of Korea
Research Intern (Advisor: Prof. Chang-Sung Moon)	Jun. 2020 – Feb. 2021

Developed momentum reconstruction algorithms for silicon detector simulations

Publications

Magnetic anomaly detection of an undersea tunnel using a drone-mounted all optical pulsed atomic magnetometer

Manuscript under review

H. Kim, S. H. Yim, S. Lee, E. -S. Bang, S. R. Yeo, Y. J. Kim, T. Jeong, and Y. Lim

Novel sealing of glass-blown atomic gas cells using resistive heating wires

Manuscript under review

S. H. Hong, Y. Lim, S. H. Yim, J. B. Nam, S. Lee, T. Jeong, and H. Kim

Aging test of an atomic vapor cell with Al₂O₃ wall coating on cubic glass

Applied Optics **64**, 7932-7937 (2025)

H. Kim, T. Jeong, S. H. Hong, J. B. Nam, S. Lee, Y. Lim, and S. H. Yim

Selected Conference Presentations

Probing magnetic noise from portable sensor components using a zero-field optically pumped magnetometer

Poster presentation, APS Division of Atomic, Molecular, and Optical Physics (DAMOP) Meeting, 2026

Experimental systems for spectroscopy and zero-field OPM with atomic vapor cells

Oral presentation (Invited), KISTI-SNU Joint workshop (QNRC Joint Workshop), 2026

Towards the development of a SERF magnetometer

Poster presentation, Korean Physical Society (KPS) Fall Meeting, 2025

Lifetime extension of rubidium vapor cells by Al_2O_3 coating

Poster presentation, APS Division of Atomic, Molecular, and Optical Physics (DAMOP) Meeting, 2025

Linear absorption spectroscopy in rubidium vapor cells: Applications in buffer gas measurement and lifetime estimation

Poster presentation, Korean Physical Society (KPS) Spring Meeting, 2025

Honors and Awards

Physics Alumni Association Award and Scholarship (Outstanding Graduate)

Feb. 2024

Department of Physics Alumni Association, Kyungpook National University

2nd Prize, 2023 MilITECH Challenge

Dec. 2023

Hosted by KAIST; Awarded by the Agency for Defense Development

2nd Prize, 2022 MilITECH Challenge

Dec. 2022

Hosted by KAIST; Awarded by the Korea Military Academy (KMA)

3rd Prize of Academic Conference

Dec. 2021

College of Natural Sciences, Kyungpook National University

Dean's List: 3 semesters (2021-1, 2021-2, 2022-2)

Nov. 2021, Apr. 2022, Apr. 2023

College of Natural Sciences, Kyungpook National University

Grants and Scholarships

National Science and Technology Scholarship

Mar. 2022 – Feb. 2024

Korea Student Aid Foundation (KOSAF)

Academic Merit Scholarship (Hyoseok Scholarship)

Apr. 2022

Kyungpook National University Alumni Association

Academic Excellence Scholarship

Aug. 2020, Feb. 2021, Aug. 2021

Kyungpook National University

Other Research Outputs

Buffer Gas Pressure Estimation for OPMs

Dec. 2024

Registered software; Korea Copyright Commission (C-2024-047156)

Rubidium Vapor Cell Lifetime Monitoring and Analysis Tool

Dec. 2024

Registered software; Korea Copyright Commission (C-2024-054414)

Additional Experiences

Selected Participant, KFAS Study Abroad Workshop

Jul. 2026 – Jul. 2027

Natural Sciences; Korea Foundation for Advanced Studies (KFAS)

Research Officer for National Defense (ROND)

Jun. 2024 – May 2027

First Lieutenant in the Republic of Korea Air Force

Selected as one of 20 research officers nationwide for STEM-based national defense research

Teaching Assistant, Classical Mechanics II (PHYS212)

Sep. 2023 – Dec. 2023

Teaching Assistant, Electromagnetism II (PHYS312)

Mar. 2023 – Jun. 2023

International Student Tutor, KNU

Feb. 2022 – May. 2022

Skills

Programming: Python, Wolfram Language (Mathematica)

Software: LabVIEW, SolidWorks, COMSOL Multiphysics