

# Richard D.P. Grumitt

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## RESEARCH POSITIONS

### **TSINGHUA UNIVERSITY | SHUIMU TSINGHUA SCHOLAR**

September 2020 - September 2022

Advisor: Prof. Yi Mao

- Working on the development of novel statistical and machine learning methods for the analysis of cosmological 21-cm data.
- Collaborating with Prof. Uros Seljak at UC Berkeley on algorithms for high-dimensional Bayesian inference and generative modelling.

## EDUCATION

### **UNIVERSITY OF OXFORD | DPHIL IN ASTROPHYSICS**

Oct 2016 - July 2020 (expected) | Wolfson College

Advisors: Prof. David Alonso, Prof. Michael Jones and Prof. Angela Taylor

Thesis Title: Component Separation for Cosmic Microwave Background Studies

- Member of the C-Band All-Sky Survey (C-BASS) collaboration. Specialising in the development and application of statistical tools for the analysis of cosmological data.
- Extensive background in Bayesian probabilistic modelling and computation (hierarchical modelling, Markov Chain Monte Carlo, variational inference etc.).

### **UNIVERSITY OF OXFORD | MASTER OF PHYSICS - FIRST CLASS HONOURS**

Oct 2012 - June 2016 | St. Hilda's College

Advisor: Dr. David Sloan

## EXPERIENCE

### **NEWTON FUND | LECTURER**

May 2017 - June 2019 | Thailand and South Africa

- Lecturer for the Newton Fund summer schools, a UK government development initiative supporting scientific capacity building in developing countries.
- Delivered workshops on Bayesian statistics and supervised student projects, along with providing language assistance on the Thai program.
- Selected participant in the first International Training Centre in Astronomy/UNESCO workshop on astronomy for STEM education.

### **RHODES ARTIFICIAL INTELLIGENCE LAB | MACHINE LEARNING ENGINEER**

January 2019 - June 2019 | Oxford, United Kingdom

- Developed a convolutional neural network architecture for the tracking of nano-particles in video microscopy data, in collaboration with the Centre de Biochimie Structurale (CBS).
- Final code base was shared with the CBS, to be released as an open source tool for biophysicists.

### **GOVERNMENT OFFICE FOR SCIENCE | POLICY INTERN**

May 2018 - August 2018 | London, United Kingdom

- Worked on the Science Capability Review (SCR), a joint project with the Government Chief Scientific Adviser and HM Treasury. Led the analysis of seven government departments, along with a study of government innovation policy.
- The SCR resulted in a new £50 million per year fund in the Autumn 2018 budget, targeting joint projects between government and industry.

## AWARDS

- Shuimu Tsinghua Scholar, September 2020 - September 2022
- Science and Technology Facilities Council (STFC) Studentship, October 2016 - July 2020.
- Allen Scholarship, October 2013 - June 2016.

## SELECTED PRESENTATIONS

- “Bayesian Statistics for Astrophysics,” DARA Summer School, HartRAO, South Africa, May 2019.
- “The C-Band All-Sky Survey: Point source detection and zero-level,” CMB foregrounds for B-mode studies, Tenerife, Spain, October 2018.
- “The C-Band All-Sky Survey,” National Astronomical Research Institute, Chiang Mai, Thailand, July 2017.

## TEACHING

- Co-supervisor, Gabriele Montefalcone, CMB Inpainting Project, University of Oxford, July 2019 - November 2020.
- Tutor in Physics, Hertford College, Oxford, October 2018 - June 2020.
- Electromagnetism Lab Demonstrator, University of Oxford, October 2017 - June 2019.

## OUTREACH

- Thai School Visits: Led outreach days at schools in Ayutthaya and Sisaket provinces, involving sessions on astrophysics and university admissions, July 2018 - present.
- Oxford Physics Outreach: Led workshops for secondary school visits to Oxford Physics, October 2016 - January 2020.
- Stargazing Oxford: Assisted in the running of Stargazing Oxford, the main annual outreach event for Oxford Astrophysics, October 2016 - January 2020.

## SKILLS

### LANGUAGES

Native fluency:

English

Professional Working Proficiency:

Thai

### SOFTWARE AND TOOLS

LaTeX • MS Office • Mathematica •

Unix/Linux

### PROGRAMMING

Python • SQL • Matlab

## PUBLICATIONS

1. R.Cepeda-Arroita et al. (including R. D. P. Grumitt). First Detection of Spectral Variations of Anomalous Microwave Emission with QUIJOTE and C-BASS. arXiv e-prints, Jan 2020, accepted by MNRAS. <https://arxiv.org/abs/2001.07159>.
2. Gabriele Montefalcone, Maximilian H. Abitbol, Darsh Kodwani, R.D.P. Grumitt. Inpainting CMB maps using Partial Convolutional Neural Networks, arXiv e-prints, Nov 2020, accepted by JCAP. <https://arxiv.org/abs/2011.01433>.
3. R. D. P. Grumitt, Luke Jew and C. Dickinson. Hierarchical Bayesian CMB Component Separation with the No-U-Turn Sampler, MNRAS, June 2020. <https://arxiv.org/abs/1910.14170>.
4. R. D. P. Grumitt et al. The C-Band All-Sky Survey: total intensity point-source detection over the northern sky. MNRAS, June 2020. <https://arxiv.org/abs/1910.08583>.
5. Luke Jew and R. D. P. Grumitt. The spectral index of polarized diffuse Galactic emission between 30 and 44 GHz. MNRAS, May 2020. <https://arxiv.org/abs/1907.11426>.
6. Luke Jew et al. (including R. D. P. Grumitt), The C-Band All-Sky Survey (C-BASS): Simulated parametric fitting in single pixels in total intensity and polarization. MNRAS, Dec 2019. <https://arxiv.org/abs/1907.11642>.
7. C. Dickinson et al. (including R. D. P. Grumitt). The C-Band All-Sky Survey (C-BASS): Constraining diffuse Galactic radio emission in the North Celestial Pole region. MNRAS, May 2019. <https://arxiv.org/abs/1810.11681>.
8. Michael E. Jones et al. (including R. D. P. Grumitt). The C-Band All-Sky Survey (C-BASS): Design and capabilities. MNRAS, Nov 2018. <https://arxiv.org/abs/1805.04490>.

## REFERENCES

- Prof. David Alonso, Department of Physics, University of Oxford.
- Prof. Clive Dickinson, Jodrell Bank Centre for Astrophysics, University of Manchester.
- Prof. Michael Jones, Department of Physics, University of Oxford.
- Prof. Angela Taylor, Department of Physics, University of Oxford.