Jiakang Chen

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Education

University College London *London, United Kingdom*
MSc Machine Learning (Distinction) *Sep 2024 – Sep 2025*

- Relevant courses: Supervised Learning (84%), Probabilistic and Unsupervised Learning (76%), Statistical Natural Language Processing (81%), Bayesian Deep Learning (75%), Applied Deep Learning (85%), and Advanced Topics in Machine Learning (77%).

Imperial College London *London, United Kingdom*
MSci Physics with Theoretical Physics *Oct 2020 – Jun 2024*

- Relevant courses: Advanced Classical Physics (83%), General Relativity (78%), Quantum Field Theory (67%), Unification (66%), Solid State Physics (70%), and Statistical Physics (72%).

Publications

- **Jiakang Chen**, Sufia Hashim, and Carla Figueira de Morisson Faria. "Physics-informed neural networks for solving saddle-point equations in strong-field physics with tailored fields." Accepted for publication in *Physical Review Research*, 2026. doi:10.1103/ltzl-bj62; arXiv:2603.15786.

Conference Presentations

Atto-FEL 2026 *London, United Kingdom*
Poster Presentation *Jun 2026 – Jul 2026*

- Presented "Physics-informed neural networks for solving saddle-point equations in strong-field physics with tailored fields" at the International Conference on Attosecond and Free-Electron Laser Science, University College London.

Research Experience

University College London *London, United Kingdom*
Physics-Informed Neural Networks for Strong-Field Saddle-Point Equations *Sep 2025 – Present*

- Developed an unsupervised physics-informed neural network framework for solving complex-time saddle-point equations governing direct above-threshold ionisation in tailored laser fields.
- Introduced a window parametrisation strategy that guides the optimisation towards physically relevant saddle points and improves convergence stability.
- Benchmarked the neural-network solutions against conventional root-finding methods across a range of laser and photoelectron-momentum parameters.
- Used the predicted saddle points to calculate coherent above-threshold-ionisation photoelectron momentum distributions.

University College London *London, United Kingdom*
MSc Project — Mesh-free Neural Solvers for PDEs *Jan 2025 – Apr 2025*

- Combined machine-learning techniques with physics for solving partial differential equations.
- Compared three solvers—physics-informed neural networks, the deep Ritz method, and weak adversarial networks—on Poisson problems up to five dimensions and on one- and two-dimensional Schrödinger equations.
- Extended the framework to a laser-driven Schrödinger equation using the Kramers–Henneberger transformation.

University College London *London, United Kingdom*
NLP Project — Retrieval-Augmented Generation with Knowledge Graphs *Jan 2025 – Apr 2025*

- Proposed a retrieval-augmented generation framework integrating knowledge-graph-based retrieval and query decomposition to improve multi-hop question answering.
- Constructed a domain-specific knowledge graph from unstructured text and combined dense retrieval with knowledge-graph reasoning.
- Evaluated retrieval precision and answer quality and identified limitations associated with embeddings and query structuring.

University College London *London, United Kingdom*
Applied Deep Learning Project — Weakly Supervised Semantic Segmentation *Jan 2025 – Apr 2025*

- Benchmarked three class-activation-map-based localisation methods: CAM, ECS-CAM, and CCAM.
- Designed an ensemble framework with conditional random field refinement to generate higher-quality pseudo-labels.
- Trained a U-Net using the pseudo-labels, achieving 76% IoU compared with a 68% fully supervised baseline.

Imperial College London *London, United Kingdom*
MSci Project — Black Holes and Branes in Supergravity *Jul 2023 – Apr 2024*

- Derived brane solutions in $D = 11$ and other dimensions using advanced techniques in general relativity and supergravity.
- Developed an understanding of the formulation of spinor fields in higher-dimensional spacetimes.
- Investigated T-duality in string theory and related dimensional-reduction methods; achieved a project mark of 78.05%.

Skills

Programming: Python
Machine Learning: PyTorch, scikit-learn, physics-informed neural networks, deep learning, probabilistic modelling
Scientific Computing: NumPy, SciPy, Pandas, Matplotlib, numerical optimisation, root finding, differential equations
Tools: Git, GitHub, Jupyter, Visual Studio Code, Mathematica, LaTeX