

Mingyuan Wang

Theoretical Physics

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Education

Utrecht University 2025-2027
MSc Theoretical Physics (expected)

University College London 2022-2025
BSc Theoretical Physics
Second-Class Honours, Upper Division (2:1)

Selected coursework: Group Theory, Differential Geometry, General Relativity, Particle Physics, Computational Physics, Probability and Statistics.

Guanghua Qidi College 2020-2022
A-levels: 5 A*, 1 A
Mathematics, Further Mathematics, Physics, Chemistry: 90%+; Psychology: 80%+.

Technical Skills

Programming
Python, C++, MATLAB, Mathematica

Scientific tools
ROOT, GEANT4, COMSOL

Design and modelling
SolidWorks, CAD

Research Interests

Theoretical high-energy physics; symmetry; differential geometry; machine learning for detector simulation and event reconstruction.

Teaching

Independent A-level Tutor 2021-2022
Mathematics, Further Mathematics, Physics, Chemistry, and competition preparation; approximately 50 teaching hours.

Languages

Chinese; English

Research Experience

Spherical-Detector Image Reconstruction Aug-Dec 2024
Research Intern, Shandong University | Prof. Hongyue Duyang

- Simulated particle events, trajectories, and spherical-detector response images using ROOT.
- Applied machine-learning methods to reconstruct particle events from detector images. Python, C++, ROOT.

Neutrino Detector Simulation and Spectrum Analysis Jun-Dec 2024
Research Intern, Sun Yat-sen University | Prof. Fengpeng An

- Simulated a plastic-scintillator-cube detector with photomultiplier readout using ROOT and GEANT4.
- Reconstructed energy spectra with Bayesian and SVD unfolding and compared reconstruction efficiencies. Python, C++, ROOT, GEANT4.

Selected Projects

Investigations of the Square-Distance Equation Sep 2024-present
Differential properties of circle- and square-distance functions

- Studied geometric properties of higher-order derivatives of distance functions for points inside a circle and a square.

Complex Orbital Dynamics Feb-May 2024
Numerical analysis of multi-body orbital systems

- Implemented Euler, velocity-Verlet, and fourth-order Runge-Kutta integrators in Python.
- Simulated two-, three-, four-, and six-body systems, including unequal-mass systems, figure-eight orbits, Lagrange configurations, and semi-stable trajectories; assessed long-term stability.

Chaos and Fluid-Mechanics Simulation Jul-Sep 2021
Double pendulum, Lorenz system, and tube-flow models

- Built interactive MATLAB simulations of the double pendulum and Lorenz system, and conducted tube-flow simulations in COMSOL.

Awards

UKMT Senior Mathematical Challenge 2020
Gold Award; top 6-7%

Canadian Intermediate Mathematics Contest 2019
Distinction; highest award category; top 25%