

Bao (William) Nguyen

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Education

Stanford University Doctor of Philosophy (PhD), Mechanical Engineering	Stanford, US Sept. 2026 – Present
Imperial College London Master in Science (MSci Physics), First Class Honours (GPA: 4.0/4.0)	London, UK 2026
Massachusetts Institute of Technology Non-Degree Exchange Year	Cambridge, US 2024

Honors & Awards

Mechanical Engineering Department Fellowship, Stanford University	2026
Thrive Fellowship, Stanford University	2026
NNSA Travel Award, National Nuclear Security Administration	2025
APS DPP Student Travel Grant, American Physical Society	2024
Dean's Fund Award, Imperial Faculty of Natural Science	2024
NNSA Travel Award, National Nuclear Security Administration	2024
Dr Richard Learner Prize, Imperial College London	2023
CCEP Travel Grant, National Science Foundation	2023
Turing Scholarship for MIT Exchange, Imperial College London	2023
Imperial-MIT Exchange (1/270 selected), Imperial College London	2023
Dean's List, Imperial College London	2022 – 2023

Research Experience

Experiment Division, Pacific Fusion Supervisor: Dr. Patrick Knapp Project: Synthetic data generation and model inference for the Magnetic Recoil Spectrometer (MARS) - Built a surrogate spectrum model, achieving a >100,000x speedup compared to a full plasma neutronics simulation. - Built a differentiable Python package to generate synthetic MARS data and recover plasma conditions from it. - Identified measurable plasma properties that isolate different mechanisms degrading fusion yield. - Will present results via a contributed talk at the APS DPP conference.	June 2026 – Aug. 2026
Theory Division, Realta Fusion Supervisor: Dr. Kai Shih Project: WarpX PIC simulations to model neutral beam injection (NBI) - Collaborated with scientists from LBNL to implement and test WarpX's capability to model NBI devices. - Successfully benchmarked WarpX against the results presented in Sorokin <i>et al.</i> (2010). - Secured a one-month extension to develop scripts for start-to-end NBI simulations for optimization studies. - Presented a poster at the APS DPP conference & published conference proceedings at IPAC'26.	June 2025 – Nov. 2025
High Energy Density Physics Division, MIT Supervisor: Dr. Maria Gatu Johnson Project: Simulations of modulated deuteron spectra from the Magnetic Recoil Spectrometer at the NIF - Collaborated with scientists from GA and LLNL to constrain conditions of high-yield shots. - Independently developed and post-processed 2D PIC simulations on the Engaging HPC cluster. - Successfully reproduced the modulation effect, demonstrating the final spectra's sensitivity to initial conditions. - Presented at various conferences and submitted a first-author manuscript to the <i>Journal of Plasma Physics</i>. - Attended the HEDS Summer School & used FLASH to study the Kelvin-Helmholtz instability.	Sept. 2023 – May 2025

Supervisor: Professor Spencer Gessner

Project: Benchmarking WarpX vs. GUINEA-PIG for the multi-TeV collider initiative

- Derived simplified ILC collision scenarios to make analytical estimates of luminosity and beamstrahlung spectra.
- Validated the luminosity and quantum synchrotron radiation modules under these scenarios.
- Demonstrated WarpX's speed-up advantage through a performance comparison on the NERSC cluster.
- Presented a poster at the APS April Meeting & published a first-author conference proceeding at IPAC'24.

Laser-Plasma Group, Imperial College London

July 2022 – May 2023

Supervisor: Professor Zulfikar Najmudin

Project: Laboratory automation of a laser wakefield accelerator

- Developed an automated control system in Python to streamline data collection and analysis of a gas jet setup.
- Characterized gas jet targets using a Mach-Zehnder interferometer.
- Worked with a fellow intern to simulate and redesign a high-field solenoid to reach a target value of 20 T.
- Presented this work as a talk at the Imperial Physics Undergraduate Colloquium.

University of Medicine and Pharmacy at Ho Chi Minh City

July. 2022 – May 2023

Supervisor: Professor Khac Thai Minh

Project: Computational drug discovery of bacterial efflux pump inhibitors

- Conducted molecular dynamics simulations and virtual screening to identify inhibitors of bacterial efflux pumps.
- Developed high-throughput Python workflows to automate virtual screening and computational drug discovery pipelines.
- Co-authored peer-reviewed journal publications.

Publications

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- [8] **B. Nguyen**, Y. Lawrence, C. W. Wink, T. M. Johnson, N. Vanderloo, B. Reichelt, A. Hennessy, D. T. Casey, D. Schlossberg, N. Masters, J.L. Milovich, A. Le, S. Craxton, M. Gatu Johnson, and J. Frenje. Modulated deuteron spectra from the neutron-mode Magnetic Recoil Spectrometer at the NIF. *Journal of Plasma Physics* (Accepted) (2026). Preprint: arXiv:2509.06999.
- [7] A. Formenti, R. Lehe, A. Huebl, S. S. Bulanov, A. Myers, J. Osterhoff, J.-L. Vay, S. Gessner, P. Kicsiny, A. Kinderman, **B. Nguyen**, and J. Park. A modern particle-in-cell code for beam-beam simulations of future colliders. Submitted to *Physical Review Accelerators and Beams* (2026).
- [6] K. Shih, **B. Nguyen**, R. Lehe, A. C. Cooper, J. Eickman, C. M. Jacobson, A. Latrille, D. A. Sutherland, A. Formenti, A. Persaud, O. Shapoval, and J. L. Vay. Self-consistent WarpX modeling of space-charge neutralization in WHAM-relevant neutral beams. *Proc. IPAC'26*.
- [5] **B. Nguyen**, K. Shih, R. Lehe, O. Shapoval, J. Eickman, A. Formenti, C. M. Jacobson, A. Latrille, A. Persaud, D. A. Sutherland, and J. L. Vay. WarpX simulation of the plasma meniscus effect in a neutral beam injection system. *Proc. IPAC'26*.
- [4] **B. Nguyen**, A. Formenti, R. Lehe, J. L. Vay, S. Gessner, and L. Fedeli. Comparison of WarpX and GUINEA-PIG for electron positron collisions. *Proc. IPAC'24*.
- [3] T. V. Phan, V. T. V. Nguyen, M. T. Le, **B. Nguyen**, T. T. Vu, and K. M. Thai. Identification of efflux pump inhibitors for *Pseudomonas aeruginosa* MexAB-OprM via ligand-based pharmacophores, 2D-QSAR, molecular docking, and molecular dynamics approaches. *Molecular Diversity* **27**, 1234–1245 (2023).
- [2] T.-V. Phan, L.-T. Tuong, V.-T.-V. Nguyen, C.-V. T Vo, T.-D. Tran, M.-T. Le, **B. Nguyen**, V.-T. Tran, T.-T. Vu, and K.-M. Thai. Computational assessment and in vitro test of phytochemicals of *Usnea aciculifera* as potential inhibitors of *Escherichia coli* efflux pump AcrB. *Journal of Biomolecular Structure and Dynamics* **43**(3), 1316–1328 (2025).
- [1] T. V. Phan, P. N. H. Huynh, T. P. Nguyen, T. T. Vu, M. T. Le, **B. Nguyen**, P. Truong, and K. M. Thai. Discovery of a novel AcrAB-TolC pump inhibitor using the multistep virtual screening, synthesis and biological evaluation of asymmetric imidazole-4,5-dicarboxamide derivatives. *New Journal of Chemistry* **47**, 20718–20722 (2023).

Conference Presentations

- [14] **B. Nguyen et al.** Synthetic data generation and inference frameworks for the MAgnetic Recoil Spectrometer (MARS) at Pacific Fusion. *APS Division of Plasma Physics*. November 2026. [Contributed Oral]
- [13] **B. Nguyen et al.** Modulated deuteron spectra obtained with the MRS on the NIF. *APS Division of Plasma Physics*, Long Beach. November 2025. [Contributed Oral]
- [12] **B. Nguyen et al.** WarpX Modeling of Positive-Ion Neutral Beam Injection from Acceleration Grid to Post-Neutralization Transport at Realta Fusion. *APS Division of Plasma Physics*, Long Beach. November 2025. [Poster]
- [11] **B. Nguyen et al.** Modulated deuteron spectra obtained with the MRS on the NIF. *MIT-Imperial Seminar*, Virtual. May 2025. [Seminar Talk]
- [10] **B. Nguyen et al.** Modulated deuteron spectra obtained with MRS on the NIF. *Omega Laser Facility Users Group Workshop*, Rochester. May 2025. [Poster]
- [9] **B. Nguyen et al.** Modulated deuteron spectra obtained with MRS on the NIF. *NIF & JLF User Groups Meeting*, Livermore. February 2025. [Poster]
- [8] **B. Nguyen et al.** PIC simulations of the MRS spectra in the foil case. *Monthly Nuclear Diagnostics and Analysis WIP Discussion*, NIF, Livermore. December 2024. [Seminar Talk]
- [7] **B. Nguyen et al.** Studies of modulated knock-on ion spectra from the charged-particle mode MRS in direct-drive ICF implosions at NIF. *APS Division of Plasma Physics*, Atlanta. October 2024. [Poster]
- [6] A. Formenti et al. Next-generation interaction point simulations for linear lepton colliders. *International Workshop on Future Linear Colliders*, Tokyo. July 2024. [Contributed Oral]
- [5] **B. Nguyen et al.** Studies of modulated knock-on ion spectra from the charged-particle mode MRS in ICF implosions at NIF. *Omega Laser Facility Users Group Workshop*, Rochester. April 2024. [Poster]
- [4] A. Formenti et al. Modeling linear electron-positron colliders at the interaction point with WarpX. *APS April Meeting*, Sacramento. April 2024. [Contributed Oral]
- [3] **B. Nguyen et al.** Electron-positron collisions: A comparison of WarpX and GUINEA-PIG simulations. *APS April Meeting*, Sacramento. April 2024. [Poster]
- [2] J. L. Vay et al. Toward start-to-end modeling of plasma-based colliders with the exascale PIC code WarpX. *6th European Advanced Accelerator Concepts Workshop*, Venice. September 2023. [Contributed Oral]
- [1] C. Wang and **B. Nguyen**. Development of a pulsed field magnet suitable for laser-matter interaction studies. *Imperial College London Physics Undergraduate Colloquium*, London. October 2022. [Contributed Oral]

Teaching Experience

Teaching Assistant, Imperial College London

PHYS4001: Practical Physics Laboratory & Computing

Oct. 2025 – Apr. 2026

- Guided and debugged first-year experiments including torsion pendulum and interferometry.
- Taught basic scientific computing in Python, including NumPy and pandas.

Skills & Interests

Programming Languages: Python, MATLAB, C/C++

Simulation Tools: PIC (WarpX, EPOCH, hybrid VPIC), FLASH, LTspice

General Tools: SLURM, VSCode, git, LaTeX

Languages: Vietnamese (native), Spanish (basic)

Hobbies: anime, badminton, charity work