Byeongchan Lee

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Education

Ph.D. Candidate in Physics *Sep 2023–Present*
Department of Physics, Sogang University, Seoul, South Korea
- Advisor: Prof. Young Woo Choi
- GPA: 4.01/4.30

B.S in Aeronautics & Mechanical Engineering *Mar 2017–Feb 2021*
Department of Engineering, Cheongju University, Cheongju, South Korea
- GPA: 3.95/4.50

Experiences

Graduate Student Researcher *Sep 2023-Present*
Department of Physics, Sogang University, Seoul, South Korea

Commissioned Officer (First Lieutenant) *Mar 2021-Jun 2023*
Republic of Korea Army (ROKA), South Korea

Research Interests

- Calculations of quantum excitations in low-dimensional materials
- *Ab initio* calculation of electronic structure of many-body interactions in quantum materials
- Development of electronic structure methods using high-performance computing and machine learning

Current Research Projects

Anisotropic interlayer excitons in ReS_2/WS_2 heterostructures
- GW–BSE calculations of ReS_2/WS_2 heterostructures to understand anisotropic interlayer excitons properties

Excitons in 1D single-chain
- First-principle study of excitons in 1D GeX_2 (X:S, Se) single-chain

One-dimensional van der Waals single-chain heterostructures
- Electronic and transport properties of 1D single-chain axial heterojunctions

Publications

3. **Byeongchan Lee** and Young Woo Choi
First-principle study of excitons in 1D GeX_2 (X:S, Se) single-chain,
In preparation.

2. Tae Keun Yun, **Byeongchan Lee**, Soyeong Kwon, Jieun Yeon, Young Woo Choi, Kwanpyo Kim, and Sung-Woo Nam
Direct observation of anisotropic interlayer excitonic emission in ReS_2/WS_2 enabled by momentum matching,
In preparation.

1. Yangjin Lee, **Byeongchan Lee**, Marvin L. Cohen, Young Woo Choi, and Alex Zettl,
0D–1D Heterostructures in the Single-Chain Limit,
In preparation.

Skills

Computational Tools: BerkeleyGW, Quantum ESPRESSO, SIESTA/TranSIESTA, VASP

Programming: Python, PyTorch, Linux basics, HPC environments

Conference Presentations

- *First-principles Study of Excitons in 1D Single Chains*, International Conference on Advanced Materials and Devices (ICAMD 2025), Busan, South Korea, 2025 (Poster).

Academic Experiences

- 11th Berkeley Excited States Conference, University of California, Berkeley, Berkeley, CA, USA, 2025.
- 6th BerkeleyGW Tutorial Workshop, University of California, Berkeley, Berkeley, CA, USA, 2025.
- APS March Meeting, Anaheim, CA, USA, 2025.
- 21st KIAS Electronic Structure Calculation Workshop, Korea Institute for Advanced Study (KIAS), Seoul, South Korea, 2025.
- 6th KISTI Electronic Structure Calculation Summer School, KAIST, Daejeon, South Korea, 2025.
- International Nanophotonics and Nanoenergy Conference (INPEC), Ewha Womans University, Seoul, South Korea, 2025.
- Korean Physical Society Spring Meeting, Daejeon, South Korea, 2025.
- Korean Physical Society Applied Physics Academy, Busan, South Korea, 2025.
- Korean Physical Society Fall Meeting, Yeosu, South Korea, 2024.

Awards & Honors

ROTC Scholarship, *Republic of Korea Army (ROKA)* *2019–2020*

3rd Place – Aerospace Technology Startup Academy *2019*
Korea Aerospace Research Institute (KARI)

Academic Scholarship (full tuition), *Cheongju University* *2017–2020*

Teaching Experience

Teaching Assistant, Sogang University, Seoul

- Electrodynamics II (PHY2004, Fall 2024)
- General Relativity (PHY4010, Fall 2024)
- General Physics Experiments I (PHY1101, Spring 2024)
- General Physics Experiments II (PHY1102, Fall 2023)