

# Hyeonjae Kim

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Researcher at Agency for Defense Development

## Research Interests

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AMO Physics, Atom-light interaction, Quantum sensing, Quantum simulation, Quantum computing

## Education

### Kyungpook National University (KNU)

Daegu, South Korea

Bachelor of Science in Physics

Mar. 2020 – Feb. 2024

Overall GPA: 4.11/4.3 (130 credits) | Major GPA: 4.19/4.3 (71 credits)

## Research Experiences

### Agency for Defense Development (ADD)

Daejeon, South Korea

Researcher (PIs: Dr. Sin Hyuk Yim, Dr. Sangkyung Lee)

Jun. 2024 – Present

Research on Optically Pumped Atomic Magnetometers (OPAMs)

- Designed and implemented an absorption spectroscopy system for rubidium vapor cells with automated measurements.
- Developed theoretical models of absorption spectra and applied them to characterize the properties of rubidium vapor cells.
- Built and optimized a zero-field (SERF) optically pumped atomic magnetometer, supported by theoretical analysis of spin dynamics.

### Novel Applied Nano Optics Lab

Daegu, South Korea

Research Intern (Advisor: Prof. Junyeob Yeo)

Jun. 2021 – Jun. 2022

Research on photo-electrochemical cells using lasers

### High Energy Physics Lab (Moon Lab)

Daegu, South Korea

Research Intern (Advisor: Prof. Chang-Sung Moon)

Jun. 2020 – Feb. 2021

Research on the development of algorithms for silicon detectors

## Publications

### Aging test of atomic vapor cell with $\text{Al}_2\text{O}_3$ 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

## Conferences

### Towards the SERF regime in an atomic magnetometer

Korean Physical Society (KPS) Fall Meeting (2025)

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

### Lifetime extension of rubidium vapor cells by $\text{Al}_2\text{O}_3$ coating

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

H. Kim, T. Jeong, S. Lee, and S. H. Yim

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

## **lifetime estimation**

Korean Physical Society (KPS) Spring Meeting (2025)  
H. Kim, T. Jeong, S. Lee, J. B. Nam, S. H. Hong, and S. H. Yim

## Honors and Awards

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<b>Physics Alumni Association Award and Scholarship (Outstanding Graduate)</b>	Feb. 2024
Awarded by the chair of the Physics Alumni Association, Kyungpook National University	
<b>Agency for Defense Development Director General's Award</b>	Dec. 2023
2nd prize at the MiliTECH Challenge hosted by KAIST	
<b>Korea Military Academy President's Award</b>	Dec. 2022
2nd prize at the MiliTECH Challenge hosted by KAIST	
<b>3rd prize of Academic Conference</b>	Dec. 2021
Awarded by the College of Natural Sciences, Kyungpook National University	
<b>Dean's list: 3 semesters (2021-1, 2021-2, 2022-2)</b>	Nov. 2021, Apr. 2022, Apr. 2023
Awarded by the College of Natural Sciences, Kyungpook National University	

## Grants and Scholarships

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<b>National Science and Technology Scholarship</b>	Mar. 2022 – Feb. 2024
Awarded by the Korea Student Aid Foundation (KOSAF)	
<b>Academic Encouragement Scholarship (Hyoseok Scholarship)</b>	Apr. 2022
Awarded by the Kyungpook National University Alumni Association	
Outstanding students selected from each college (Representative of the College of the Natural Sciences)	
<b>Academic Achievement Scholarship</b>	Aug. 2020, Feb. 2021, Aug. 2021
Awarded by Kyungpook National University	
A partial tuition reduction granted for academic excellence	

## Teaching Experiences

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<b>Undergraduate Tutoring in Classical Mechanics2 (PHYS212) Courses</b>	Sep. 2023 – Dec. 2023
Teaching Assistant	
<b>Undergraduate Tutoring in Electromagnetism2 (PHYS312) Courses</b>	Mar. 2023 – Jun. 2023
Teaching Assistant	

## Patents and Software

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<b>Buffer Gas Pressure Estimation for OPAMs</b>	Dec. 2024
Registered in Korea Copyright Commission (C-2024-047156)	
<b>Rubidium Vapor Cell Lifetime Monitoring and Analysis Tool</b>	Dec. 2024
Registered in Korea Copyright Commission (C-2024-054414)	

## Other Experiences

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<b>Research Officer for National Defense (ROND)</b>	Jun. 2024 – May. 2027
Selected top students (2 per year in Physics) for a program modeled after Israel's Talpiot, completing mandatory military service through research at the Agency for Defense Development, Korea's DARPA	

counterpart.

Concurrently serving as a First Lieutenant in the Republic of Korea Air Force.

**Tutoring for International Undergraduate Freshmen**

Feb. 2022 – May. 2022

Mentored for 2 hours per week on general academic life and basic calculus

Selected as an excellent tutor

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Skills

- Programming: Python (NumPy, SciPy, SymPy, pandas, matplotlib), Wolfram Language (Mathematica)
- Software: LabVIEW, Solidworks