Young Woo Choi

Assistant Professor
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Education

Ph.D. in Physics Mar 2016 – Feb 2021
Department of Physics, Yonsei University, Seoul, Korea
(Advisor: Prof. Hyoung Joon Choi)

B.S. in Physics Mar 2010 – Feb 2016
Department of Physics, Yonsei University, Seoul, Korea
(Mandatory military service from Oct 2012 to Jul 2014)

Experience

Assistant Professor Sep 2024 – present
Department of Physics, Sogang University, Seoul, Korea

Postdoctoral Researcher Jun 2021 – Aug 2024
Department of Physics, University of California, Berkeley, CA, USA
(Advisor: Prof. Marvin L. Cohen)

Postdoctoral Researcher Mar 2021 – May 2021
Department of Physics, Yonsei University, Seoul, Korea
(Advisor: Prof. Hyoung Joon Choi)

Research Interests

- **Calculation of electronic properties and many-body interactions in quantum materials**
  - Electrons and phonons in moiré materials, electron-phonon coupling and superconductivity in graphene moiré flat bands, 2D pseudospin semiconductors, Fe-based superconductors
- **Design of functional nanomaterials and nanostructures for next-generation quantum devices**
  - One-dimensional van der Waals heterostructures, molecular nanomachines, pseudospin tunneling junctions
- **Development of electronic-structure methods using high-performance computing**
  - Density functional theory, large-scale tight-binding calculations, many-body perturbation theory

Honors and Awards

Post-doctoral Training Grants, National Research Foundation of Korea, 2023 (45M KRW/year)
Global Ph.D. Fellowship, National Research Foundation of Korea 2017-2021 (30M KRW/year)
Yonsei Alumni Scholarship, Yonsei University Alumni Association, 2012, 2014-2015 (15M KRW/year)
Miraeasset Scholarship, Miraeasset, 2011 (7M KRW/year)
Excellent Paper Award, Korea Institute of Science and Technology Information, 2019
Excellent Presentation Award, The 15th KIAS Electronic Structure Calculation Workshop, 2019
Excellent Presentation Award, Korean Physical Society Spring Meeting, 2019.
Excellent Presentation Award, APCTP-KIAS Quantum Materials Symposium, 2019
Excellent Presentation Award, Korean Physical Society Spring Meeting, 2017
Best Presentation Award, KIAS Physics Winter Camp, 2016

Publications

14. **Young Woo Choi**†, Yangjin Lee†, Kwanpyo Kim, Alex Zettl, and Marvin L. Cohen,
Atomic and Electronic Structures of 1D Phosphorus Nanoring and Nanohelix,
ACS Nano **19**, 12155 (2025). († Equal Contributions)

13. **Young Woo Choi**, Jisoon Ihm, and Marvin L. Cohen,
Pairing interaction from Demons in Sr_2RuO_4,
Physical Review B **110**, 155127 (2024).

12. Yangjin Lee†, Young Woo Choi†, Linxuan Li, Wu Zhou, Marvin L. Cohen, Kwanpyo Kim, and Alex Zettl,
SiX_2 (X=S, Se) Single Chains and (Si-Ge)X_2 Quaternary Alloys,
ACS Nano **18**, 17882 (2024). († Equal contributions)

11. Jeehong Park†, Soonsang Huh†, **Young Woo Choi**†, Donghee Kang, Minsoo Kim, Donghan Kim, Soohyung Park, Hyoung Joon Choi, Changyoung Kim, Yeonjin Yi,
Visualizing the low-energy electronic structure of prototypical hybrid halide perovskite through clear band measurements,
ACS Nano **18**, 7570 (2024). († Equal contributions)

10. Yangjin Lee†, **Young Woo Choi**†, Kihyun Lee, Chengyu Song, Peter Ercius, Marvin L. Cohen, Kwanpyo Kim, Alex Zettl,
One-dimensional Magnetic MX_3 Single-Chains (M=Cr, V and X=Cl, Br, I),
Advanced Materials, 2307942 (2023). **(**† Equal contributions)

9. Soo Yeon Lim†, Han-gyu Kim†, **Young Woo Choi**†, Takashi Taniguchi, Kenji Wantanabe, Hyoung Joon Choi, and Hyeonsik Cheong,
Modulation of phonons and excitons due to moiré potentials in twisted bilayer of $WSe_2/MoSe_2$,
ACS Nano **17**, 13938 (2023). **(**† Equal contributions)

8. Yangjin Lee†, **Young Woo Choi**†, Kihyun Lee, Chengyu Song, Peter Ercius, Marvin L. Cohen, Kwanpyo Kim, and Alex Zettl**,**
Tuning the sharing modes and composition in a tetrahedral GeX_2 (X=S, Se) system via one-dimensional confinement,
ACS Nano **17**, 8743 (2023). **(**† Equal contributions)

7. Jangwon Kim†, Youjin Lee†, **Young Woo Choi**†, Taek Sun Jung, Suhan Son, Jonghyeon Kim, Hyoung Joon Choi, Je-Geun Park, and Jae Hoon Kim,
Terahertz spectroscopy and DFT analysis of phonon dynamics of the layered van der Waals semiconductor Nb_3X_8 (X = Cl, I),
ACS Omega **8**, 14190 (2023). **(**† Equal contributions)

6. **Young Woo Choi** and Marvin L. Cohen,
Resonantly Enhanced Electromigration Forces for Adsorbates on Graphene,
Physical Review Letters **129**, 206801 (2022).

5. **Young Woo Choi** and Hyoung Joon Choi,
Dichotomy of Electron-Phonon Coupling in Graphene Moiré Flat Bands,
Physical Review Letters **127**, 167001 (2021).

4. **Young Woo Choi** and Hyoung Joon Choi,

Anisotropic Pseudospin Tunneling in Two-Dimensional Black Phosphorus Junctions,
2D Materials **8**, 035024 (2021).

3. **Young Woo Choi** and Hyoung Joon Choi,
Intrinsic band gap and electrically tunable flat bands in twisted double bilayer graphene,
Physical Review B **100**, 201402(R) (2019).

2. **Young Woo Choi** and Hyoung Joon Choi,
Role of Electric Fields on Enhanced Electron Correlation in Surface-Doped FeSe,
Physical Review Letters **122**, 046401 (2019).

1. **Young Woo Choi** and Hyoung Joon Choi,
Strong electron-phonon coupling, electron-hole asymmetry, and nonadiabaticity in magic-angle twisted bilayer graphene,
Physical Review B **98**, 241412(R) (2018).

Teaching Experience

Applications of Machine Learning in Physics / Spring 2025
General Physics I / Spring 2025
Statistical Physics / Fall 2024