Bao (William) Nguyen

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Education

Imperial College London, London, UK   Aug. 2021 — May 2026
MSci Physics, **First Class Honours**, Equivalent GPA: **4.0/4.0.**

- Selected as **1/270** student for an exchange year at MIT based on academic excellence and potential.
- Coursework: **Advanced Electromagnetism**, Waves & Optics, **Mathematical Methods**, Thermodynamics, Advanced Practical Physics, **Python with OOP** (ray tracing project to model adaptive optics), **Partial Differential Equations**.
- Interruption of studies from 2024-2025 to continue my research at the MIT High Energy Density Physics group.

Massachusetts Institute of Technology, Cambridge, USA   Aug. 2023 — June 2024
Junior Exchange Year, GPA: 4.4/5.0

- Year-long research project in the MIT PSFC's High Energy Density Group headed by Dr. Johan Frenje.
- Attended various PSFC seminars on plasma physics and ICF/MCF concepts.
- Attended the Princeton's **Introduction to Plasma Physics and Fusion Energy** summer school.
- Coursework: **Plasma Physics I** (Graduate), **Fusion Energy** (Graduate), Introduction to Matrix Calculus (Undergraduate), Introduction to Machine Learning (Undergraduate).

Selected Honors & Awards

APS DPP Student Travel Grant, American Physical Society	2024
URSSI Summer School Scholarship, University of Illinois Urbana-Champaign	2024
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, Imperial College London	2023
Imperial-MIT Exchange, Imperial College London	2023
SULI Program Awardee, Department of Energy	2023
Dean's List (Top 10%, 1st & 2nd Year), Imperial College London	2022 —2023
John Adams Institute Grant, Imperial College London	2022

Publications

[1] **B. Nguyen**, et al. Modulated deuteron spectra from the neutron-mode Magnetic Recoil Spectrometer at the NIF. In preparation to submit to Physics of Plasmas (2024).

[2] **B. Nguyen**, et al. Comparison of WarpX and GUINEA-PIG for electron positron collisions. In proceedings of IPAC 2024.

[3] T-V. Phan, et al. Discovery of novel AcrAB-TolC pump inhibitor by multistep virtual screening, synthesis and biological evaluation of asymmetric imidazole-4,5-dicarboxamide derivatives. Published in the New Journal of Chemistry (2023)

[4] T-V. Phan, et al. Identification of efflux pump inhibitors for Pseudomonas aeruginosa MexAB-OprM via ligand-based pharmacophores, 2D-QSAR, molecular docking, and molecular dynamics approaches. Published in the Molecular Diversity (2023).

Conference Posters and Talks

[1] **B. Nguyen**. PIC simulations of the MRS spectra in the foil case. Monthly Nuclear Diagnostics and Analysis WIP Discussion. National Ignition Facility, Livermore, United States. December 2024. (Oral).

[2] **B. Nguyen**, Y. Lawrence, T.M. Johnson, N. Vanderloo, S. Craxton, M.G. Johnson. Modulated deuteron spectra from the Magnetic Recoil Spectrometer at the NIF. APS Division of Plasma Physics, Atlanta, United States. October 2024. (Poster)

[3] A. Formenti, R. Lehe, A. Huebl, C. B. Schroeder, S. Gessner, **B. Nguyen**, L. Fedeli, J.L. Vay. Next-generation interaction point simulations for linear lepton colliders. International Workshop on Future Linear Colliders, Tokyo, Japan. July 2024. (Oral)

[4] **B. Nguyen**, A. Formenti, R. Lehe, J.L. Vay, S. Gessner, L. Fedeli. Comparison of WarpX and GUINEA-PIG for electron positron collisions. 15th International Particle Accelerator Conference, Nashville, United States. May 2024. (Poster)

[5] **B. Nguyen**, Y. Lawrence, T.M. Johnson, N. Vanderloo, S. Craxton, M.G. Johnson. Studies of Modulated Knock-on Ion Spectra from the Charged Particle Mode Magnetic Recoil Spectrometer in Direct-Drive ICF Implosions at NIF. Omega Laser Facility Users Group 2024 Workshop, Rochester, United States. April 2024. (Poster)

[6] A. Formenti, R. Lehe, A. Huebl, C. B. Schroeder, S. Gessner, **B. Nguyen**, L. Fedeli, J.L. Vay. Modeling linear electron-positron colliders at the interaction point with the exascale code WarpX. APS April Meeting 2024, Sacramento, United States (Oral).

[7] **B. Nguyen**, A. Formenti, S. Gessner, J.L. Vay, R. Lehe, L. Fedeli. Electron-Positron Collisions: A Comparison of WarpX and GUINEA-PIG Simulations. APS April Meeting 2024, Sacramento, United States. (Poster)

[8] **B. Nguyen** and A. Ameri. Particle Driven Plasma Wakefield Accelerator: Linear Theory and PIC Simulation. MIT Physics Directed Reading Program, Cambridge, United States. January 2024. (Oral)

[9] J.L. Vay, A. Fomenti, A. Huebl, **B. Nguyen**, C-K. Ng, E. Zoni, H. Vincenti, L. Fedeli, M. Garten, O. Shapoval, R. Lehe, R. Sandberg, S. Gessner. 6th European Advanced Accelerator Concepts Workshop, Venice, Italy. September 2023. (Oral)

[10] C. Wang and **B. Nguyen**. Development of a pulsed field magnet suitable for laser-matter interaction studies. Imperial College London Physics Undergraduate Colloquium, London, United Kingdom. October 2022. (Oral)

Skills & Interests

Programming languages: Python, MATLAB, C/C++
Simulation tools - PIC (WarpX, EPOCH, hybrid VPIC), Geant4, LTspice
Languages - Vietnamese (native), Spanish (basic)

Operating systems - Linux, macOS, Windows
General tools - SLURM, vim, git, LaTeX
Hobbies - anime, badminton, charity work

Research Experience

High Energy Density Physics Group, MIT PSFC   Sept. 2023 — May 2025
Supervisor: Dr. Maria Gatu Johnson
Project: Investigation into the unclear origin of ion energy modulation observed by the Magnetic Recoil Spectrometer

- Collaborated with scientists from GA and LLNL to constrain the experimental conditions of high-yield NIF shots.
- Independently developed and post-processed 1D PIC simulations with synthetic probes on the Engaging HPC cluster.
- Reproduced the modulation effect, demonstrating the final spectra's sensitivity to initial conditions.
- Presented a poster at the OLUG'24 and APS DPP 2024 conferences.
- Finalizing data analysis and preparing a manuscript for publication.

FACET-II, Stanford Linear Accelerator Center   June. 2023 — May 2024
Supervisor: Professor Spencer Gessner
Project: Benchmarking WarpX (modern PIC) vs GUINEA-PIG (serial beam-beam code) as part of the 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 different collision scenarios.
- Demonstrated WarpX's speed-up advantage through a performance comparison on the NERSC HPC cluster.

Laser-Plasma Group, Imperial College London   June. 2022 — Apr. 2023
Supervisor: Professor Zulfikar Najmudin
Project: Lab automation of a laser wakefield accelerator

- Characterized gas jet targets using a Mach-Zehnder interferometer.
- Developed an automated control system via Python to reduce data collection and analysis of a gas jet set up.
- Worked with fellow intern to simulate and redesign a high field solenoid to reach a new B-field target strength of 20 T.

Computational Chemistry Group, University of Pharmacy and Medicine of Ho Chi Minh   Aug. 2021 — July. 2022
Supervisor: Professor Khac Thai Minh
Project: Molecular dynamics simulation (MD) & data analysis automation

- Identified efflux pump inhibitor candidates through literature reviews and pharmacophore modelling.
- Conducted MD simulations (GROMACS) to assess the inhibition potential of these candidates on different bacteria.
- Developed Python automation scripts for high-throughput data analysis shared on the group server.