

# QIAORONG YU

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## EDUCATION

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**MMathPhys, Balliol College, University of Oxford, UK** Oct 2021 - June 2025 (Expected)  
*Master of Mathematical and Theoretical Physics*

- **First Class** in Part A & B exams
- **Distinction** in preliminary exams

**Guanghua Cambridge International School, China** Sep 2018 – Jun 2021

## HONORS & AWARDS

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- Four Undergraduate Project Grants received from Balliol College, Oxford 2022 – 2024
- Reynolds Scholarship received from Balliol College, Oxford 2023
- Prosser Exhibition received from Balliol College, Oxford 2022
- British Physics Olympiad Round One Top Gold 2020
- Silver and Bronze Duke of Edinburgh Award 2020

## RESEARCH EXPERIENCE & INTERNSHIPS

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**Vogelsberger lab, Massachusetts Institute of Technology** Cambridge, MA, USA  
**Research Assistant** Jan 2024 - Ongoing  
*The measurements of the splashback features of dark matter halos using TNG300 and MillenniumTNG simulations*

- Investigated factors affecting the splashback radius and the splashback features of dark matter halos using cosmological galaxy formation simulations IllustrisTNG and MillenniumTNG. Independently conducted comprehensive data analysis, including computing density profiles, performing bootstrap methods, and applying curve fitting techniques to derive mathematical formulas.
- Solved technical challenges on remote servers, including remote visualization, parallel computing, and job submission. Managed complex computations by utilizing GPU acceleration and parallel computing, and proficiently handled tasks in the Linux terminal using SSH, Git, and screen-related commands.
- Manuscript in preparation.

**Staresina lab, University of Oxford** Oxford, UK  
**Research Assistant** Feb 2024 - Ongoing  
*Memory transformation during sleep*

- Investigating the memory transformation during sleep by analyzing the changes in lower and higher-level visual representations of memories pre- and post-sleep by comparing the performance of various visual and semantic deep neural networks (DNNs), including Alexnet, ResNet, BLIP, CLIP, GPT, etc, and correlating sleep and memory retention by electroencephalogram (EEG) analysis on both Python and Matlab.
- Assisting in data collection and analyzing within the group, including EEG setup and localization, fMRI preprocessing and MVPA, and diffusion MRI analysis and modeling.

**DxE Laboratory, University of Montreal**

**Research Assistant**

Montreal, Canada

May 2023 - Oct 2023

*Attempting dream decoding with generalizable visual EEG encoding models*

- Attempted using EEG to decode visual dream content by leveraging an encoding model which generates EEG signals from pretrained deep neural networks on natural images.
- Accumulated skills including EEG preprocessing, extracting visual feature maps, representative similarity analysis (RSA), permutation tests and correlational analysis via Python (e.g., MNE, scikit-learn).
- Poster presented at the Cognitive Neuroscience Society (CNS) 2024 Annual Conference.

**Department of Physics, University of Oxford**

**Undergrad Extended Practical in Astrophysics**

Oxford, UK

Jan 2023 – Mar 2023

*Analysis of Exoplanet Radial Velocity Observations*

- Implemented radial Velocity Method to measure the orbital parameters of exoplanets 51 Peg b and hd80606 b, as part of second year physics course in Oxford.
- Manually implemented optimization, curve fitting, Lomb-Scargle periodogram and Markov Chain Monte Carlo (MCMC) algorithms to simulate and to fit radial velocity data to determine planetary parameters via Python (Astropy). Both circular and eccentric orbits are successfully analyzed.

**Motus VR<sup>1</sup>**

**Internship**

Oxford, UK

Mar 14<sup>th</sup>, 2022 – Mar 18<sup>th</sup>, 2022

- Developed 3D environments for an Endless Running game using Unreal Engine 4.27, enhancing skills in game engineering and art design, including mesh design, texture modification, and lighting.
- Demonstrated strong time management and stress-handling abilities during a short and intensive internship, successfully delivering a functional VR project and presented the project to employers by exporting and performing the Endless running via VR helmet.

## OTHER EXPERIENCE

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**Comprehensive Oxford Math and Physics Online School, University of Oxford**

**Student Tutor**

Oxford, UK

Nov 14<sup>th</sup>, 2022 – May 1<sup>st</sup>, 2023

- Led six UK high school students in weekly physics and mathematics sessions which are beyond A-Level syllabus. Marked students' assignments and provided feedback.
- Co-ordinated with other COMPOS tutors to improve the lesson plan and teaching structure.

**Oxford University Pistol Club**

**Secretary & Committee Member**

Oxford, UK

Mar 2023 – June 2024

- Served as Secretary and Committee Member, managing club documentation and organizing events, including membership, regular training sessions, varsity competitions, and the Freshers' Fair.
- Coordinated with the Rifle Associations in Britain and the Home Office, developing strong communication and administrative skills.

**Oxfam<sup>2</sup>**

**Volunteer**

Oxford, UK

Jan 2023 - Mar 2023

- Assisted in the operation of charity shops every weekend, including cashiering, ironing donated clothes, organizing shelves, managing the online store, and sorting second-hand records and CDs.

- Worked with elderly people in the UK, enhancing communication and cooperation skills while fostering awareness of social service and diverse cultural backgrounds.

## CORE COURSE

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- First year: Classical Mechanics, Linear Algebra, Calculus, Differential Equations, Functions of a Complex Variable, Basic Statistics.
- Second year: Mathematics Methods, Thermodynamics and Statistical Mechanics, Electromagnetism and Optics, Quantum Mechanics.
- Third year: Special Relativity and Symmetry, General Relativity and Cosmology, Atomic and Laser Physics, Nuclear and Particle Physics, Solid State Physics, Numerical Methods.

## COMPUTATIONAL SKILLS

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- **Shell:** Skilled in Unix/Linux systems, remote server operations, SSH, job submission, and environment management with conda, and GPU acceleration.
- **Python:** Proficient in NumPy, pandas, SciPy, Matplotlib, PyTorch, h5py, Astropy, unyt, MNE, mpi4py (parallel computation), and Qiskit.
- **Matlab:** Proficient in data visualization, numerical analysis.
- **Unreal Engine:** Basic skills in 3D graphics and scene design.
- Extensive experienced with **VS Code**, **Git/GitHub**, **LaTeX**, and **Mathematica**.

## SKILLS & INTERESTS

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**Languages:** English, Chinese, French (A1).

**Interests:** painting, playing the lute (Pipa), pole dance, MMA, movies & science fictions.