ALEXANDER REEVES

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EDUCATION

ETH Zürich *September 2021- current*

PhD candidate in Professor Alexandre Refregier's Cosmology group. Working on probe combination and Neutrino Cosmology.

Downing College, University of Cambridge *September 2017 - July 2021*

Masters: Part III Natural sciences (Astrophysics)
Examined courses in Cosmology, Quantum Field Theory, Gauge Field Theory and Particle Physics.
Non-examined courses in General Relativity and Field theory in Cosmology.
Masters grade: 1st class (ranked 4th in cohort)

Undergraduate: Part II Physics with courses in Quantum Mechanics, Electromagnetism and Optics, Thermodynamics, Condensed Matter Physics, Relativity and Astrophysical fluids
Undergraduate grade: 1st class

Latymer Upper School, London *September 2011 - June 2017*

A Levels: Maths(A*), Physics(A*) (Salter's Horners prize for gaining one of the top 5 marks achieved in the 2017 Physics A-Level), Chemistry(A*), Further Maths(A*)
GCSEs: 10 subjects (all Grade A*) including Maths and English

AWARDS

1st place: International PLANCKS theoretical Physics competition *2020*

Part of the 4-person University of Cambridge team that came first out of 45 University teams at the international finals.

Whitelegg and Unwin Scholarships, Downing College *2018, 2021*

Scholarships for academic achievement.

Olympiads, Latymer Upper *2016-2017*

Gold (Top 50) certificate in the British Physics Olympiad.

RELEVANT EXPERIENCE

Masters Research Project, University of Cambridge *October 2020- present*

- Master thesis entitled: restoring concordance with early dark energy and massive neutrinos.
- Explored an extension to the standard ΛCDM model of cosmology involving Early Dark Energy and massive neutrinos.
- Supervised by Dr Blake Sherwin, Dr Sunny Vagnozzi and Professor George Efstathiou.

Internship at The Technology Partnership (TTP) *Summer 2020*

- Developed an algorithm in C to perform nerve data signal processing on a microcontroller.
- The aim of this project was to provide a feedback mechanism for implantable pain relief devices that interface with the spinal cord.
- Designed a Physics model describing the heatflow from a natural gas pipe.

Research Internship, Cardiff University *Summer 2019*

- Developed a Python-based code to perform relativistic ray tracing for tracking light curves around Kerr Black holes to create simulated accretion disk images under the supervision of Dr Hong Qi.
- Delivered a 30-minute presentation of my work to the research group at the end of the internship.

PROGRAMMING SKILLS

- Python: 5 and a half years experience including two long research projects. Large Astrophysical data handling and statistical analysis including Bayesian analysis
- C: Used to program microcontrollers for an internship project as well as for astrophysics masters project.
- MATLAB: 2 years of experience using MATLAB for computational exercises as part of undergraduate degree.
- Other computational skills: LaTeX, Git, MS packages (including Excel to analyse data)
- Cosmology specific software: experienced user of `CLASS`, `HealPy`, `MontePython`

TALKS

1. Talk at NBI Summer school: 'Neutrinos here there and everyhwere'
   Delivered a 10 minutes talk on Masters research project: link
2. Talk at Tensions in Cosmology conference, Corfu
   Delivered a 10 minute talk on results of paper: arXiv:2207.01501

PUBLICATIONS

1. AR, L.Herold, S.Vagnozzi, B.Sherwin, E.Ferreira, Restoring concordance with Early Dark Energy and Massive neutrinos, April 2023, accepted in MNRAS, arXiv:2207.01501.
   Contribution: led the project and performed the bulk of the Computational analysis and subsequent writing of paper analysing an extension to the ΛCDM model.
2. AR, A.Nicola A.Refregier, T.Kacprzak, L.F.Machado Poletti Valle, 12×2pt combined probes: pipeline, neutrino mass, and data compression, September 2023, Submitted to JCAP, arxiv:2309.03258.
   Contribution: led the project and performed most of the Computational analysis and subsequent writing of the paper.