# Jaan Altosaar — Curriculum Vitæ

Department of Physics, Princeton University
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Born: March 8, 1992—Ottawa, Canada
Citizenship: Canadian and Estonian

## Areas of Specialization

Biophysics • Condensed Matter Physics • Machine Learning • Science Outreach

## Education

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

2009-2013 **B.Sc. Joint Honours, Mathematics and Physics**
*McGill University*, Montreal, Quebec
*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)

# Research Experience

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: developing a physical foundation for the Resonant Recognition Model as a viable theory of biomolecular recognition via transition dipole coupling. Computational predictions of active sites of uncharacterized human genes. 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. This project was nominated to the Canadian Undergraduate Physics Conference.

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*.

9/2005-12/2005 **Advisors: Professor Adrian Unc & Professor Syed Sattar**
***University of Ottawa**, Centre for Research on Environmental Microbiology*
Microbiology: bacterial analysis of bottled water and the antibacterial properties of sucralose. Awarded first prize at the Ottawa Regional Science Fair and Bronze Medal in the Biotechnology category at the 2006 Canada Wide Science Fair.

## 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

## Other Experience

5/2013-8/2013 *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 October 2013.

## Oral Presentations

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 languages: C, C++
Scripting languages: Python, Shell Script
Data analysis: Mathematica, MATLAB
Digital typesetting: LaTeX, XeLaTeX

## 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. *Submitted to The American Physical Society March Meeting 2013, Log # MAR13-2012-002764.*
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 and Workshops

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 Highly Frustrated Magnetism, *McMaster University*
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*
2011 NSERC CREATE Integrated Sensor Systems, *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 Puiu)

## Languages

*English* (native speaker)
*Estonian* (professional proficiency)
*French* (professional proficiency)