Bowen Yu

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Education

Massachusetts Institute of Technology *(B.S., Physics & AI)* — *Aug. 2024 — Jun. 2027*
Peking University *(B.S., Physics)* — *Sep. 2023 — Jul. 2024*
No.1 High School Affiliated to Central China Normal Univ. — *Sep. 2020 – Jul. 2023*

- **GPA**: 5.00/5.00 (*MIT*); 3.91/4.00 (*Peking Univ.*)
- *Selected Coursework*: Machine Learning, Deep Learning, Natural Language Processing, Design and Analysis of Algorithms, Computational Architecture, Quantum Physics I, II & III, Probability and Statistics

Working Experiences

AI & Material Science Research Assistant @ MIT (*Cambridge, MA, United States*) — *Jan. 2025 — Present*

- Leveraged CNNs, RL, generative models, and MLFFs for defect identification and materials design
- Co-authored three papers in ML-based defect engineering and valence-informed generative material discovery
- Collaborated with the *Quantum Measurement Group* under Prof. Mingda Li

Large Language Model Data Researcher @ ByteDance (*Beijing, China*) — *Aug. 2025 — Sep. 2025*

- Led the design of a benchmark suite of 500+ university-to-PhD-level physics problems for evaluating LLM reasoning
- Contributed to internal projects improving symbolic reasoning fidelity in frontier LLMs
- Co-developed a test-time scaling (TTS) pipeline enabling gold-medal–level performance on IPhO 2025 theoretical problems

AI Workload Deployment Intern @ Intel Corporation (*Shanghai, China*) — *Jun. 2025 — Jul. 2025*

- Authored internal tutorials on GPU memory layouts (CuTe layout, linear layout) for AI workloads
- Analyzed CuTeDSL lowering paths for GEMM kernels, informing backend optimization strategies
- Produced technical notes adopted by the CuTeDSL framework team as performance reference materials

Awards & Honors

International Physics Olympiad (IPhO) — *Jul. 2023*
Gold medal, ranked **1st place** (Absolute Winner) in the world

Publications

† → Equal contribution; * → Corresponding author

1. Cheng†,*, M., Fu†, C.-L., **Yu†, Bowen**, Li*, M. & *et al.* A Foundation Model for Non-Destructive Defect Identification from Vibrational Spectra. *arXiv preprint arXiv:2506.00725* (2025).
2. Cheng†,*, M., Luo†, W., Tang†, H., **Yu, Bowen**, Li*, M. & *et al.* Enhancing Materials Discovery with Valence Constrained Design in Generative Modeling. *arXiv preprint arXiv:2507.19799* (2025).
3. Cheng†,*, M., Wan†, Q., **Yu†, Bowen**, Li*, M. & *et al.* Reinforcement learning-guided optimization of critical current in high-temperature superconductors. *arXiv preprint arXiv:2510.22424* (2025).

Projects

PaperPlay (HackMIT 2025) — *Sep. 2025*

- Built a web platform that converts hand-drawn Mario-style levels into playable games in under 5 minutes using OpenCV and Modal.
- Won 2nd place in the Modal sponsor track.
- Demo: https://demo-description.vercel.app/; Code: https://github.com/HACKMIT-2025

Representation Efficiency in Neural Reasoning (MIT 6.7960 Deep Learning) — *Oct. 2025 — Dec. 2025*

- Designed and executed a multilingual evaluation pipeline for representation efficiency in neural reasoning using multilingual mathematical benchmarks as an example
- Analyzed token/character length distributions across five tokenizers, identifying an **encoder gap** between *intrinsic* vs. *realized* token density
- Demonstrated 5–10% token savings available under well-aligned multilingual representations
- Repo and blog: https://github.com/bowenyu066/language-shapes-reasoning/

Skills

- Python, C/C++, PyTorch, NumPy, Triton, CUTLASS, MACE, MLFFs; English (*fluent*), Chinese (*native*)