+44 (0)7402 130477
St Edmunds College, Cambridge
sakl2@cam.ac.uk

Samuel AK Leeney

1st year PhD in Physics candidate

github.com/samleeney
cavendishradiocosmology.com

My current work focused on building data analysis tools for use in Cosmology - designing statistical tools that take data from telescopes and output results that are useful to Physics. During my MPhil I developed a first-of-its-kind Bayesian anomaly detection methodology using numerical sampling techniques. Initially designed for RFI mitigation, we hope to use it to detect other anomalies in the future such as Fast Radio Bursts. Prior to that I developed a machine learning algorithm to classify malignant tissue during breast cancer surgery, which is currently being tested at NU Hospital.

Publications

Leeney et al (2023)	A Bayesian approach to RFI mitigation (Phys. Rev. D 108, 062006)
Anstey and Leeney (2023)	Enhanced Bayesian RFI mitigation and transient flagging using likelihood reweighting (2310.02146)
Barkhur et al (in prep)	Intra-operative ex-vivo assessment of lymph node metastases by selective-sampling Raman micro-spectroscopy

Academic Talks

Bayesian anomaly detection — **November 2023**
Breakthrough Listen UK Technosignature Workshop — *Jodrell Bank, United Kingdom*

A Bayesian approach to RFI mitigation — **June 2023**
Kavli Astrostatistics and Machine Learning — *Cambridge, United Kingdom*

A Bayesian approach to RFI mitigation — **October 2022**
5th Global 21cm Conference, UC Berkeley — *Berkeley, United Kingdom*

RFI Management in the REACH pipeline — **April 2022**
Observational and Theoretical 21cm Cosmology, Kavli Institute for Cosmology — *Cambridge, United Kingdom*

Research Experience

PhD student — **October 2023 — Present**
Cavendish Astrophysics — *Cambridge, United Kingdom*

- Developing statistical methods for global 21cm Cosmology to be used in the REACH telescope.
- Extending Bayesian anomaly detection to time transient anomalies of interest such as fast radio bursts.

Research assistant / SKA data challenge — **April 2023 — October 2023**
Cavendish Astrophysics — *Cambridge, United Kingdom*

- Working on the Cambridge effort to separate a mock 21cm signal from simulated foregrounds in the SKA data challenge.

MPhil Project / Bayesian anomaly detection — **Jan 2022 — Jan 2023**
Cavendish Astrophysics — *Cambridge, United Kingdom*

- Using novel Bayesian inference techniques mitigate for radio frequency interference
- Initially designed for use in global 21cm Cosmology
- Now trialing as a general Bayesian anomaly detector for radio transients
- Published in APS Physical Review D

Extended summer research project / image segmentation techniques for breast cancer diagnosis — **June 2021 — Dec 2021**
Nottingham University — *Nottingham, United Kingdom*

- My work on this project (continued from my undergraduate thesis) was to design an image segmentation algorithm to generate sampling points for raman spectra analysis, providing a highly sensitive diagnosis on malignant tissue in intra-operative timeframes.
- This was achieved using convolutional neural networks, which I designed based on the U-Net neural network.
- These works are currently in preparation for publication. I will be named as the third co author.

Education

MPhil Physics — **Lent 2022 — Lent 2023**
Cambridge University — *Cambridge, United Kingdom*

First Class Degree in Physics — **Sept 2018 — July 2021**
Nottingham University — *Nottingham, Unted Kingdom*

- Notable Electives: Physics Research Project B (79); Introductory Experimental Physics (89); Intermediate Experimental Physics (82); The Quantum World (77).

A-Levels and GCSES — **Sept 2000 — July 2013**
The King Alfred School — *London, United Kingdom*

+44 (0)7402 130477
St Edmunds College, Cambridge
sakl2@cam.ac.uk

Samuel AK Leeney

1st year PhD in Physics candidate

github.com/samleeney
cavendishradiocosmology.com

Teaching

Supervisions: Part IA Physics for Natural Sciences — **Michaelmas 2023 - Present**
Supervisions: Part IA Scientific Computing — **Lent 2023**
Demonstrating: Part IA Physics Labs — **Lent 2023**

Computer Skills

Computing/Programming — Unix, BASH, zsh, vim, git, Python, MATLAB, MPI, TensorFlow, PyTorch

Referees

Eloy de lera Acedo — +44 (0)1223 337365, eloy@mrao.cam.ac.uk
Ioan Notitingher — +44 (0)115 9515172, ioan.notingher@nottingham.ac.uk