JAAN ALTOSAAR

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BORN: March 8, 1992 — Ottawa, Canada
LANGUAGES: English (native), Estonian (native), French (fluent), Spanish (working)

AREAS OF SPECIALIZATION

Machine Learning • Theoretical Physics • Biophysics • Deep Learning • Time series models

EDUCATION

2013- **Ph.D., Physics**. Advisors: David Blei and Shivaji Sondhi.
Princeton University, Princeton, New Jersey, United States of America

2009-2013 **B.Sc. First Class Honours in Mathematics and Physics**
McGill University, Montreal, Quebec, Canada
Top 10% cumulative GPA, Dean's Honour List, Dean's Multidisciplinary Undergraduate Research List

2007-2009 **Ontario Secondary School Diploma**
Hillcrest High School, Ottawa, Ontario, Canada. Honours, Co-President of 1200-student body

2006-2007 **Higher School Certificate Years 9 & 10**
Randwick Boys High School, Sydney, New South Wales, Australia

HONORS, AWARDS, & FELLOWSHIPS

2014 Google Summer of Code: Topic modeling LaTeX on the arXiv (Princeton, $6,000)
2014-2017 NSERC Doctoral Postgraduate Scholarship: ranked 3rd of 204 (Princeton, $63,000)
2013 Julie Payette NSERC Research Scholarship: awarded to the top 24 applicants in the Canada-wide Postgraduate Scholarships M competition (Ottawa, $25,000)
2013-2016 Commonwealth Scholarship, DPhil studies at University of Oxford (*Declined*, £31,875/year)
2013 The Faculty of Science Moyse Travelling Scholarship, McGill University (Montreal, $8,800)
2013 Delta Upsilon Graduate Scholarship, McGill University (Montreal, $5,000)
2013 Travel award, KAUST WEP Conference (Jeddah, $2000)
2012 First Prize for best poster, Canadian Undergraduate Physics Conference (Vancouver)
2012 Elected to Sigma Xi Society (Montreal)
2012 Second Prize, McGill Faculty-wide Undergraduate Research Conference (Montreal, $150)
2012 Third Prize, McGill Department of Physics Poster Conference (Montreal)
2012 NSERC Undergraduate Student Research Award (Waterloo, $8,400)
2011 McGill Award for Canadian Undergraduate Physics Conference (Saskatoon, $1,000)
2011 NSERC Undergraduate Student Research Award (Montreal, $7,600)
2010 Estonian Foundation of Canada Scholarship (Toronto, $2,000)
2010 NSERC Undergraduate Student Research Award (Montreal, $5,500)
2009 Annette S. Hill McGill Scholarship and Bursary (Montreal, $5,000)
2008 Harry Elton Memorial Award (Shanghai, China, $2,000)

WORK EXPERIENCE

5/2016-9/2016 **Research Intern, Google Brain** (Mountain View, CA). Host: Eugene Brevdo
Research internship; variational inference in TensorFlow.

5/2015-9/2015 **Research Intern, Google DeepMind** (London, UK). Host: Andriy Mnih
Research internship, Deep Learning group.

11/2013- **Founder, Useful Science** (http://usefulscience.org)
Led team of 65 through launch of a non-profit science website (700k+ hits, 15k+ subscribers). Partnered with Fitbit, "won $50,000" on Dragons' Den.

5/2013-8/2013 **UI and UX Designer, Ottawa Hospital Research Institute**
Led UI design and testing; completed the design of Canada's vaccinations mobile app used to submit vaccination profiles to the government. My designs are still in use: demo (140k+ users).

RESEARCH EXPERIENCE

4/2014- **Advisors: David Blei & Shivaji Sondhi**
***Columbia University**, Departments of Computer Science and Statistics*
***Princeton University**, Department of Physics*
Combining Bayesian inference with deep learning to model LaTeX equations and other time series; recommendation systems.

9/2013-4/2014 **Advisor: Iain Couzin**
***Princeton University**, Departments of Physics, Ecology and Evolutionary Biology*
Applied machine learning techniques to study rainforest health via audio recordings. Completed 3-week field study in Costa Rica to collect rainforest audio.

9/2012-7/2013 **Advisors: Jürgen Sygusch & Anmar Khadra**
***Université de Montréal**, Department of Biochemistry*
***McGill University**, Department of Mathematics and Statistics*
Theoretical biophysics: analysis and testing of the Resonant Recognition Model as a potential theory of biomolecular recognition.

5/2012-8/2012 **Advisor: Michel Gingras**
***University of Waterloo**, Department of Physics and Astronomy*
Condensed matter theory: studies of the generalized dipolar spin ice model of dysprosium titanate via cumulant expansion methods implemented within Monte Carlo simulations.

5/2011-4/2012 **Advisors: Walter Reisner & Moshe Szyf**
***McGill University**, Department of Physics; Department of Pharmacology & Therapeutics*
Biophysics: single-molecule DNA methylation mapping in nanochannels. Experienced with Matlab, protein purification and binding assays, and TIRF microscopy.

5/2010-8/2010 **Advisor: Jürgen Sygusch**
***Université de Montréal**, Department of Biochemistry*
Bioinformatics: computational high throughput screening of potential *Magnaporthe* pesticides.

RESEARCH ADVISING

Spring 2016 Eamonn Bell (Ph.D. '18, Columbia University)
Fall 2014 Ethan Benjamin (M.Sc. '14, Columbia University)
Fall 2014 Jingwei Zhang (M.Sc. '14, Columbia)
Fall 2014 Andrew James Mercer-Taylor (B.Sc. '15, Columbia University)
Fall 2014 Anjishnu Kumar (M.Sc. '14, Columbia University)
Fall 2014 Tony Paek (M.Sc. '15, Columbia University)
Fall 2014 Drishan Arora (M.Sc. '14, Columbia University)

TEACHING EXPERIENCE

Spring 2014 **Instructor, Princeton Splash.** Four lectures to local high school students.
Winter 2013 **Teaching Assistant, McGill University**. Applied Linear Algebra (Prof. Adam Oberman)
Winter 2012 **Teaching Assistant, McGill University.** Honours Complex Variables (Prof. Robert Seiringer)
Fall 2011 **Teacher, Montreal Estonian Society Kindergarten**
Fall 2011 **Mentor, McGill University Buddy Program**

INVITED TALKS

2017 food2vec. *New York Times, Machine Learning & Cooking editorial teams*
2016 Machine learning seminar: Operator Variational Inference. *Imperial College, London*
2016 Machine Intelligence Research Institute Colloquium Series on Robust and Beneficial AI
2015 Dragons' Den demo day, *Canadian Broadcasting Corporation*
2013 Montreal Startup Club presentation on the Immunize Canada app, *Rho Canada Ventures*
2012 Department of Physics Undergraduate Student Symposium, *McGill University*
2012 Canadian Undergraduate Physics Conference, *University of British Columbia*

PUBLICATIONS

2016 J. Altosaar, R. Ranganath, and D. Blei. f-Proximity Variational Inference. *Approximate Inference Workshop, NIPS 2016*.
2016 R. Ranganath, D. Tran, J. Altosaar, and D. Blei. Operator Variational Inference. *NIPS 2016*.
2016 D. Liang, J. Altosaar, L. Charlin, and D. Blei. Factorization meets the item embedding. *Submitted to Recsys 2016.*
2016 E. Bell, and J. Altosaar. Word embedding models applied to classical music recover the circle of fifths in embedding space. *Submitted to ISMIR 2016.*
2015 J. Zhang, A. Gerow, J. Altosaar, R. J. So, and J. A. Evans. Discovering Topic Correlation Across Arbitrary Collections. *Empirical Methods on Natural Language Processing.*
2015 P. Henelius, T. Lin, M. Enjalran, Z. Hao, J. Altosaar, P. Henelius, F. Flicker, T. Yavors'kii, and M. J. P. Gingras. Refrustration and Competing Orders in a Spin Ice Material. *Phys. Rev. B.*
• Featured on Phys. Rev. B. front page.
2015 A. J. Mercer-Taylor, and J. Altosaar. Sonification of fish movement using pitch mesh pairs. *NIME 2015.*
2015 E. Benjamin, and J. Altosaar. MusicMapper: Interactive 2D representations of music samples for in-browser remixing and exploration. *NIME 2015.*
• Featured and interviewed on The Wire magazine.
2012 J. Altosaar. Detecting methylation of single molecules of DNA using a methyl binding domain GFP fusion protein. *McGill Honours Research Thesis*.

SELECTED POSTERS

2017 New York Academy of Sciences, Proximity Variational Inference
2016 NIPS, Operator Variational Inference
2016 NIPS Approximate Inference Workshop, Proximity Variational Inference
2016 ICML Music Discovery Workshop
2016 Rec'Sys, Factorization Meets the Item Embedding
2014 ComSciCon: Communicating Science, *Harvard University: ranked top 50 of 870 applicants*
2012 [2]Canadian Undergraduate Physics Conference, *University of British Columbia*
First Prize for best poster
2012 [2]Faculty of Science Undergraduate Research Conference, *McGill University*
Second Prize: induction to Sigma Xi Society
2012 [2]Department of Physics Poster Conference, *McGill University*
Third Prize: nomination and award for Canadian Undergraduate Physics Conference
2011 [1]Department of Physics Poster Conference, *McGill University – Honourable Mention*
[2]*Poster: How stuffing leads to novel behaviour in spin ice*
[1]*Poster: DNA methylation mapping in nanochannels*

SCIENCE OUTREACH

2014 Hopewell Elementary School science fair judge
2014 Princeton Physics Open House Committee

PROFESSIONAL ASSOCIATIONS

Reviewer for: NIPS, PLOS ONE
Member: Association for Computing Machinery, Institute of Physics, Sigma Xi Scientific Society (nominated), American Association for the Advancement of Science (nominated), Institute of Mathematical Statistics

ACTIVITIES & INTERESTS

1996- Classical and jazz piano, electronic music production
2014-2015 Resident Graduate Student, Wilson College, Princeton University
2012 University of Waterloo Choir (Director: Professor Gerard Yun)
2011 Milton Park Recreation Association Beach Volleyball

SELECTED PRESS

2016 Editorial, The Conversation, "Accurate science or accessible science in the media – why not both?"
2016 Interview, The Wire magazine
2016 MusicMappr featured on Prosthetic Knowledge blog
2015 Featured on Dragons' Den
2015 In Training, "Medical Student Startup Improves Science Communication"
2014 Reddit front page
2014 Boing Boing, "Useful Science, accessible by all"
2014 Lifehacker, "Excel shortcuts, article summaries, and web notes"
2014 Fitbit corporate blog, "7 science-backed numbers to improve your life"
2014 New Zealand Herald, "10 top sites to visit this weekend"
2014 AweSci, "A chat with Jaan Altosaar from Useful Science"
2014 IT World, "Useful Science headlines that apply to your weird little computer life"

2014 McGill Tribune, "Useful Science bridges communication gap in research"
2014 McGill News, Alumni Magazine, "Better living through science"
2014 Betakit, "McGill grad launches curated list of science articles"
2014 CBC Radio, Spark episode on Sciencescape