

- CONTACT INFORMATION** School of Informatics, University of Edinburgh
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- EMPLOYMENT**
- **Research Associate** (postdoc), School of Informatics, University of Edinburgh. Since September 2014. Supervisor: Rahul Santhanam.
 - ***Future tense***: I have accepted a position as Assistant Professor at University of Chicago, Computer Science Dept. Scheduled to begin employment July 2015.
- PREVIOUS EMPLOYMENT**
- **Member** (postdoctoral fellow), School of Mathematics, Institute for Advanced Study, Princeton, NJ. 2-year position, Fall 2012-Summer 2014. Supervisor: Avi Wigderson.
 - Concurrently to IAS, I was **Senior postdoc** for the Center for Computational Intractability, Princeton. I contributed to Center planning and communications. 2013-2014 academic year. Supervisor: Moses Charikar.
- EDUCATION**
- **Ph.D. in Computer Science**
MIT, EECS Dept., Cambridge, MA, 2008-2012
 - ▷ Advisor: Scott Aaronson
 - ▷ Thesis title: “The Complexity of Joint Computation” (accepted September 2012)
 - ▷ Earned **S.M. (Master of Science)**, June 2010. Master’s Thesis: “PCPs for Arthur-Merlin Games and Communication Protocols”
 - ▷ GPA: 4.0
 - **Ph.D. studies in Computer Science**
U.C. San Diego, CSE Dept., La Jolla, CA, 2006-2007
 - ▷ Advisor: Russell Impagliazzo
 - ▷ GPA: 4.0 (Transferred to MIT)
 - **Undergraduate studies**
Swarthmore College, Swarthmore, PA, 2002-2006
 - ▷ B.A. in Mathematics (High Honors); Minor in Computer Science
 - ▷ Advisor: Charles F. Kelemen
 - ▷ GPA: 3.9 in major, 3.8 overall
 - **High school**
Berkeley H.S., Berkeley, CA. Graduated June 2002.
- SERVICE**
- Program committee member for 4th conference on Innovations in Theoretical Computer Science (ITCS 2013).
 - Program committee member for 55th Annual Symposium on Foundations of Computer Science (FOCS 2014).

- (ongoing) Program committee member for 30th Conference on Computational Complexity (CCC 2015; chair: David Zuckerman).

- Major editing efforts for the textbook, *Boolean Function Complexity: Advances and Frontiers* by Stasys Jukna.

See <http://www.thi.informatik.uni-frankfurt.de/~jukna/boolean/index.html>

- Reviewer for dozens of journal and conference submissions.

INVITED TALKS

- “Kernel-Size Lower Bounds: The Evidence from Complexity Theory”—a three-part tutorial, given at the 2013 Workshop on Kernelization, University of Warsaw, April 11-12, 2013.

- “Nondeterministic Direct Product Theorems and the Success Probability of SAT Solvers”—given (with variations in title/emphasis) at:

- ▷ Workshop on “Optimal Algorithms and Proofs”, Schloss Dagstuhl, October 16, 2014

- ▷ CWI (Amsterdam), March 6, 2014

- ▷ Workshop on “Exponential Algorithms: Algorithms and Complexity Beyond Polynomial Time”, Schloss Dagstuhl, August 14, 2013

- ▷ Columbia University CS Dept. Theory Seminar, September 27, 2013

- ▷ MIT CS Dept. Theory of Computation Colloquium, December 10, 2013

- “New Limits to Classical and Quantum Instance Compression”—given (with variations in title/emphasis) at:

- ▷ Princeton University CS Theory seminar, February 17, 2012

- ▷ University of Washington CS Theory seminar, February 28, 2012

- ▷ Workshop on “Recent Progress in Quantum Algorithms,” Institute for Quantum Computing (IQC), University of Waterloo, April 13, 2012

- ▷ UC San Diego CSE Dept. Theory Seminar, May 14, 2012

- ▷ Workshop on “Data Reduction and Problem Kernels,” Schloss Dagstuhl, June 12, 2012

- ▷ Joint Mathematics Meetings (AMS Special Session on “Mathematical Underpinnings of Multivariate Complexity Theory and Algorithm Design, and Its Frontiers and the Field of Incrementalization”), San Diego, January 11, 2013

- “Kernelization Lower Bounds from Weaker Hardness Assumptions”—given at Workshop on “Optimality and Tight Results in Parameterized Complexity,” Schloss Dagstuhl, November 6, 2014

- “High-Confidence Predictions under Adversarial Uncertainty”—Institute for Advanced Study, Computer Science/Discrete Math seminar, February 13, 2012

- “Efficient Probabilistically Checkable Debates”—given at:

- ▷ Workshop on “Computational Complexity of Discrete Problems,” Schloss Dagstuhl, March 21, 2011

- ▷ U.C. Berkeley, Computer Sciences Dept., Theory Seminar, April 11, 2011
- “A PCP Characterization of AM”—given (with variations in title/emphasis) at:
 - ▷ UC Berkeley, Computer Sciences Dept., Quantum Seminar, February 4, 2011
 - ▷ DIMACS Theoretical Computer Science Seminar, Rutgers University, November 7, 2012
- “Quantum Proofs for Classical Theorems”—given at Caltech Institute for Quantum Information Seminar, February 22, 2011
- “Non-Standard Advice Sources for Quantum Computation”—given at Workshop on Quantum Computer Science, Centre de recherches mathématiques (CRM), Montreal, October 6, 2011
- “Improved Direct Product Theorems for Randomized Query Complexity”—given at:
 - ▷ University of Chicago, Dept. of Computer Science, May 11, 2010
 - ▷ China Theory Week, ITCS, Tsinghua University, September 13, 2010

JOURNAL
PUBLICATIONS

(Note: many of these have earlier conference versions, listed in the next section)

- S. Aaronson and A. Drucker. A Full Characterization of Quantum Advice. *SIAM Journal on Computing*, 43(3): 1131-1183 (2014). Earlier version in STOC 2010.
- A. Drucker. High-confidence predictions under adversarial uncertainty. *Transactions on Computation Theory*, 5(3): 12 (2013). Special Issue on ITCS’12.
- A. Drucker. Improved Direct Product Theorems for Randomized Query Complexity. *Computational Complexity*, 21(2):197-244 (2012). Special Issue on CCC’11.
- A. Drucker. Block Sensitivity of Minterm-Transitive Functions. *Theoretical Computer Science (Notes)*, 412(41):5796-5801 (2011).
- A. Drucker and R. de Wolf. Uniform Approximation by (Quantum) Polynomials. *Quantum Information and Computation*, 11(3&4): 215-225 (2011).
- (Survey Paper) A. Drucker and R. de Wolf. Quantum Proofs for Classical Theorems. *Theory of Computing Library Graduate Surveys*, 2 (2011).
- S. Aaronson, S. Beigi, A. Drucker, B. Fefferman, and P. Shor. The Power of Unentanglement. *Theory of Computing*, 5 (2009). Earlier version in CCC 2008.

PAPERS IN
CONFERENCE
PROCEEDINGS

- A. Drucker, F. Kuhn, and R. Oshman. On the power of the congested clique model. In: *ACM Symposium on Principles of Distributed Computing (PODC 2014)*.
- A. Drucker. Nondeterministic Direct Product Reductions and the Success Probability of SAT Solvers. In: *IEEE FOCS 2013*.
- A. Drucker. New Limits to Classical and Quantum Instance Compression. In: *IEEE FOCS 2012*.
- A. Drucker. Limitations of Lower-Bound Methods for the Wire Complexity of Boolean Operators. In: *IEEE Conference on Computational Complexity (CCC 2012)*.

- A. Drucker, F. Kuhn, and R. Oshman. The Communication Complexity of Task Aggregation. In: *ACM Symposium on Principles of Distributed Computing (PODC 2012)*.
- A. Drucker. High-Confidence Predictions under Adversarial Uncertainty. In: *Innovations in Theoretical Computer Science (ITCS 2012)*.
- A. Drucker. Efficient Probabilistically Checkable Debates. In: *APPROX-RANDOM 2011*.
- A. Drucker. A PCP Characterization of AM. In: *ICALP 2011*.
- S. Aaronson and A. Drucker. Advice Coins for Classical and Quantum Computation. In: *ICALP 2011*.
- A. Drucker. Improved Direct Product Theorems for Randomized Query Complexity. In: *IEEE Conference on Computational Complexity (CCC 2011)*.
- S. Aaronson and A. Drucker. A Full Characterization of Quantum Advice. In: *ACM STOC 2010*. Also presented at QIP 2010.
- A. Drucker. Multitask Efficiencies in the Decision Tree Model. In: *IEEE Conference on Computational Complexity (CCC 2009)*.
- S. Aaronson, S. Beigi, A. Drucker, B. Fefferman, and P. Shor. The Power of Unentanglement. In: *IEEE Conference on Computational Complexity (CCC 2008)*.

UNPUBLISHED
PAPERS

- J. Chen and A. Drucker. Short Multi-Prover Quantum Proofs for SAT without Entangled Measurements. 2010. Available on arxiv/quant-ph.

(Informal article) A. Drucker. Multiplying 10-digit numbers with Flickr: The power of recognition memory. 2011. Available on my webpage.

AWARDS/HONORS

- Ronald V. Book Prize for Best Student Paper at 26th IEEE Conference on Computational Complexity (CCC 2012). Awarded for the paper “Limitations of Lower-Bound Methods for the Wire Complexity of Boolean Operators.”
- Best Student Paper Award at 3rd annual conference on Innovations in Theoretical Computer Science (ITCS 2012), for the paper “High-Confidence Predictions under Adversarial Uncertainty.” Also invited to special issue of Transactions on Computation Theory for ITCS '12.
- Ronald V. Book Prize for Best Student Paper at 26th IEEE Conference on Computational Complexity (CCC 2011). Awarded for the paper “Improved Direct Product Theorems for Randomized Query Complexity” (co-recipient). Also invited to special issue of Computational Complexity for CCC'11.
- Honorable Mention, NSF Graduate Research Fellowship Program competition, 2007
- Akamai Presidential Graduate Fellowship (MIT, Sep. 2008-May 2009)
- Kunzel Fellowship (U.C. San Diego, Sep. 2006-May 2007)
- Member, Phi Beta Kappa (2006) and member, Sigma Xi (2005)

TEACHING
EXPERIENCE

- Instructor for “Math Behind the Machine,” an elective course for the New Jersey Governor’s School of Engineering & Technology, held at Rutgers University, Summer 2014. This course was a 3-week introduction to theoretical computer science for talented New Jersey high school students. I designed and taught the course with the help of input and course materials from previous years’ instructors.
- Course Assistant (part-time), MIT, Fall 2011. For 6.893, Philosophy and Theoretical Computer Science (Instructor: Scott Aaronson).
- Teaching Assistant, MIT, Fall 2009. For 6.840, Theory of Computation (Instructor: Michael Sipser).
- Math Clinician, Swarthmore College, Sep. 2004-Dec. 2005. Helped college students one-on-one with a wide variety of math coursework. Supervisor: Janet Talvacchia.

ACADEMIC VISITS
AND INTERNSHIPS

- Visiting student, CS Division, U.C. Berkeley. February 2011-June 2011. (No courses; cross-enrolled at MIT.) Host: Umesh Vazirani.
- Visiting student, EECS Dept., MIT. September 2007-June 2008. (Paid, no academic credit.) Host: Scott Aaronson.
- Summer intern, CS Dept., Swarthmore College. June 2005-August 2005. Advisor: Charles F. Kelemen. Studied automata theory.
- Summer intern, Lawrence Berkeley National Lab (LBNL). June 2004-August 2004. Supervisor: Robert Van Buskirk. Studied energy efficiency and rural development.
- Summer intern, LBNL. June 2002-August 2002. Worked in the Physical Biosciences Division under Thomas Earnest and John Taylor, doing computer vision.

PROFESSIONAL
REFERENCES

- Avi Wigderson. Professor, School of Mathematics, Institute for Advanced Study. avi@ias.edu
- Scott Aaronson. Associate Professor, EECS Dept., MIT. aaronson@csail.mit.edu
- Rod Downey. Professor, School of Mathematics, Statistics and Operations Research, School of Mathematics, Statistics and Operations Research. rod.downey@vuw.ac.nz
- Rahul Santhanam. Reader, School of Informatics, U. Edinburgh. rsanthan@inf.ed.ac.uk
- Michael Sipser. Professor, Mathematics Dept., MIT. sipser@math.mit.edu
- Ronald de Wolf. Researcher, Dutch Centre for Mathematics and Computer Science and Professor (part-time), ILLC, University of Amsterdam. ronald.de.wolf@cwi.nl