

Jaan Altosaar — Curriculum Vitæ

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Born: March 8, 1992—Ottawa, Canada
Citizenship: Canadian and Estonian

Areas of Specialization

Machine Learning • Theoretical Physics • Biophysics • Teaching • Science Outreach

Education

- 2013- **Ph.D., Physics.** Advisor: Professor [Iain Couzin](#)
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>)
Leading a team of thirteen through concept to launch and funding of a non-profit science outreach website. The beta can be found at <http://usefulscience.dev.aegir.lab43.com>.
- 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 for a Canada-wide vaccinations tracking mobile app to be released in November 2013.

Research Experience

- 9/2013- *Advisor: Professor Iain Couzin*
Princeton University, Departments of Physics, Ecology and Evolutionary Biology
Julie Payette NSERC Research Scholarship
Acoustic ecology: machine learning and theoretical neuroscience techniques applied to rainforest audio. Realtime computer vision techniques to analyze animal behavior.
- 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, and Python.

- 9/2009-3/2010 **Advisor: Professor Moshe Szyf**
McGill University, *Department of Pharmacology & Therapeutics*
 Epigenetics: measuring DNA methylation in the promoters of microRNAs triggered during cancer metastasis. Experienced with fundamental techniques in molecular biology such as cloning, PCR, cell culture, sequencing, and cell transformation.
- 6/2008-8/2008 **Advisor: Professor Alain Stintzi**
University of Ottawa, *Department of Biochemistry, Microbiology & Immunology*
 Microbiology: investigated the bactericidal effects of protamine on *Campylobacter jejuni*.

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

- 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
 System administration: LEMP/LAMP stacks on Ubuntu & Debian
 Systems languages: C
 Scripting languages: Python, Shell Script
 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

- 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 ‡WEP Poster Competition, *King Abdullah University of Science and Technology*
- 2013 Biological Small Angle X-Ray Scattering Workshop, *University of Montreal*
- 2012 †Canadian Undergraduate Physics Conference, *University of British Columbia*
First Prize for best poster
- 2012 †Faculty of Science Undergraduate Research Conference, *McGill University*
Second Prize: induction to Sigma Xi Society
- 2012 †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 *Groupe de Recherche Axé sur la Structure des Protéines Symposium, *McGill University*
- 2011 *Canadian Undergraduate Physics Conference, *University of Saskatchewan*
- 2011 *Department of Physics Poster Conference, *McGill University*
Hon. Mention: nomination and award for Canadian Undergraduate Physics Conference
- 2011 *Department of Engineering Poster Conference, *McGill University*
- 2010 Gordon Research Conference: Enzymes & Metabolic Pathways, *New Hampshire*
‡Poster: *Protein interaction through transition dipole couplings: Resonant Recognition*
†Poster: *How stuffing leads to novel behaviour in spin ice*
*Poster: *DNA methylation mapping in nanochannels*

Professional Associations

Member, Canadian Association of Physicists

Member, Institute of Physics

Member, Sigma Xi Scientific Society

Activities & Interests

- 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)
 - 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 Puiiu)

Languages

English (native speaker)

Estonian (professional proficiency)

French (professional proficiency)