Jaan Altosaar

Department of Physics, Princeton University
Office: 307 Jadwin Hall
Princeton, New Jersey 08544

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

Born: March 8, 1992
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

Honours & Awards

2013-2014	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-   **Founding Director – Useful Science** (http://usefulscience.org)
Led team of 26 through concept, launch, and funding of a non-profit science outreach website (75k hits). Featured on mainstream tech websites: Lifehacker and Boing Boing.

10/2013-   **Science Media Consultant – Thwacke Consulting** (http://thwacke.com)
Consulting for game developers: how to make realistic game elements based on science. Literature reviews, communicating science to developers and screenwriters.

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

Research Experience

9/2013-4/2014   **Advisor: Professor Iain Couzin**
Princeton University, *Departments of Physics, Ecology and Evolutionary Biology*
Julie Payette NSERC Research Scholarship
Machine learning: applying topological data analysis and theoretical neuroscience techniques to rainforest audio. Realtime computer vision techniques to analyze 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 Total Internal Reflection Fluorescence (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, 3D conformational modeling of various aldolases. Experienced with AutoDock, Schrodinger Glide, PyMOL, Shell scripting, and Python.
9/2009-3/2010	**Advisor: Professor Moshe Szyf** ***McGill University**, Department of Pharmacology & Therapeutics* Epigenetics: quantifying changes in microRNAs triggered during cancer metastasis.

Teaching Experience

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	Acoustical Society of America Spring 2014 Meeting, *Providence, Rhode Island*
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*

IT & Programming Skills

Version control systems: Git
Systems administration: LEMP/LAMP stacks on Ubuntu & Debian
Systems languages: C
Scripting languages: Python, Shell Script
Web development: 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, manuscript in preparation for submission.*
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, T. Lin, and M. J. P. Gingras. Cumulants to crystal fields: a case for stuffing of the B-site in dysprosium titanate. *Technical Report, Department of Physics and Astronomy, University of Waterloo.*
2012	J. Altosaar. Detecting methylation of single molecules of DNA using a methyl binding domain GFP fusion protein. *McGill Honours Research Thesis.*

Conferences & Workshops

2014   [4]Acoustical Society of America Spring 2014 Meeting, *Providence, Rhode Island*
2014   [4]Ecology and acoustics: emergent properties from community to landscape, *Paris, France*
2014   Collective Intelligence, *Massachusetts Institute of Technology*
2014   ComSciCon: Communicating Science, *Harvard University*
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*
2013   Biological Small Angle X-Ray Scattering Workshop, *University of Montreal*
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   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*
       [4]*Talk & Poster: Machine learning an audio taxonomy: quantifying biodiversity and habitat recovery through rainforest audio recordings*
       [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   San Diego Comic-Con International panelist
2014   Hopewell Elementary School science fair judge

Professional Associations

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

Activities & Interests

2014-2015   Resident Graduate Student, Wilson College, Princeton University
2009-present   Meditation (Enpuku-ji Zen Center, Abbess: Zengetsū Myōkyō)
1996-present   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)
2010   Mentor with McGill University Mentorship Program for First-Year Students
2010   Montreal Estonian Society Kindergarten Teacher