

# 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 Phil Torr  
Expected completion by Oct 2020 | Oxford, UK

### UNIVERSITY OF NOTTINGHAM

MMATH IN MATHEMATICS  
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  
LaTeX • HTML

### SPECIFIC LIBRARIES

Pytorch • Pyro • Pyprob • Matplotlib • Numpy •  
Scikit-learn • SciPy • PyMC3

### INTERPERSONAL SKILLS

Team player • Patient • Organised  
Motivator • Responsible • Adaptive  
Hard-working • Good Listener • Observant

### LANGUAGES

Englsh (Native) • Madarin (Learning) • French  
(Basic)

### REFERENCES

Several available upon request.

## EXPERIENCE

### FRONTIER DEVELOPMENT LAB RESEARCH INTERNSHIP, JUN 2018 – OCT 2018

- Designed a 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.
- Collaborative project with the European Space Agency, Oxford University, SA Catapult, Nvidia and UNICEF

### CLASSICAL FOUNDATIONS TUTORING TUTOR, APR 2016 – JUN 2016

- Perform one-to-one tuition with a wide variety of different pupils for both Mathematics and Physics.
- Adapt to the different needs and questions asked by each pupil, which ranged from GCSE lower tier to A2-level mathematics.
- Enable the pupil to develop as a character and open their mind to other aspects of mathematics.
- Inspire the pupil to see that they had the potential to achieve.

### UNIVERSITY OF NOTTINGHAM RESEARCH INTERN, JUN 2014 – SEPT 2014

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

## RESEARCH

### OXCSML AND TORR VISION GROUP Oct 2016 – Present | Oxford, Uk

- Designing probabilistic programming languages and interpretable AI systems, with a focus on social and scientific applications.
- Developed new inference strategies that leverage deep learning frameworks.
- Created a customisable probabilistic programming system for “First-order models”, enabling new classes of inference algorithms to be deployed in probabilistic programming systems.
- Developed a framework for overriding any industrial simulator, written in any language and connecting it to a generic probabilistic programming systems to perform statistically correct inference.
- Developed my own framework and algorithm for performing inference on small data-sets with Gaussian Processes.

## 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

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, Qualified to Represent UK for Long Distance Duathlon
2016	Silver Medal, Nottinghamshire Fell Running Championships
2005-2007	National mini field youth hockey champion U13 and U15

# PUBLICATIONS

## 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, 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
- 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

## PRE-PRINTS

- B. Gram-Hansen and S.J Roberts, Multi-layer Stacked Gaussian Processes 2019
- B. Gram-Hansen, An Insight Into: Quantum Random Walks Thesis 2014

## 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