

Christopher T. Altman

Applied Physics, Kavli Institute of Nanoscience, Delft University of Technology

Citizenship: United States of America

Research weblog: <http://www.cohaerence.net/>
TU Delft, <http://superconducting.weblog.tudelft.nl/>
Contact: christopher.t.altman@gmail.com

Research Foci

Quantum information science and technology, macroscopic quantum phenomena, coherence and entanglement in space, microgravity and novel environments

Professional Background

2005 - present

Applied Physics, Kavli Institute of Nanoscience

Faculty of Applied Sciences at Delft University of Technology

Austrian fellowship at International Akademie Traunkirchen, "Quantum Mechanics in Higher Dimensional Hilbert Spaces," with Anton Zeilinger. Project based research and consulting at NASA Ames Research Center, US QUIST/ATIP Tokyo/East Asia, and FISBA Optik, Switzerland. Yetadel Foundation graduate fellowship in applied physics at Kavli Institute of Nanoscience. Experimental fieldwork in optical fabrication technology, metrology, entanglement and coherent optics. Development of a novel, fault-tolerant adaptive learning protocol at the intersection of quantum topology and neural networks.

2003 - 2004

Quantum Information Science and Technology Project

ATIP Tokyo, Japan

Postdoctoral level technical assessment of leading research initiatives across East Asia. Travels to university and national research centers in the region. Provided timely, incisive scientific analysis to national policy and funding agency directors under ægis of US quantum information science program ARDA/DTO (now IARPA) and DARPA under ONR grant N00014-03-1-0726.

2001 - 2003

UNISCA, Universiteit van Amsterdam

Amsterdam, The Netherlands

International studies at ISHSS. Graduate research in applied physics, high performance computing, quantum information science. Elected to serve as Chairman, UNISCA First Committee on Disarmament and International Security. Chair Report to the General Assembly on nanoscience, biotechnology, information science, "*Converging Technologies: The Future of the Global Information Society*," selected as recipient of the annual RSA Information Security Awards in Barcelona, Spain (2004).

2001

Starlab NV/SA

Brussels, Belgium

Research fellowship in high-performance computing. Creation of a novel neural network approach for implementation in parallel, field-programmable gate array, evolutionary computing hardware. Engineering, design and functional specifications of a cellular automata-based evolutionary hardware supercomputing platform, utilizing genetic algorithms to evolve a large-scale artificial neural network. Project featured on Discovery Channel documentary "[Starlab: Deep Future](#)."

Education

Delft University of Technology, The Netherlands

Applied Physics, Faculty of Applied Sciences. Postgraduate research, consulting and coursework in applied physics, quantum information science. Experimental fieldwork in optical fabrication, metrology. Project-based research and consulting at NASA Ames Research Center, Quantum Information Science and Technology Project (Tokyo), and FISBA Optik (Switzerland). Activities and Associations: Vereniging voor Technische Physica (Applied Physics Union), Delft Student Aeroclub (Segelflugzeug).

University of Missouri-St. Louis, Pierre Laclède Honors College, USA

BA, Philosophy, with Honors (2004). Research thesis: *Evolutionary Hardware-Based Neural Networks* at Starlab, Brussels. Recipient of AIEJ Japanese national Fulbright award, Tokyo, Japan. Reconnaissance Scholar at J.F. Oberlin University (3 awarded per year). Pierre Laclède Honors Research Fellowship (first student ever selected, only student that year). Activities and Associations: Center for International Studies Scholar, Japan-America Student Association.

Research Contributions

Superposed Quantum Network Topologies, with Jaroslaw Pykacz and Roman Zapatin. *International Journal of Theoretical Physics*. We introduced a novel, fault-tolerant adaptive learning architecture at the intersection of algebraic quantum topology and evolutionary neural networks. The model provides a rich source for development of new quantum algorithms in applications such as pattern recognition and associative processing.

Backpropagation in Adaptive Quantum Networks, with Roman Zapatrin. *International Journal of Theoretical Physics* and *NATO Advanced Research Workshop*, Villa Cagnola, Italy. We introduced backpropagation training to adaptive quantum networks. The method provides quantitative, numerical indicators for optimization of both network topology and single-neuron activation functions, for prospective implementation of adaptive networks in condensed matter and quantum information processing systems.

Professional Service, Honors and Awards

Austrian fellowship, Internationale Akademie Traunkirchen, with Anton Zeilinger
Featured in Discover Magazine, "Entangled Life," Cover article, February 2009
Featured in "Astronaut scientists for hire open new research frontier in space," KurzweilAI, March 2011
Referee, International Journal of Theoretical Physics
Referee, Journal of Biological Physics
Referee, Symmetry
Yetadel Foundation Graduate Research Fellowship, Kavli Institute of Nanoscience
US Quantum Information Science and Technology Project, QUIST/ATIP Tokyo
Department Chair, Teaching Fellow and Faculty Advisor, SU/NASA Ames Research Center
Starlab Research Fellowship
Technology Advisor and Scientific Correspondent, KurzweilAI
RSA Information Security Award for Outstanding Achievement, 2004
Chairman, UNISCA First Committee on Disarmament and International Security
Reconnaissance Japan scholar, J. F. Oberlin University, Tokyo, Japan
AIEJ Scholar, Japanese national Fulbright program
Outstanding Young Alumni Award, University of Missouri-St. Louis
Pierre Laclede Honors grant, National Security Agency
Pierre Laclede Honors grant, Starlab NV/SA
Pierre Laclede Honors Scholar
National Access Award
Dean's List

Selected Research Publications

- 2010 Altman C and Zapatrin R. "Backpropagation in Adaptive Quantum Networks,"
International Journal of Theoretical Physics, Vol 49, No 12.
- 2008 Altman C and Zapatrin R. "Superposed Adaptive Quantum Networks,"
International Conference on Quantum Structures, Brussels-Gdansk.

- 2007 Altman C, Knorring E and Zapatrin R. "Accelerated Training Convergence in Superposed Quantum Networks," *NATO Advanced Study Institute on Mining Massive Data Sets for Security*.
- 2007 Altman C. "Microlens Array Fabrication: Future Directions in Quantum Communications and Coherent Information Processing," *FISBA-TU Delft OFT/Applied Physics*.
- 2004 Altman C, Pykacz J and Zapatrin R. "Superpositional Quantum Network Topologies," *International Journal of Theoretical Physics* Vol 43, No 10.
- 2004 Kahaner D and Altman C. "Korean Quantum Information Research," *Quantum Information Science and Technology Program, ATIP Tokyo*.
- 2004 Altman C. "Quantum Algorithms Research at Tokyo University of Science " *Quantum Information Science and Technology Program, ATIP Tokyo*.
- 2004 Satoh T and Altman C. "Japanese National Research and Development Programs," *Quantum Information Science and Technology Program, ATIP Tokyo*.
- 2003 Altman C. "RIKEN Quantum Dynamics Research" *Quantum Information Science and Technology Program, ATIP Tokyo*.
- 2003 Altman C. "SOKENDAI Quantum Information Research" *Quantum Information Science and Technology Program, ATIP Tokyo*.
- 2003 Altman C. "Quantum Circuit Complexity Research," *Quantum Information Science and Technology Program, ATIP Tokyo*.
- 2003 Altman C. "International Conference on Quantum Information," *Quantum Information Science and Technology Program, ATIP Tokyo*.
- 2003 Altman C. "Quantum State Engineering with the *rf* SQUID," *NATO Advanced Research Workshop on Quantum Chaos*. Como, Italy.
- 2002 Altman C. "Converging Technologies: The Future of the Global Information Society," *UNISCA First Committee Chair Report to the UN General Assembly*.
- 2002 Altman C. "Directed Evolution in Silico," *Towards a Science of Consciousness*. MIT Press.
- 2002 Altman C. "Mathematics, Truth and Uncertainty," *Towards a Science of Consciousness*. MIT Press.
- 2002 Altman C. "United Nations Sustainable Futures: Eden Project," *Trintab: Special Issue with UN Secretary General Kofi Annan*. Buckminster Fuller Institute.

International Conferences, Symposia and Workshops

- 2012 NASA-CSF-SwRI Next-Generation Suborbital Research Conference
- 2012 Quantum Information and Nanoscale Optoelectronics, UC Berkeley
- 2012 NASA Quantum Future Technologies Conference, Ames Research Center
- 2011 Quantum Coherence in Excitation Energy Transfer, UC Berkeley
- 2011 Delft-Leiden Biannual Casimir Symposium
- 2011 Alain Aspect: The Second Quantum Revolution
- 2010 ESA-TNO Space Pier Day, The Hague, Netherlands
- 2010 Kavli-Delft Bionanoscience Founding Conference
- 2010 Quantum Mechanics in Higher-dimensional Hilbert Spaces, Traunkirchen, Austria
- 2010 What is real in the quantum world? Traunkirchen, Austria
- 2010 NASA-ESA Pacific International Space Center for Exploration Systems
- 2009 NASA-JAXA Japan-US Science, Technology and Space Applications Program
- 2009 NASA Advisory Council on the Future of Human Spaceflight
- 2009 From the Foundations of Quantum Mechanics to Quantum Information, Kavli Meeting
- 2009 Supercomputing and High Performance Computing, EU DEISA/PRACE
- 2008 Quantum Decoherence and Quantum Information Science, Lorentz Center
- 2008 Triennial Conference on Low-Temperature Condensed Matter Physics XXV
- 2008 International Conference on Quantum Structures, Brussels-Gdansk
- 2008 Workshop on Time Symmetry in Quantum Mechanics
- 2007 Optical Fabrication Technologies, Coherence and Metrology
- 2006 "The Best of Nanoscience," International Symposium for Hans Mooij
- 2006 SPIE Defense and Security Applications of Quantum Information Science
- 2005 New Computational Paradigms, Neural Nets, Quantum, Molecular and Biocomputing
- 2005 UNESCO Physics for Tomorrow
- 2004 RSA Information Security
- 2004 Defense and Security Applications of Quantum Information Science
- 2004 Gordon Research Conference on Quantum Information
- 2003 Quantum Information Technology IX
- 2003 International Conference on Quantum Information
- 2003 NATO Advanced Research Workshop on Quantum Chaos
- 2003 National Science Foundation Coding Theory and Quantum Computing
- 2002 United Nations International Student Conference Amsterdam
- 2002 International Conference on High-Energy Physics XXXI
- 2001 World Technology Summit
- 2001 French Senate Hearing on the Future of Artificial Intelligence
- 2001 US Government Salishan Conference on High Performance Computing
- 2001 National Security Agency

Astronaut Training

Formally selected as a scientist-astronaut candidate for suborbital and developing orbital flights with a next-generation commercial astronaut corps that counts senior NASA/ESA astronauts, astronaut trainers and instructors among its flight members and board of advisors.

High-Altitude Physiology Training: Reduced Gravity Research Program, NASA Johnson Space Center, 2009. National Aerospace Training and Research Center (NASTAR), 2011

Microgravity Experience: Zero G, NASA Ames Research Center (20 parabolas)

High G Centrifuge Training: NASTAR, 2011

Suborbital Scientist Astronaut Certification: NASTAR, 2011

Emergency egress and sea survival training: Survival Systems, USA, 2011

Experimental aircraft training: NASA Ames Research Center, Vertical Motion Simulator, 2009

Pilot: Glider, solo. 131 flights with Janus C, Astir, DG500 and HK36, powered Super Dimona

SCUBA: PADI Open Water, Philippines, Hawai'i, US East Coast (IP)

Extracurricular Interests

Astronautics and space exploration; aerospace, gliding, soaring, piloting; international travel and affairs; proficient in several martial arts: Kendo; Shodan (first degree black belt) rank in Kyudo, Judo, Muay Thai, Kali, Escrima, and Arnis; motorcycling, roadracing; rock climbing and rappelling; scuba diving; electronic music production

Foreign Language Proficiency

Fluent Japanese, advanced Dutch, intermediate French