

# Bradley.J Gram-Hansen

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"Life is nothing but an electron looking for a place to rest"

## EDUCATION

### UNIVERSITY OF OXFORD

PHD IN MACHINE LEARNING AND STATISTICS

Supervisors : Prof Yee Wyhe Teh • Dr Tom Rainforth  
Dr Atılım Günes Baydin • Prof Frank Wood •  
Prof Phil Torr

Expected completion by Aug 2020 | Oxford, UK

### UNIVERSITY OF NOTTINGHAM

MMATH IN MATHEMATICS

BACHELORS IN MATHEMATICAL PHYSICS

2011 - 2015 | Nottingham, UK

Grade: 75% avg over 4 years. First (GPA 4.0)

## LINKS

Github:// [bayesianbrad](#)

Google Scholar:// [Publications](#)

LinkedIn:// [bradleygramhansen](#)

Twitter:// [@bayesianbrad](#)

Blog:// [Bradley's Blog](#)

## SKILLS

### TECHNICAL SKILLS

Statistical Modelling

Machine Learning

Probabilistic Programming

Markov Chain Monte Carlo

Gaussian Processes

Regression

Neural Networks

Deep Learning

Bayesian Inference

Time Series

Differential Equations

Relativity

Analysis

Quantum and Classical Mechanics

Quantum and Classical Information Theory

Linear Algebra

Stochastic Processes

Quantum Field Theory

Mathematical Biology

Non-linear Systems

### PROGRAMMING SKILLS

Python • Matlab • Clojure •

C++ • Git • Docker & Singularity • Shell

Linux & UNIX •  $\LaTeX$  • HTML

### SPECIFIC LIBRARIES

Pytorch • Pyro • Pyprob • Matplotlib • Numpy

Scikit-learn • SciPy • Jupyter Notebook • Many

others

### INTERPERSONAL SKILLS

Team player • Patient • Organised

Motivator • Responsible • Adaptive

Hard-working • Good Listener

Observant • Analytical

### LANGUAGES

English (Native) • Mandarin (Learning)

French (Basic)

### REFERENCES

Several available upon request.

## EXPERIENCE

### OXCSML AND TORR VISION GROUP

RESEARCHER, OCT 2016 – PRESENT

- Designed probabilistic programming languages and interpretable AI systems, with a focus on social and scientific applications, for physics and health-care.
- Developed new inference strategies that leverage deep learning frameworks.
- Created a probabilistic programming model checking system for "First-order models", enabling new classes of inference algorithms to be deployed to probabilistic programming systems in an automated way.
- Contributed to building a framework for automating the calibration of industrial simulators, written in any language.
- Developed a kernel-based algorithm for performing inference on small data-sets.

### TECHNICAL CONSULTANT

CONSULTING, JUN 2019 – PRESENT

- I work with several social ventures, creating localised electricity grids to providing education solutions to children across Africa.
- I offer insights and technical solutions on how to apply statistical analysis and machine learning 'AI' to a variety of different domains.
- This role often requires me to think outside of the box to deploy unique solutions and work with a variety of different teams.

### FRONTIER DEVELOPMENT LAB

RESEARCH INTERN, JUN 2018 – OCT 2018

- I designed a state-of-the-art system for generating automated maps of informal settlements from low-resolution satellite imagery. This was the first time any such thing had been done with this type of low-resolution data structure.
- This project was a collaboration between the European Space Agency, Oxford University, SA Catapult, NVidia and UNICEF.
- I had to develop methods that were robust to very noisy data and help lead teams of researchers.

### UNIVERSITY OF NOTTINGHAM

RESEARCH INTERN, JUN 2014 – SEPT 2014

- I worked on developing novel techniques for analysing quantum channels and quantum maps in a relativistic framework using Gaussian states.
- I worked both independently and as part of a small team

## INVITED TALKS

- Invited by the UN to give a talk on AI for space at the AI for good global summit. Geneva, CH, 2019
- Invited to the Oxford centre for Human Brain Activity to give a talk on Probabilistic Programming. Oxford, UK, 2018.
- Invited to ESA Esrin to give a talk on using machine learning to detect informal settlements. ESA Esrin, IT, 2018.

## AWARDS

### ACADEMIC

- |           |  |
|-----------|--|
| 2020      | EY - Best Technology Business Award at the AI for Climate Change Challenge |
| 2019      | Runner-up in the Vice-Chancellor's Social Impact Award                     |
| 2019      | NeulPS travel award  |
| 2018      | FDL Award for Unexpected Discovery   |
| 2016-2020 | EPSRC Fully-Funded 4-Year PhD Studentship                                  |
| 2014      | EPSRC Summer Research Award  |
| 2014      | BP Ambition Award  |
| 2012      | Eliahou Dangoor Scholarship  |
| 2012      | PWC High Flyers Award  |
| 2011      | Sir Peter Mansfield High Achiever Scholarship                              |
| 2011-2015 | St Ann's Experian Scholarship  |
| 2011-2015 | First in the Family Scholarship  |
| 2010      | Excellent Dedication and Contribution A-level Physics                      |
| 2010      | Interest and Enthusiasm A-level Mathematics                                |

### SPORTING

- |           |   |
|-----------|---|
| 2016      | IronMan Copenhagen 11th in Age Group                  |
| 2016      | Silver Medal, Fell Running Championships              |
| 2005-2007 | National mini field youth hockey champion U13 and U15 |

## PUBLICATIONS

### PRE-PRINTS

- **B. Gram-Hansen**\*, C. Schroeder de Witt\*, P.H.S.Torr, Y.W. Teh, A. G. Baydin and T. Rainforth, **Efficient Bayesian Inference for Nested Simulators** 2nd Symposium on Advances in Approximate Bayesian Inference 2020
- **B. Gram-Hansen**\*, C. Schroeder de Witt\*, N.Nardelli, A. Gambardella, R. Zinkov, P. Dokania, Siddharth N. A. B. Espinosa-Gonzalez, Lord A. Darzi, P.H.S. Torr and A. G. Baydin, **Simulation-Based Inference for Global Health Decisions** 2020
- **B. Gram-Hansen** and S.J Roberts, Multi-layer Stacked Gaussian Processes 2019

### PUBLISHED PAPERS

- AG. Baydin, L. Heinrich, W. Bhimji, **B. Gram-Hansen**, G. Louppe, L. Shao, K. Cranmer and F.Wood, **Efficient Probabilistic Inference in the Quest for Physics Beyond the Standard Model** The International Conference on Neural Information Processing Systems (NeurIPS) 2019
- AG. Baydin, L. Heinrich, W. Bhimji, **B. Gram-Hansen**, G. Louppe, L. Shao, K. Cranmer and F.Wood, **Etalumis: Bringing Probabilistic Programming to Scientific Simulators at Scale** The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC) 2019
- **B. Gram-Hansen**\*, Y. Zhou\*, T. Kohn, T. Rainforth, H. Yang and F. Wood, **A Low-Level Probabilistic Programming Language for Non-Differentiable Models** The 22nd International Conference on Artificial Intelligence and Statistics (AISTATS) 2019
- **B. Gram-Hansen**\*, P. Helber\*, I. Varatharajan, F. Azam, A. Coca-Castro, V. Kopackova and P. Bilinski, **Mapping Informal Settlements in Developing Countries using Machine Learning and Low Resolution Multi-spectral Data** The AAAI/ACM Conference on AI Ethics and Society (AAAI) 2018
- **B. Gram-Hansen**\*, Y. Zhou\*, T. Kohn, T. Rainforth, H. Yang and F. Wood, **Hamiltonian Monte Carlo for Probabilistic Programs with Discontinuities** The International Conference on Probabilistic Programming 2018

### WORKSHOP PAPERS

- **B. Gram-Hansen**\*, C. Schroeder de Witt\*, P.H.S.Torr, Y.W. Teh, A. G. Baydin and T. Rainforth, **Efficient Bayesian Inference for Nested Simulators** 2nd Symposium on Advances in Approximate Bayesian Inference (AABI) 2019
- **B. Gram-Hansen**\*, C. Schroeder de Witt\*, P.H.S.Torr, Y.W. Teh, T. Rainforth and AG. Baydin, **Hijacking Malaria Simulators with Probabilistic Programming** AI for Social Good Workshop at the International Conference on Machine Learning (ICML) 2019
- **B. Gram-Hansen**, P. Helber, I. Varatharajan, F. Azam, A. Coca-Castro, V. Kopackova and P. Bilinski, **Generating Material Maps to Map Informal Settlements** Machine Learning for the Developing World Workshop at the 32nd Conference for Neural Information Processing Systems (NeurIPS) 2018

## REVIEWING DUTIES

- NeurIPS 2019 workshop on Deep Learning for the Physical Sciences
- NeurIPS 2019 main conference
- NeurIPS 2018 workshop on Deep Learning for the Physical Sciences
- NeurIPS 2018 workshop on Critiquing and Correcting Trends in Machine Learning