# MATTHEW PAN

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## EDUCATION

**Carnegie Mellon University** **Pittsburgh, PA**
*B.S. Statistics & Machine Learning and Computer Science* May 2028
- Selected Coursework: Computer Systems (15-213), Discrete Math (21-127), Imperative Computation (15-122)

## EXPERIENCE

**Undergraduate Researcher** **Pittsburgh, PA**
Machine Learning Department, CMU May 2025 - Present
- Developing a multi-agent LLM system for clinical decision support, enabling real-time collaboration between specialized agents for diagnosis, treatment planning, and literature retrieval
- Engineered an automated MCP orchestrator with a pipeline for discovering, configuring, and validating medical MCP servers via scraping, config generation, and Docker-based sandbox testing
- Second author on *EMNLP 2025 System Demo* (under review); open-source release planned

**Undergraduate Researcher** **Pittsburgh, PA**
McWilliams Center for Cosmology and Astrophysics, CMU January 2025 - Present
- Developing a novel Graph Neural Network cosmological simulator for complex physical systems that predicts particle accelerations and temperature evolution using an encode–process–decode architecture
- Demonstrated improved simulation fidelity over prior GNN-based simulators (e.g., DeepMind's GNS), enabling stable, long-horizon rollouts across thousands of timesteps
- Manuscript in preparation for submission to *The Astrophysical Journal*; open-source release planned

**Blockchain Research Intern** **Taipei, Taiwan**
Academia Sinica June 2023 - July 2024
- Designed and implemented stochastic blockchain network simulators, improving predictive accuracy by 54% using reinforcement learning and Monte Carlo optimization
- Executed MEV mitigation experiments, analyzing transaction ordering, latency, and topology across five blockchain architectures, enabling more stable and fair transaction processing

**Web3 Analyst Intern** **Taipei, Taiwan**
AppWorks Venture August 2023 - December 2023
- Built and deployed a full Cosmos-based blockchain network to benchmark Skip Protocol's MEV SDK and interoperability features, assessing feasibility for production use, leading to an investment decision
- Conducted due diligence on 30+ AI/Web3 startups in Greater SEA, assessing technical feasibility, market potential, and risk through structured founder interviews

## PUBLICATIONS

Li, Y., **Pan, M.**, Liu, C., Zhu, H. *Evaluating Multi-Agent Clinical Reasoning Systems*. **NeurIPS 2025 GenAI4Health Workshop***, in preparation*.

Li, Y., **Pan, M**., Liu, C., Zhu, H. *Medical Deep Research: Orchestrating LLM Agents and Resources for Medical Investigation*. **EMNLP 2025 System Demo**, *under review*.

**Pan, M.,** Catalano, A., Zhang, X., Croft, R. *Learning the Evolution of Large-Scale Cosmological Structure via Graph-Based Deep Learning.* **The Astrophysical Journal**, *in preparation*.

## SKILLS

Programming: Python, Java, JavaScript, C++, R, Go
Frameworks: PyTorch, TensorFlow, scikit-learn, Hugging Face Transformers, NetworkX, NumPy, Matplotlib
Tools: Git, Docker, Supabase, Next.js, Vercel, Slurm, Linux
Topics: Graph Neural Networks, Large Language Models, Physics-Informed Neural Networks, Model Evaluation

## LANGUAGES

English (Native), Mandarin (Native)