

CURRICULUM VITAE

Ruben S. Andrist

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BIOGRAPHICAL DATA

Date and Place of Birth
Citizenship

March 27, 1984, Switzerland
Swiss

EDUCATION

Ph.D. in Physics Swiss Institute of Technology (ETH) Advisor: Prof. Helmut G. Katzgraber	10/2008 – 07/2012
Diploma in Theoretical Physics (Masters Equivalent) Swiss Institute of Technology (ETH) Mobility year at St. Petersburg State University, Russia Diploma thesis advisor: Prof. Helmut G. Katzgraber	09/2003 – 10/2008
Private Pilot's Licence (PPL, SEP) Flight instruction by the Swiss military (FVS I+II)	07/2002 – 07/2005
Languages: German (native), English (fluent), French and Russian (intermediate)	

PROFESSIONAL EXPERIENCE

Principal Researcher Microsoft Quantum, Switzerland	05/2020 – present
Senior Software Engineer Google Research, Zurich, Switzerland	10/2014 – 05/2020
Omidyar Postdoctoral Fellowship Santa Fe Institute, Santa Fe, NM, USA	09/2013 – 09/2014
Research Assistant Institute for Theoretical Physics, ETH Zurich, Switzerland	09/2008 – 08/2013
Instructor for C++ and Python IT Services, ETH Zurich, Switzerland	03/2008 – 09/2014

AWARDS

Omidyar Fellowship , awarded by the Santa Fe Institute, NM	2013
ETH Medal , awarded by ETH Zurich for outstanding doctoral thesis	2012

RESEARCH INTERESTS

Disordered systems: spin, vector & structural glasses
Complex systems, optimization problems, phase transitions
Topological quantum computation: error correction, color codes
Scale free networks, neural networks, machine learning
Algorithm analysis & development

PUBLICATIONS

- Ruben S. Andrist**, H. G. Katzgraber, H. Bombín, M.-A. Martín-Delgado
“Error tolerance of topological codes with independent bit-flip and measurement errors”
 Phys. Rev. A 94, 012318 (2016)
- Ruben S. Andrist**, James R. Wootton, H. G. Katzgraber
“Error Thresholds for Abelian Quantum Double Models: Increasing the bit-flip Stability of Topological Quantum Memory”
 arXiv:1406.5974 (2014)
- H. G. Katzgraber, Firas Hamze, **Ruben S. Andrist**
“Glassy Chimeras could be blind to quantum speedup: Designing better benchmarks for quantum annealing machines”
 Phys. Rev. X 4, 021008 (2014)
- H. G. Katzgraber, **Ruben S. Andrist**
“Stability of topologically-protected quantum computing proposals as seen through spin glasses”
 arXiv:1306.0540 (2013)
- J. C. Andresen, **Ruben S. Andrist**, H. G. Katzgraber, V. Dobrosavljevic and G. T. Zimanyi
“Self-organized criticality in glassy spin systems requires long-range interactions”
 arXiv:1210.3796 (2012)
- Ruben S. Andrist**, H. Bombín, H. G. Katzgraber, M.-A. Martín-Delgado,
“Optimal error correction in topological subsystem codes”
 Phys. Rev. A 85, 050302(R) (2012)
- H. Bombín, **Ruben S. Andrist**, M. Ohzeki, H. G. Katzgraber and M.-A. Martín-Delgado,
“Strong resilience of topological codes to depolarization”
 Phys. Rev. X 2, 021004 (2012)
- Ruben S. Andrist**, D. Larson and H. G. Katzgraber,
“Evidence of a thermodynamic glass transition in the 10-state non-mean-field Potts glass,”
 Phys. Rev. E 83, 030106(R) (2011)
- Ruben S. Andrist**, H. G. Katzgraber, H. Bombín, M.-A. Martín-Delgado,
“Tricolored Lattice Gauge Theory with Randomness: Fault-Tolerance in Topological Color Codes,”
 New J. Phys. 13, 083006 (2011)
- H. G. Katzgraber, H. Bombín, **Ruben S. Andrist**, M.-A. Martín-Delgado,
“Topological color codes on Union Jack lattices: a stable implementation of the whole Clifford group,”
 Phys. Rev. A 81, 012319 (2010)

Theses

- Ruben S. Andrist**, *“Understanding Quantum Error-Correction Codes Using Classical Spin Models,”*
 Ph.D. thesis, awarded the *ETH Medal*, ETH Zurich, Switzerland (2012)
- Ruben S. Andrist**, *“Monte Carlo Study of the One-Dimensional Ten-States Potts Glass with Power-Law Interactions,”* diploma thesis (masters equivalent), ETH Zurich, Switzerland (2008)

INVITED TALKS AND SEMINARS

Seminar Quantum Information, ETH Zurich, Switzerland, <i>"Understanding topological quantum error-correction codes using classical disordered spin models"</i>	07/2013
Seminar, Santa Fe Institute, Santa Fe, NM, USA, <i>"Seeing the World through Spin-Glasses"</i>	01/2013
Seminar, Tokyo Institute of Technology, Tokyo, Japan, <i>"Understanding topological quantum error-correction codes using classical disordered spin models"</i>	10/2012
Seminar, University of California, Santa Cruz, CA, USA, <i>"Understanding quantum error-correction schemes using classical disordered spin models"</i>	05/2012
Seminar, University of Massachusetts, Amherst, MA, USA, <i>"Understanding quantum error-correction schemes using classical disordered spin models"</i>	03/2012
Seminar, Université Henri Poincaré Nancy 1, France, <i>"Quantum Error Correction and Classical Spin Models: A Fruitful Relationship"</i>	04/2011

CONFERENCE CONTRIBUTIONS

Talks

APS March Meeting, Baltimore, MD, USA, <i>"Resilience of topological error-correction codes to concurrent qubit and measurement errors"</i>	03/2013
Annual Meeting of the Swiss Physical Society, Switzerland, <i>"Stability of topological quantum computing schemes to bit-flip and measurement errors"</i>	06/2012
APS March Meeting, Boston, MA, USA, <i>"Error-threshold for topological subsystem quantum error-correcting codes"</i>	02/2012
Joint Annual Meeting of the SPS and ÖPG, Switzerland, <i>"Resilience of Topological Codes to Depolarization"</i>	06/2011
APS March Meeting, Dallas, TX, USA, <i>"Stability of Topological Codes to Depolarization"</i>	03/2011
5th Monte Carlo Workshop, Heidelberg, Germany, <i>"Application of Classical Monte Carlo Techniques to Quantum Error Correction"</i>	01/2011
APS March Meeting, Portland, OR, USA, <i>"Error threshold of topological color codes and random three-dimensional gauge models"</i>	03/2010
APS March Meeting, Portland, OR, USA, <i>"Glass transition in structural-glass models"</i>	03/2010

Summer Schools

El Escorial, Spain, <i>"Disordered Systems: From Condensed-Matter Physics to Ultracold Atomic Gases,"</i>	07/2011
Leuven, Belgium, <i>"Fundamental Problems in Statistical Physics XII,"</i>	09/2009

Posters

Quantum Information meets Statistical Mechanics, Innsbruck, Austria, <i>"Computing Error Thresholds for Topological Quantum Computing Proposals"</i>	09/2012
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TEACHING

Substitute Lecturer

Undergraduate Course, “Thermodynamics,” ETH Zurich (2010, 2011)

Undergraduate Course, “Electrodynamics,” ETH Zurich (2010)

Teaching Assistant

Assistant, Proseminar, “The physics of the Large Hadron Collider,” ETH Zurich (2013)

Assistant, Undergraduate Course, “Quantum Mechanics,” ETH Zurich (2011)

Assistant, Undergraduate Course, “Thermodynamics,” ETH Zurich (2008 – 2011)

Assistant, Undergraduate Course, “Electrodynamics,” ETH Zurich (2008 – 2010)

MISCELLANEA

Computer Experience

Languages: C++, Python, R

Platforms: Linux, HPC Clusters, CUDA

Toolchain: vim, git, cmake, googletest valgrind, gdb, gprof

Web/Script: nginx, django, flask, js, jquery, angular

Algorithmic Programming Contests

Bronze Medal, International Olympiad in Informatics (2002)

Organizer of the Swiss Olympiad in Informatics (2004-2008)

ETH Representative to the ACM–ICPC regionals, 14th place (2007)

Ranked 1018 of 8981 on topcoder.com (July 8th, 2013)

Professional Memberships

Member of the Swiss Physical Society (since 2011)

Member of the American Physical Society (since 2010)

Hobbies

Ice Hockey (HC Wohlen Freiamt, Swiss Regional League)

Snowboarding (J&S Snowboard Instructor)