JAAN ALTOSAAR

Department of Physics, Princeton University
Office: 307 Jadwin Hall
Princeton, New Jersey 08540

+1 (609) 423-3987
altosaar@princeton.edu
https://jaan.io

BORN: March 8, 1992 — Ottawa, Canada
LANGUAGES: English (native), Estonian (native), French (professional proficiency)

AREAS OF SPECIALIZATION

Machine Learning • Theoretical Physics • Biophysics • Functional Analysis • Algebra

EDUCATION

2013- **Ph.D., Physics**
Princeton University, Princeton, New Jersey

2009-2013 **B.Sc. First Class Honours in Mathematics and Physics**
McGill University, Montreal, Quebec
Distinction, Dean's Honour List, Dean's Multidisciplinary Undergraduate Research List

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

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

HONORS & AWARDS

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 Full funding to attend the King Abdullah University of Science and Technology WEP Conference: international competition, 15 recipients (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

11/2013- **Founder, Useful Science** (http://usefulscience.org)
Led team of 46 through concept and launch of a non-profit science outreach website (250k+ hits). Featured on mainstream tech websites such as Lifehacker and Boing Boing, and syndicated by the Washington Post.

10/2013- **Science Media Consultant, Thwacke**
Consulting for game developers on how to create realistic game elements based on science. Literature reviews, communicating science to developers and screenwriters.

5/2013-8/2013 **iOS & Android User Interface Designer, Ottawa Hospital Research Institute**
Led user interface design and testing; completed the design of Canada's national vaccinations tracking mobile app and backend released in 2014 (demo).

RESEARCH EXPERIENCE

4/2014- **Advisor: Professor David Blei**
***Princeton University**, Department of Computer Science*
***Columbia University**, Departments of Computer Science and Statistics*
Google Summer of Code award
Topic modeling LaTeX equations on the arXiv: applying machine learning techniques to the arXiv corpus to analyze patterns in science and improve recommendation systems.

9/2013-4/2014 **Advisor: Professor Iain Couzin**
***Princeton University**, Departments of Physics, Ecology and Evolutionary Biology*
Julie Payette NSERC Research Scholarship
Applied stochastic neighbor embedding techniques to analyze rainforest health via audio recordings, and realtime computer vision techniques to study collective behavior. Completed 3-week field study in Costa Rica to collect rainforest audio.

9/2012-7/2013 **Advisors: Professor Jürgen Sygusch & Professor Anmar Khadra**
***Université de Montréal**, Department of Biochemistry*
***McGill University**, Department of Mathematics and Statistics, Honours Research Project*
Theoretical biophysics: developed a physical foundation for the Resonant Recognition Model as a viable theory of biomolecular recognition via transition dipole coupling. This project received full funding for the KAUST 2013 Undergraduate Poster Competition.

5/2012-8/2012 **Advisor: Professor Michel Gingras**
***University of Waterloo**, Department of Physics and Astronomy*
NSERC Undergraduate Student Research Award
Condensed matter theory: studies of the generalized dipolar spin ice model of dysprosium titanate via cumulant expansion methods implemented within Monte Carlo simulations, and crystal field calculations with Stevens operator methods. This project won awards at departmental, faculty-wide, and national conferences.

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

5/2010-8/2010 Advisor: Professor Jürgen Sygusch
***Université de Montréal**, Department of Biochemistry*
NSERC Undergraduate Student Research Award
Bioinformatics: virtual high throughput screening of potential *Magnaporthe grisea* aldolase II pesticides through simulation of molecular docking. 3D conformational modeling of various aldolases.

TEACHING EXPERIENCE

Spring 2014 Taught four mini-courses to local high school students through Princeton Splash
Winter 2013 Teaching Assistant: Math 270, Applied Linear Algebra (Professor Adam Oberman)
Winter 2012 Teaching Assistant: Math 249, Honours Complex Variables (Professor Robert Seiringer)
Fall 2011 Supervised a graduate student in the Szyf Lab at McGill

ORAL PRESENTATIONS

2014 Experimental project final oral presentation, *Princeton University*
2013 Montreal Startup Club presentation on the Immunize Canada app, *Rho Canada Ventures*
2013 Faculty of Science presentation on research opportunities, *McGill University*
2012 Department of Mathematics Honours Project Oral Component, *McGill University*
2012 Department of Physics Undergraduate Student Symposium, *McGill University*
2012 Canadian Undergraduate Physics Conference, *University of British Columbia*
2012 Department of Physics Honours Research Thesis Defense, *McGill University*

PROGRAMMING SKILLS

Version control systems: Git
Systems administration: AWS, LE(A)MP stacks on Ubuntu & Debian
Systems languages: C
Scripting languages: Python, Shell Script
Web development: D3.js, HTML5, CSS, Flask, MySQL
Data analysis: Mathematica, Matlab

PUBLICATIONS

2013 J. Sygusch and J. Altosaar. The Resonant Recognition Model: long-range protein interaction via transition dipole couplings. *McGill Honours Research Project*.
2013 T. Lin, J. Altosaar, P. Henelius, and M. J. P. Gingras. Numerical study of perturbations in dipolar spin ice. *The American Physical Society March Meeting 2013*.
2012 J. Altosaar. Detecting methylation of single molecules of DNA using a methyl binding domain GFP fusion protein. *McGill Honours Research Thesis*.

CONFERENCES, WORKSHOPS & POSTERS

2015 Workshop on Big Data and Statistical Machine Learning, *University of Toronto*
2014 Y Combinator Startup School, *New York City*
2014 ComSciCon: Communicating Science, *Harvard University: ranked top 50 of 870 applicants*
2013 Reinforcement Learning and Decision Making, *Princeton University*
2013 John von Neumann Symposium: Towards Quantitative Biology, *Rockefeller University*
2013 HackMIT; developed Android app to track sitting, *Massachusetts Institute of Technology*
2013 [3]WEP Poster Competition, *King Abdullah University of Science and Technology*
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
2012 Highly Frustrated Magnetism, *McMaster University*
2012 Friday Condensed Matter Seminars, *Perimeter Institute for Theoretical Physics*
2012 Southwest Ontario Condensed Matter Symposium, *Perimeter Institute*
2012 [1]Groupe de Recherche Axé sur la Structure des Protéines Symposium, *McGill University*
2011 [1]Canadian Undergraduate Physics Conference, *University of Saskatchewan*
2011 [1]Department of Physics Poster Conference, *McGill University*
Hon. Mention: nomination and award for Canadian Undergraduate Physics Conference
2011 [1]Department of Engineering Poster Conference, *McGill University*
2010 Gordon Research Conference: Enzymes & Metabolic Pathways, *New Hampshire*
[3]*Poster: Protein interaction through transition dipole couplings: Resonant Recognition*
[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

Member: Association for Computing Machinery, Canadian Association of Physicists, Institute of Physics, Sigma Xi Scientific Society (nominated), American Association for the Advancement of Science (nominated), Institute of Mathematical Statistics

ACTIVITIES & INTERESTS

2014-2015 Resident Graduate Student, Wilson College, Princeton University
2009- Meditation (Enpuku-ji Zen Center, Abbess: Zengetsu Myokyo)
1996- Classical and jazz piano
2012 University of Waterloo Choir (Director: Professor Gerard Yun)
2012 University of Waterloo Intramural Beach Volleyball (placed second out of 54 teams)
2011 Milton Park Recreation Association Beach Volleyball
2010 Mentor with McGill University Mentorship Program for First-Year Students
2010 Montreal Estonian Society Kindergarten Teacher
2009 McGill Choral Society (Director: Mary-Jane Puiu)

SELECTED PRESS

2014 Boing Boing, "Useful Science, accessible by all"
2014 Lifehacker, "Excel shortcuts, article summaries, and web notes"
2014 New Zealand Herald, "10 top sites to visit this weekend"
2014 AweSci, "A chat with Jaan Altosaar from Useful Science"
2014 Computerworld.nl, "Het leven van een IT'er is dodelijk!"
2014 McGill Reporter, "Simplifying science without dumbing it down"
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 MSURJ, "Scientifically proven* to improve your life – an interview with Useful Science"
2014 Betakit, "McGill grad launches curated list of science articles"
2014 uOttawa Gazette, "Useful Science… in 5 seconds or less"
2014 Art of Change podcast, "The secret to making your ideas a reality"
2014 CBC Radio, Spark episode on Sciencescape
2013 The Bull & Bear, "Undergraduate Innovation – A Campus-wide Opportunity"
2013 McGill Office for Undergraduate Research in Science