Sun-jae Lee

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Sun jae Lee | satelite2517-repo

Seoul, South Korea

Research Interest

MHD, Stability, Negative triangularity, High performance computing, Artificial Intelligence(AI)

Education

- **Seoul National University** *Mar 2026 -*
  Department of Energy Resources Engineering Seoul, Korea
  - M.S. Candidate, Nuclear Engineering
- **Seoul National University** *Mar 2021 - Feb 205*
  College of Liberal Studies Seoul, Korea
  - B.S., Computer Science and Engineering Major
  - B.S., Physics Program Major

Experience

- **Princeton Plasma Physics Laboratory (PPPL)** *Jul 2025 – Aug 2025*
  Visiting Research Student Princeton, NJ, USA
  - Selected as one students for the SNU–PPPL joint research program on 3D fusion plasma physics
- **Dept. of Nuclear Engineering, Seoul National University** *Sep 2023 – Present*
  Undergraduate Research Assistant Seoul, Korea

  Advisor: Prof. Jong-Kyu Park
  - Utilized GPEC and DCON simulations to compare kinetic stabilization effects in PT vs. NT tokamaks and analyzed radial profiles of perturbed equilibria
  - Utilized GPEC and DCON simulations to compare kinetic stabilization effects in PT vs. NT tokamaks

  Advisor: Prof. Young-Suk Hwang
  - Built a reproducible data pipeline for VEST tokamak by integrating diagnostics, EFIT–CHEASE–GPEC workflow, and Python-based tools compatible with IMAS and HSDS
  - Developed a Python package to automate data processing and visualization for VEST experiments, enhancing research efficiency and collaboration
- **Dept. of Energy Resoureces Engineering, Seoul National University** *April 2022 - Dec 2022*
  Undergraduate Research Participant Seoul, Korea

  Advisor: Prof. Jin soo Kang
  - Participated in electrochemical lithium recovery experiments using CDI methods and evaluated system scalability by comparing theoretical and actual Li-ion recovery efficiency

Publications

C=Conference, J=Journal, R=In Review, S=In Submission, T=Thesis

[R.1] Hong-Sik Yun†, **Sun-jae Lee**†, Laurent Jung, et al. (2025). **Developing an IMAS-Compatible Platform for the University-Level Tokamak VEST and Its Application in Operating Characteristics Analysis**. *Plasma Physics and Controlled Fusion*, Vol. XX, Issue X, pp. XXX-XXX. DOI: XX.XXXX/XXXXX.XXXX.XXXXXXX

† These authors contributed equally to this work.

Presentations

P=Poster presentation, O=Oral presentation, A=Abstract

[P.4] **Sunjae Lee**, et al. (2025).**"Kinetic stability of negative-triangularity plasmas"**. *67th Annual Meeting of the APS Division of Plasma Physics*, Long Beach, California USA (Nov, 2025)

[P.3] **Sunjae Lee**, et al. (2025).**"Kinetic stability of negative-triangularity plasmas"**. *29th Workshop on MHD Stability Control*, Princeton, New Jersey, USA (July, 2025)

[P.2] **Sunjae Lee**, et al. (2025). **"Standardized Data Infrastructure for Tokamak: Implementation in VEST (Versatile Experiment spherical tokamak)"**. *2025 Spring meeting of the Korean Physics Society*, Seoul, Korea (April, 2025)

[P.1] **Sunjae Lee**, et al. (2024). **"Improvements of database system and analysis suite in VEST"**. *3rd International Fusion and Plasma conference (IFPC)*, Seoul, Korea (June 2024)

Projects and Awards

- **Perturbed Equilibrium Code Hackathon – Columbia Fusion Research Center** *Jul 2025*
  Tools: Julia, GPEC (reference), Plasma Physics Modeling Collaborative Hackathon Project
  - Will participate in a 3-day intensive hackathon to reproduce key functionalities of the GPEC equilibrium and response simulation package in Julia
  - Collaborate with undergraduate and graduate students to implement open-source plasma stability tools
  - Focus on real-time performance and software modularity for physics-informed code design in fusion simulation
- **High-Performance CUDA Programming Project – Accelerator Programming Summer School** *June 2024*
  Tools: CUDA, NVIDIA GPU, Nsight, C++
  - Completed program focused on GPU acceleration and CUDA optimization techniques at SNU
  - Developed CUDA-based performance tuning project in 2-person team, including kernel design and profiling
- **Text-to-Image Generation using Conditional GAN – 2023 OUTTA Deep Learning Bootcamp** *Jun 2023 – Aug 2023*
  Tools: PyTorch, Conditional GAN, Google Colab 2nd Prize Winner
  - Built a text-to-image generation model using conditional GAN architecture
  - Presented final results at bootcamp showcase and awarded 2nd prize among top-university teams
- **"Pairing" – SKYCC Hackathon** *May 2023*
  Tools: Node.js, MongoDB, AWS, Slack API Selected for Best Idea
  - Developed backend infrastructure for a web app; Designed data model and REST API endpoints using Node.js and MongoDB, deployed via AWS
  - Collaborated in a hackathon supported by AWS, Elastic, and Slack Korea

Leadership Experience

- **Teaching Assistant** *Sep 2025 - Dec 2025*
  Seoul National University, Computer Architecture [🌐]
  - Key responsibility or achievement in this role
  - Quantifiable impact or improvement made during tenure

Volunteer Experience

- **Volunteer Role A** *Month Year - Month Year*
  Organization Name [🌐]
  - Key responsibility or contribution in this role
  - Impact of your volunteer work
  - Skills developed or applied during this experience

Skills & Additional Information

- **Programming Languages:** Python, C/C++, Fortran, Java, Linux, CUDA, MATLAB, OpenCL, MPI / OpenMP
- **Simulation Tools:** DCON, GPEC
- **TOEFL iBT Score:** 102/120 (Reading 26, Listening 28, Speaking 25, Writing 23)