



# Rafael Cabral

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## Summary

As a statistics researcher, I specialize in applied and computational statistics. My research revolves around building more robust and computationally efficient modelling frameworks for spatial and temporal data. I have worked with Gaussian and non-Gaussian processes, model criticism and robustness, and approximate inference with MCMC, INLA, and variational inference. I also did internships in the industry in data science, deep neural networks, and image segmentation. My website is [rafaelcabral96.github.io](https://rafaelcabral96.github.io).

## Education

### Ph.D. in Statistics

KAUST

Saudi Arabia

2020 - 2023

- Thesis entitled [Criticism and robustification of latent Gaussian models](#).
- Supervised by Profs. Håvard Rue and David Bolin

### M.Sc. in Applied Mathematics

INSTITUTO SUPERIOR TÉCNICO - UNIVERSITY OF LISBON

Lisbon, Portugal

2017 - 2019

- Thesis entitled [Space-time trends and dependence of wind extremes in north-western Germany](#).
- Top degree in Portugal: the lowest entry grade is 18.35/20.

### B.Sc. in Engineering Physics

INSTITUTO SUPERIOR TÉCNICO - UNIVERSITY OF LISBON

Lisbon, Portugal

2014 - 2017

- Top degree in Portugal: the lowest entry grade is 18.9/20.

## Awards

2022 **Al-Kindi Statistics Research Student Award**, a research award for top Statistics Ph.D. students at KAUST

Saudi Arabia

2022 **McKinsey & Company, Forward program**

Saudi Arabia

2022 **Dean's list award**, during Ph.D. at KAUST

Saudi Arabia

2020-2022 **Ph.D. progress rated as Outstanding (A+)**, by the KAUST evaluation committee

Saudi Arabia

2019 **Research fellowship grant**, for the development of research work in extreme value theory (FCT-BL299/2018)

Portugal

2019 **Diploma of academic merit**, for great performance in the M.Sc. in Applied Mathematics

Portugal

2017 **Diploma of academic merit**, for great performance in the B.Sc. in Engineering Physics

Portugal

2013 **Asteroid Discovery Award**, International Astronomical Search Collaboration. Confirmed asteroid by the Minor Planet Center of the University of Harvard with name 2013 EZ7

Portugal

## Publications

### Fitting latent non-Gaussian models using variational Bayes and Laplace approximations

R. CABRAL, D. BOLIN, AND H. RUE, *arXiv* (PREPRINT)

2022

- Paper: [arxiv.org/abs/2211.11050](https://arxiv.org/abs/2211.11050)
- R package: [github.com/rafaelcabral96/ngvb/](https://github.com/rafaelcabral96/ngvb/)

### Controlling the flexibility of non-Gaussian processes through shrinkage priors

R. CABRAL, D. BOLIN, AND H. RUE, *Bayesian Analysis*

2022

- Paper: [doi.org/10.1214/22-BA1342](https://doi.org/10.1214/22-BA1342)
- Github: [github.com/stan-dev/connect22-space-time](https://github.com/stan-dev/connect22-space-time)

### Space-time trends and dependence of precipitation extremes in north-western Germany

R. CABRAL, A. FERREIRA, AND P. FRIEDERICH, *Environmetrics*

2019

- Paper: [doi.org/10.1002/env.2605](https://doi.org/10.1002/env.2605)

### A price model with finitely many agents

A. ALHARBI, T. BARKARYAN, R. CABRAL, ET AL., *Bulletin of the Portuguese Mathematical Society*

2019

- Paper: [hdl.handle.net/10754/662310](https://hdl.handle.net/10754/662310)

## Professional Experience

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### Internship on Optimization

Saudi Arabia

KAUST

2019

- Implemented and improved a particle-swarm optimization algorithm
- Application to non-convex function optimization and machine learning problems.
- Python (Numpy and Tensorflow).

### Data Science Internship

Lisbon, Portugal

ODYSAI

2018

- Startup developing Docdigitizer, a product that automatically extracts information from documents using machine learning.
- Data processing tasks using Python.
- Designed real-time analytics dashboards to understand user behavior and product performance.

### Deep Learning Internship

Lisbon, Portugal

HOSPITAL DA LUZ LEARNING HEALTH

2018

- Won the IST Enterprise Challenge competition on how AI can aid the medical industry.
- Applied deep learning algorithms to segment 3D medical images automatically.
- Convolutional neural networks in Python (Keras and Tensorflow).

### Data Science Spring Program

Lisbon, Portugal

BNP PARIBAS

2018

- Worked with Alteryx for data processing and Tableau for data visualization.

## Leadership experience

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### Student Ambassador

Saudi Arabia

KAUST

2021-2023

- Represented the CEMSE division and aided in its recruitment efforts.
- Promoted the Statistics program abroad.

### Teaching assistant on the stochastic processes course

Saudi Arabia

KAUST

2020-2022

- Mandatory course in M.Sc./Ph.D. in Statistics and Electrical Engineering with 45 attending students.
- Designed course projects, weekly homeworks and graded exams and projects.
- Delivered weekly lectures where I solved the homework live and answered students' questions.

## Attended conferences and workshops

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### StanConnect 2022: Stan Through Space and Time

Online

- Speaker: Robust non-Gaussian models and how to fit them in Stan.
- [github.com/stan-dev/connect22-space-time](https://github.com/stan-dev/connect22-space-time)

2022

### Summer school: Statistics for Point Patterns in Space and Beyond

Aalborg, Denmark

AALBORG UNIVERSITY

2022

- Attended classes given by Professors Jesper Møller and Rasmus Waagepetersen.

### 2022 ISBA world meeting

Montreal, Canada

INTERNATIONAL SOCIETY FOR BAYESIAN ANALYSIS

2022

- Poster: Controlling the flexibility of non-Gaussian processes through shrinkage priors

## Referrals

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Håvard Rue

Professor, Statistics

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KAUST, Saudi Arabia

David Bolin

Associate Professor, Statistics

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KAUST, Saudi Arabia