Fannie Vaquero

MSci. Theoretical Physics | Problem Solver | Teacher

Aspiring theoretical physicist and MSci graduate looking for a PhD position. My research interets include: Dark matter and dark energy, baryogenesis, large scale structures, black holes, early cosmology, neutrinos and beyond the standard model. Desire to contribute to cutting-edge research as well as sharing knowledge and enthusiasm by teaching at a university level.

fannievaquero@gmail.com | GitHub : Penguin64100 | My LinkedIn

Languages : English | French

Skills

Python | Advanced Mathematics | Problem Solving | LaTeX | NumPy | MATLAB | Teaching Experience | HTML

Education

SEP 2019 - SEP 2023 | **MSci Physics with Theoretical Physics** | **King's College London** | **First Class Honours**

SEP 2016 - JUY 2017 | **CPGE - Classe Préparatoire aux Grandes Ecoles | Physique-Chimie et Sciences de l'Ingénieur** | **Lycée René Cassin**

Intensive preparatory programs geared towards students with ambitions of entering the prestigeous French Grandes Écoles by performing exceptionally well in highly competitive entrance examinations.

SEP 2013 - JUN 2016 | **French Baccalaureate** | **Lycée René Cassin**

Employment and Volunteering

Mathematics Teacher | Work | Lycée Français Charles de Gaulle | SEP 2023 - SEP 2025

Mathematics teacher at Lycée Français Charles de Gaulle, where I also teach Python and HTML as part of the computer science curriculum. Beyond classroom instruction, I actively contribute to the institution through participation in staff meetings, strategy planning sessions, and budget management discussions.

Highlight: Volunteered to guide enthusiastic senior students in preparing weekly physics experiments, which were presented during a special event held in honor of the visit of Nobel Laureate, Professor Gérard Mourou.

Physics and Maths tutor | Work | TUTORS AND COACHES LTD | OCT 2019 - JUL 2023

Specialised in tutoring physics and mathematics while tailoring lessons to the student's needs and abilities. Assistance with homework, test preparation, or a deeper comprehension of complex topics. For students from 11 to 18 years old exclusively from French schools in London.

Social Secretary for the Womxn in Physics Society | `Volunteering` | `King's College London` | `SEP 2021 - MAY 2022`

Highlight: Instrumental in onboarding the first ever male panelist during the WiP annual conference.

Responsible for planning events for KCL Womxn in Physics. Part of the organisation of the annual conference inviting female physicists across the UK to highlight the importance of women in STEM.

Teaching Assistant | `Civil Service` | `Collège Aturri, St Pierre d'Irube` | `OCT 2018 - JUN 2019`

Collaborated with teachers during mathematics and science lessons, providing specialized support to small groups of students with learning disabilities.

Research Projects

Flavour Oscillations in the Reissner-Nordström spacetime | `4th year Thesis` | `MAY 2022`

Highlight: This research contributed novel findings that align with the established scientific literature.

Conducted a research investigation centred on the oscillatory behaviour of neutrinos in the vicinity of a charged black hole. Followed by intricate computations to determine the phase discrepancy between different neutrino flavours when two beams underwent gravitational lensing.

Literature Review on Neutrino Oscillations in Schwarzchild spacetime | `Report` | `OCT 2022 - DEC 2022`

Compilation of key discoveries related to neutrino oscillations, encompassing existing knowledge and the outstanding inquiries yet to be resolved. Thorough review of all derivations and calculations were conducted.

Dark Matter and Cosmic Structure Formation | `Report` | `DEC 2022`

Project on cosmological perturbation theory and its role in the formation of large scale structures: from primordial fluctuations to CMB anisotropies. Review of the cosmological origin of Primordial Black Holes (PBHs), the violation of the slow rolls parameters and the enhanced power spectrum. Followed by the review of mass constraints from astrophysical sources. Generated some original code.

Investigating the Dirac equation using Supersymetric Quantum Mechanics (SUSYQM) | `3rd year Thesis` | `APR 2022`

Investigation of the SUSYQM framework applied to the 1+1 Dirac equation. The project was followed by a detailed analysis of the fractionalisation of charge in a topological soliton field.

Achievements and Certifications

`JUNE 2023` Participed in BBC Radio 4's 'The 3rd Degree' podcast | `King's College London`

`MAY 2023` Produced novel research in cosmology as part of my master's thesis | `King's College London`

Relevant Courses

Dark Matter & Dark Energy | King's College London

Strings, Branes and Quantum Gravity | King's College London

Supersymmetry and Conformal Field Theory | King's College London

Quantum Field Theory | King's College London

Standard Model and Beyond | King's College London

Lie Group and Lie Algebra | King's College London | audit only

General Relativity and Cosmology | King's College London

Advanced Mathematical Methods for Theoretical Physics | King's College London

Statistical Mechanics | King's College London

Quantum Mechanics | King's College London

Relativity and Sub-atomic Physics | King's College London

Stellar Structure and Evolution | King's College London

Introduction to Astrophysics | King's College London

References

Prof. Jean Alexandre | email: jean.alexandre@kcl.ac.uk

Dr. David Marsh | email: david.j.marsh@kcl.ac.uk