Curriculum Vitae

Basic Information

Name: Sung Yun Lee

Contact: sungyun98@postech.ac.kr

Homepage: https://sungyun98.github.io/

Languages: Korean (native), English (fluent)

Skills

Experimental Techniques

- Resonant X-ray diffraction
- Coherent X-ray diffraction imaging & X-ray ptychography
- X-ray absorption spectroscopy

Software Literacy

- Advanced development and data analyses based on Python (Pytorch), MATLAB, and C/C++
- Basic device control based on LabVIEW
- Basic two-temperature-model & solid-mechanics simulation based on COMSOL Multiphysics

Education

Ph.D. in Physics 03/2020–08/2025

Pohang University of Science and Technology

Thesis: *Development of functional coherent X-ray nanoimaging with deep-learning methods*

Advisor: Prof. Changyong Song

B.Sc. in Physics, Minor in Electrical Engineering 03/2016–02/2020

Pohang University of Science and Technology

Thesis: *A Comprehensive Evaluation of the Process of Copying a Complex Figure in Early- and Late-Onset Alzheimer Disease*

Advisor: Prof. Jee Hyun Choi (Korea Institute of Science and Technology) & Prof. Changyong Song

Experiences

Postdoctoral Researcher 09/2025–Current

Center for Ultrafast Science on Quantum Matter, Max Planck POSTECH/Korea Research Initiative (Principal investigator: Prof. Changyong Song)

- X-ray Bragg ptychography + X-ray fluorescence @ APS-U
  (with vortex beam by spiral zone plate)
- Time-resolved coherent X-ray diffraction imaging @ PAL-XFEL
- Time-resolved dark-field X-ray microscopy @ PAL-XFEL

Participating Researcher (as a graduate student) 02/2020–08/2025

Femtosecond X-ray Diffraction & Imaging Laboratory, Department of Physics, Pohang University of Science and Technology (Principal investigator: Prof. Changyong Song)

- Time-resolved multiplexing X-ray measurements (small-angle X-ray scattering + wide-angle X-ray scattering + X-ray emission spectroscopy) @ PAL-XFEL
- Time-resolved coherent X-ray diffraction imaging @ PAL-XFEL
- Time-resolved X-ray diffraction @ PAL-XFEL
- X-ray Bragg ptychography @ ESRF
- X-ray ptychography + X-ray fluorescence @ PLS-II
  (with circularly polarized beam by diamond phase retarder & vortex beam by spiral zone plate)
- Coherent X-ray diffraction imaging @ PLS-II
- Scanning transmission X-ray microscopy @ PLS-II
  (with circularly polarized beam by elliptically polarizing undulator)

Undergraduate Researcher 03/2019–02/2020

Femtosecond X-ray Diffraction & Imaging Laboratory, Department of Physics, Pohang University of Science and Technology (Principal investigator: Prof. Changyong Song)

Intern 06/2019–08/2019

Machine Learning Team, Columbus Center, Netmarble Corp.

Research Trainee 06/2018–08/2018

Convergence Research Center for Diagnosis, Treatment and Care System of Dementia, Brain Science Institute, Korea Institute of Science and Technology (Principal investigator: Prof. Jee Hyun Choi)

Intern 06/2017–08/2017

PnA Team, Accelerator Business Division, Dawonsys Co., Ltd.

Teaching Assistant

Department of Physics, Pohang University of Science and Technology

- PHYS199: Freshman Research Participation 09/2021–12/2021
- PHYS103: General Physics Laboratory I 03/2021–06/2021

- PHYS250: Physics Laboratory I 09/2020–12/2020

Student Mentoring Program Mentor

Pohang University of Science and Technology

- CSED101: Programming & Problem Solving 09/2019–12/2019
- CSED101: Programming & Problem Solving 09/2018–12/2018
- PHYS101: General Physics I 03/2018–06/2018

The 13th University Student Knowledge Volunteering KOSAF Camp Mentor 08/2016

Korea Student Aid Foundation

- Jeonggok Middle School (Topic: Tessellation & Four-color theorem)

Honors & Awards

Graduate Student Excellent Paper Award 2024

Korean Synchrotron Radiation User's Association

POSTECHIAN Fellowship – Innovation 2024

Pohang University of Science and Technology

Graduate Student Excellent Paper Award 2023

Department of Physics, Pohang University of Science and Technology

Presidential Science Scholarship 2016–2019

Ministry of Science, ICT, and Future Planning

Best Poster Award

The 35th Synchrotron Radiation Users' Workshop, Korean Synchrotron Radiation User's Association 2023

The 3rd PAL-XFEL Users' Meeting, Korean Synchrotron Radiation User's Association 2023

The 34th Synchrotron Radiation Users' Workshop, Korean Synchrotron Radiation User's Association 2022

Graduate Student Excellent Teaching Assistant Award 2020

Department of Physics, Pohang University of Science and Technology

BK21 First Paper Award 2020

Department of Physics, Pohang University of Science and Technology

Best Bachelor’s Thesis Award 2019

Department of Physics, Pohang University of Science and Technology

Patents

[1] Apparatus and Method of Processing Image Copying Test for Evaluating Cognitive Impairment, and Computer Readable Recording Medium

Registration #10-2338071-00-00, Republic of Korea 12/09/2021

[2] METHOD FOR GAME DATA PROCESSING

Registration #10-2333941-00-00, Republic of Korea 11/29/2021

Publications (†: co-first author, *: corresponding author)

[1] Eunyoung Park†, Chulho Jung†, Junha Hwang, Jaeyong Shin, Sung Yun Lee, Heemin Lee, Seung-Phil Heo, Daewoong Nam, Sangsoo Kim, Min Seok Kim, Kyung Sook Kim, In Tae Eom, Do Young Noh, Yungok Ihm, and Changyong Song*, *Surface-plasmon control of ultrafast energy-relaxation modes in photoexcited Au nanorods probed by time-resolved single-particle X-ray imaging*, Nature Communications **16**, 9876 (2025).

[2] Seung-Phil Heo, Choongjae Won, Heemin Lee, Hanbyul Kim, Eunyoung Park, Sung Yun Lee, Junha Hwang, Hyeongi Choi, Sang-Youn Park, Byungjune Lee, Woo-Suk Noh, Hoyoung Jang, Jae-Hoon Park, Dongbin Shin*, and Changyong Song*, *Frustrated phonon with charge density wave in vanadium Kagome metal*, Nature Communications **16**, 4861 (2025).

[3] Sung Yun Lee, Do Hyung Cho, Chulho Jung, Daeho Sung, Daewoong Nam, Sangsoo Kim, and Changyong Song*, *Deep-learning real-time phase retrieval of imperfect diffraction patterns from X-ray free-electron lasers*, npj Computational Materials **11**, 68 (2025).

[4] Jangwoo Kim†, HyoJung Hyun†, Seonghan Kim, Sun Min Hwang, Myong-Jin Kim, Dogeun Jang, Kyung Sook Kim, Jaeyong Shin, Sejin Kim, Junha Hwang, Sung Yun Lee, Eunyoung Park, Sangsoo Kim, Intae Eom, Changyong Song, and Daewoong Nam*, *Development of the Nanobeam X-ray Experiments instrument at PAL-XFEL*, Journal of Synchrotron Radiation **32**(2), 466–473 (2025).

[5] Sung Yun Lee, Eunyoung Park, Sinwoo Kim, Euije Jo, Su Yong Lee, Jun Woo Choi, and Changyong Song*, *Off-Axis X-Ray Vortex Beam Ptychography*, ACS Photonics **11**(9), 3804–3810 (2024).

[6] Junha Hwang†, Yungok Ihm†, Daewoong Nam, Jaeyong Shin, Eunyoung Park, Sung Yun Lee, Heemin Lee, Seung-Phil Heo, Sangsoo Kim, Je Young Ahn, Ji Hoon Shim, Minseok Kim, Intae Eom, Do Young Noh, and Changyong Song*, *Inverted nucleation for photoinduced nonequilibrium melting*, Science Advances **10**(18), eadl6409 (2024).

[7] Junha Hwang, Sejin Kim, Sung Yun Lee, Eunyoung Park, Jaeyong Shin, Jae Hyuk Lee, Myong-jin Kim, Seonghan Kim, Sang-Youn Park, Dogeun Jang, Intae Eom, Sangsoo Kim, Changyong Song, Kyung Sook Kim*, and Daewoong Nam*, *Development of the multiplex imaging chamber at PAL-XFEL*, Journal of Synchrotron Radiation **31**(3), 469–477 (2024).

[8] Sung Yun Lee†, Do Hyung Cho†, Sung Chan Song†, Jaeyong Shin, Junha Hwang, Eunyoung Park,

Su Yong Lee, Seongseop Kim, Jinwoo Lee, and Changyong Song*, *Nanoscale Three-Dimensional Network Structure of a Mesoporous Particle Unveiled via Adaptive Multidistance Coherent X-ray Tomography*, ACS Nano **17**(22), 22488–22498 (2023).

[9] Sung Yun Lee, Do Hyung Cho, Chulho Jung, Daeho Sung, Daewoong Nam, Sangsoo Kim, and Changyong Song*, *Denoising low-intensity diffraction signals using k-space deep learning: Applications to phase recovery*, Physical Review Research **3**(4), 043066 (2021).

[10] Do Hyung Cho†, Zhou Shen†, Yungok Ihm, Dae Han Wi, Chulho Jung, Daewoong Nam, Sangsoo Kim, Sang-Youn Park, Kyung Sook Kim, Daeho Sung, Heemin Lee, Jae-Yong Shin, Junha Hwang, Sung Yun Lee, Su Yong Lee, Sang Woo Han, Do Young Noh, N. Duane Loh*, and Changyong Song*, *High-Throughput 3D Ensemble Characterization of Individual Core-Shell Nanoparticles with X-ray Free Electron Laser Single-Particle Imaging*, ACS Nano **15**(3), 4066–4076 (2021).

[11] Ko Woon Kim†, Sung Yun Lee†, Jongdoo Choi, Juhee Chin, Byung Hwa Lee, Duk L. Na*, and Jee Hyun Choi*, *A Comprehensive Evaluation of the Process of Copying a Complex Figure in Early- and Late-Onset Alzheimer Disease: A Quantitative Analysis of Digital Pen Data*, Journal of Medical Internet Research **22**(8), e18136 (2020).

[12] Sungyun Lee*, Sunghun Kim, Inhae Seok, and Mincheol Kim, *Detecting Abuser Group in MMORPG by using Ranking System based on Game Transaction Network*, In Proceedings of the Korea Software Congress, 584–586 (KIISE, 2019).

Presentations

[1] The 37th Synchrotron Radiation Users' Workshop (Oral, as an invited talk) 2025
Korean Synchrotron Radiation User's Association
Title: *Deep learning and phase retrieval for coherent diffraction imaging*

[2] The 5th PAL-XFEL Users' Meeting (Oral, as an invited student talk) 2025
Korean Synchrotron Radiation User's Association
Title: *Deep learning for coherent diffraction imaging using XFELs*

[3] The 36th Synchrotron Radiation Users' Workshop (Poster) 2024
Korean Synchrotron Radiation User's Association
Title: *Off-axis X-ray vortex beam ptychography*

[4] APS March Meeting 2024 (Oral) 2024
American Physical Society
Title: *Nanoscale X-ray Tomography of Mesoporous Particle Improved via Adaptive Multidistance Coherent Diffraction Imaging*

[5] The 35th Synchrotron Radiation Users' Workshop (Poster) 2023
Korean Synchrotron Radiation User's Association
Title: *Network analysis of pore structure inside mesoporous particle revealed by multi-distance coherent X-ray tomography*

[6] 2023 KPS Fall Meeting (Poster) 2023

Korean Physical Society
Title: *Nanoscale three-dimensional network structure of a mesoporous particle unveiled via adaptive multi-distance coherent X-ray tomography*

[7] The 3rd PAL-XFEL Users' Meeting (Poster) 2023
Korean Synchrotron Radiation User's Association
Title: *Deep-Learning-Based Denoiser for Phase Recovery of Singe-Shot Diffraction Signals via X-ray Free Electron Laser*

[8] The 34th Synchrotron Radiation Users' Workshop (Poster) 2022
Korean Synchrotron Radiation User's Association
Title: *Multi-distance Coherent Diffraction Imaging for Super-resolution X-ray Microscopy*

[9] 2021 KPS Fall Meeting (Poster) 2021
Korean Physical Society
Title: *Deep-Learning-Based Denoiser for Phase Recovery of Single-Shot Diffraction Patterns Using XFEL*

[10] The 32nd Synchrotron Radiation Users' Workshop (Poster) 2020
Korean Synchrotron Radiation User's Association
Title: *Low Intensity Phase Retrieval Enhanced by Deep Neural Network*

[11] Korea Software Congress 2019 (Poster) 2019
Korean Institute of Information Scientists and Engineers
Title: *Detecting Abuser Group in MMORPG by using Ranking System based on Game Transaction Network*