Alan Lyu

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Education

Peking University *Sep. 2023 – Jul. 2027*

- Major in **Physics** (School of Physics, PKU)

  Take a dual degree in **Life Sciences** (School of Life Sciences, PKU)
- **CGPA: 3.822/4.0; MGPA: 3.811/4.0; Top 10%**
- **Coursework:**
  - **Mathematics:** 3.81 & 3.93 in Advanced Mathematics I & II, 3.81 in Linear Algebra, 3.95 in Methods of Mathematical Physics;
  - **Physics:** 3.73 in Mechanics, 3.88 in Electromagnetism, 3.99 in Thermal Physics, 3.86 in Optics, 3.52 in Theoretical Mechanics, Electrodynamics*, 3.91 in Equilibrium Statistical Physics, 3.73 in Quantum Mechanics, 3.68 in General Physics Lab I & II*, 3.58 in Fundamentals of Electronic Circuits and Experiments; Nonlinear Physics*;
  - **Life Sciences:** 3.88 in Physiology, Genetics*, Cell Biology*, Lectures on Systems Biology*;
  - **Computation:** 3.83 in Introduction to Computation; 3.88 in Data Structures and Algorithms.

** represents that the course is currently in progress.*

Research Experience

Sessile/Motile Transition in Bacillus subtilis *Sep. 2024 – Feb. 2025*

*Advisor: Prof. **Chao Tang**, Center for Quantitative Biology & School of Physics, Peking University*

- Studied the sessile/motile transition of *Bacillus subtilis*, exploring how bacteria adapt to environments by a bistable transition strategy.
- Extended the bistable transition in static environments to fluctuating environments, utilizing computational simulation to determine the adaptive range of this strategy to environmental stress and entropy parameters.
- Established a program to simulate the behavior of bacteria group in fluctuating environments by simple rules, investigating the adaptation not only to the environmental stresses but also the environmental entropy.

Modeling Molecule Motor by Stochastic Thermodynamics (in progress) *Feb. 2025 -*

*Advisor: AP **Yuansheng Cao**, Department of Physics, Tsinghua University*

- Applied stochastic thermodynamics to model and analyze molecular motors — a typical mesoscopic systems far from equilibrium.

Impact of ER on Calcium Oscillation in Pancreatic (in progress) *Mar. 2025 -*

*Advisor: Prof. **Chao Tang**, Center for Quantitative Biology & School of Physics, Peking University*

- Modeled and computed calcium-electrical coupling utilizing novel experimental techniques to record calcium oscillations and electrical signals in pancreatic cells.
- In particular, incorporated the buffering effect of endoplasmic reticulum(ER) into a system of differential equations to analyze its impact on the stability of dynamic systems.

Honors and Awards

- China National Scholarship (2023)
- Merit Student of Peking University (2023)
- CUPT Research Training Competition among Peking University Students (2024)
  - Second prize in the competition (ranked 2/18 teams)
  - Best Opponents and Commentators
- CPhO — Chinese Physics Olympiad (2021-2022)
  - Provincial First Prize in CPhO2022

  - Provincial Second Prize in CPhO2021
- IM^2C — The International Mathematical Modeling Challenge (2017-2021)
  - Meritorious in IMMC2021 International Competition
  - Finalist in IMMC2021 China Division;
  - Meritorious in IMMC2020 International Competition
  - Meritorious in IMMC2020 China Division
  - Meritorious in IMMC2019 International Competition
  - Meritorious in IMMC2019 China Division