Sooyong Chae

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Education

Doctor of Philosophy, Physics — Palaiseau, France
École Polytechnique, Institut Polytechnique de Paris — *Sep 2024 – Sep 2027*

Master of Artificial Intelligence
Victoria University of Wellington — *Wellington, New Zealand*

Master of Economics
University of Otago — *Dunedin, New Zealand*

Bachelor of Science, Economics
University of Otago — *Dunedin, New Zealand*

Academic Experience

Research Exchange — Aug 2026 – Sep 2026
Hamlyn Centre for Robotic Surgery, Imperial College London — *London, UK*

Research Exchange — Sep 2025 – Dec 2025
Medical Photonics Laboratory, Florida International University — *Miami, USA*

PhD Candidate — Sep 2024 – Sep 2027
École Polytechnique, Institut Polytechnique de Paris — *Palaiseau, France*

Research Internship — Mar 2024 – Jul 2024
École Polytechnique, Institut Polytechnique de Paris — *Palaiseau, France*

Research Assistant & Teaching — Mar 2021 – Apr 2022
University of Otago — *Dunedin, New Zealand*

Teaching & Mentoring

Master's Student Tutor — 2025 – Present
École Polytechnique, Institut Polytechnique de Paris — *Palaiseau, France*

Tutor, Economics and Business Statistics — 2021
University of Otago — *Dunedin, New Zealand*

Industry Experience

Data Engineer / Consultant — Nov 2021 – Apr 2023
Ernst & Young, Data & AI Practice (APAC) — *Wellington, New Zealand*

Business Development Consultant — Mar 2016 – Nov 2018
Korea Trade Commission (KOTRA) — *Auckland, New Zealand*

Select Awards, Achievements & Honours

SPIE Best Student Paper Presentation Award (2026): SPIE Photonics Europe, Strasbourg.
Hi!PARIS Collaborative Project Funding (2026): Principal contributor; EUR 30,000 for the PRISMM project (PI: Dr. Tatiana Novikova).
COST Short-Term Scientific Mission Grant (2026): Research mobility to Hamlyn Centre, Imperial College London.
SPIE Conference Fellowship (2026): SPIE Photonics West, San Francisco.
Optica Best Student Poster Award (2025): 4th International Workshop on BioPhotonics and Optical Angular Momentum, Palaiseau.
3MT® Winner (2025): Institut Polytechnique de Paris winner, inter-university finals, and People's Choice Award.
Biomedical Engineering Research Exchange Award (2025): Engineering for Health (E4H), Institut Polytechnique de Paris.
Biomedical Engineering Conference Fellowship (2024): Engineering for Health, Institut Polytechnique de Paris.
École Polytechnique Doctoral Scholarship (2024).

Skills

Research: Biomedical optics, polarimetry, machine learning, computer vision, Monte Carlo simulation, medical imaging.
Programming: Python, SQL, Dart, R, Stata, EViews, Matlab, C++.
Tools: Git, Docker, Azure, GCP, Hadoop, Apache Spark, Alteryx, Power BI, Flutter, Django, Qt & various AI tools.

Languages: English (native/bilingual), Korean (native/bilingual), French (limited working proficiency).

Professional Development

MIT Global Entrepreneurship Program, Sloan School of Management (2017): Selected from 6,000+ applicants (120 places), Brisbane.

Other: IBM Data Science Professional Certificate; DataCamp Machine Learning Career Track; EY Core Consulting Program (100 hours).

Other Activities

Volunteering: SPIE student chapter president (2025); EY Climate Challenge Competition facilitation (2023).

Hobbies: Long-distance runner; 1st place, Tarawera Ultramarathon 165 km (20–29 age division), 2021.

Select Publications

Full list: scholar.google.com/citations?user=wVJsHuUAAAAJ

Peer-Reviewed Journals

Chae, S., et al. (2025). Machine learning approach to 3×4 Mueller polarimetry for complete reconstruction of diagnostic polarimetric images of biological tissues. *IEEE Transactions on Medical Imaging*, **44**(9). DOI: 10.1109/TMI.2025.3567570

Wang, M., **Chae, S.**, et al. (2025). Retardance and depolarization of brain white matter for intraoperative delineation of brain tumours: experiments and simulations. *Biomedical Optics Express*, **16**(12), 5261–5278. DOI: 10.1364/BOE.577075

Book Chapter & Patent

Novikova, T., Rodríguez-Núñez, O., Lucas, T., **Chae, S.** (2026). *Polarization-Sensitive Microscopy.* In: *Optical Techniques in Clinical Applications*, Progress in Optical Science and Photonics. Springer Nature. *(submitted).*

Novikova, T., **Chae, S.**, & Chae, H. *Physics-Informed Machine Learning System and Method for Real-Time Extraction of Polarimetric Parameters from Complete and Partial Mueller Matrices.* Patent application: **FR2604664**.

Selected Conference Presentations & Posters

Chae, S., & Novikova, T. (2026). Wide-field Mueller polarimetry for real-time intra-operative brain tumour visualization. *Gordon Research Conference: Optics and Photonics in Medicine and Biology*, Bates College, ME *(poster)*.

Chae, S., et al. (2026). Collagen quantification using Mueller matrix imaging with second-harmonic generation; and gestational stage prediction from cervical tissue. *SPIE Photonics Europe 2026*, Strasbourg. **Best Student Paper Presentation Award.**

Chae, S., et al. (2025). Fast Mueller matrix decomposition using physics-informed algorithms for intraoperative neurosurgery. *NESBO*, MIT, Cambridge, MA *(poster)*; and *4th International Workshop on BioPhotonics and Optical Angular Momentum*, Palaiseau *(poster)*. **Best Student Poster Award.**