Rebecca Schulman

CONTACT
INFORMATION

Post: Johns Hopkins University
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Baltimore, MD 21218

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ACADEMIC
EMPLOYMENT

Johns Hopkins University August 2011–
  Assistant Professor, Chemical and Biomolecular Engineering
  Computer Science by courtesy

University of California, Berkeley September 2008–August 2011
  Miller Fellow, Department of Physics
  Sponsor: Jan Liphardt

California Institute of Technology June 2007–September 2008
  Postdoctoral Scholar, Department of Computer Science

EDUCATION

California Institute of Technology May 2007
  PhD, Computation and Neural Systems
  Dissertation: "The Self-Replication and Evolution of DNA Crystals"
  Advisor: Erik Winfree

Massachusetts Institute of Technology June 1999
  B.S., Mathematics
  B.S., Computer Science
  GPA 4.8/5.0

JOURNAL
PUBLICATIONS

Dominic Scalise and Rebecca Schulman. Modular Reaction-Diffusion Programs for Complex Pattern Formation. Submitted.

Rebecca Schulman, Christina Wright and Erik Winfree. Increasing Redundancy Exponentially Reduces Error Rates During Algorithmic Self-Assembly. In revision.

Abdul Mohammed and Rebecca Schulman. Directing Self-Assembly of DNA Nanotubes Using Programmable Seeds. *Nano Letters*, 13 (9) 4006–4013, 2013.

Steve Whitelam, Rebecca Schulman and Lester O. Hedges. Self-assembly of multicomponent structures in and out of equilibrium. *Physical Review Letters*, 109, 265506, 2012.

Rebecca Schulman, Bernard Yurke and Erik Winfree. Robust Self-Replication of Combinatorial Information via Crystal Growth and Scission. *Proceedings of the National Academy of Sciences USA*, 109 (17) 6405–6410, 2012.

Rebecca Schulman and Erik Winfree. Simple Evolution of Complex Crystal Species. *Natural Computing*, 11 187–197, 2012.

Rebecca Schulman and Erik Winfree. Programmable control of nucleation for algorithmic self-assembly. *SIAM Journal on Computing*, 39 (4) 1581–1616, 2009.

Robert Barish[1], Rebecca Schulman[1], Paul Rothemund and Erik Winfree. An Information-Bearing

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[1]These authors contributed equally to this work.

Seed for Algorithmic Self-Assembly. *Proceedings of the National Academy of Sciences USA*, 106 (15), 6054-6059, 2009.

Rebecca Schulman and Erik Winfree. How Crystals that Sense and Respond to Their Environments Could Evolve. *Natural Computing*, 7 (2) 219-237, 2008.

Rebecca Schulman and Erik Winfree. Synthesis of Crystals with a Programmable Kinetic Barrier to Nucleation, *Proceedings of the National Academy of Sciences USA*. 104 (39), 15236–15241, 2007.

Ho-Lin Chen[1], Rebecca Schulman[1], Ashish Goel and Erik Winfree. Reducing Facet Nucleation During Algorithmic Self-Assembly. *Nano Letters*, 7 (9), 2913–2919, 2007.

PEER-REVIEWED CONFERENCE PROCEEDINGS	Rebecca Schulman and Bernard Yurke. A Molecular Algorithm for Path Self-Assembly in 3 Dimensions. In Proceedings of Robotics: Science and Systems, 2010. (**<20% acceptance rate for submitted papers**)

Rebecca Schulman and Erik Winfree. Simple Evolution of Complex Crystal Species. In Proceedings of the 16th Annual Conference on DNA Computing and Molecular Programming, 2010.

Rebecca Schulman and Erik Winfree. Self-Replication and Evolution of DNA Crystals. In Proceedings of the VIIIth European Conference on Artificial Life, 2005. **Won Best Paper at Conference.**

Rebecca Schulman and Erik Winfree. Controlling nucleation rates in algorithmic self-assembly. In Proceedings of the 10th Annual Conference on DNA-Based Computation, 2004.

Rebecca Schulman, Shaun Lee, Nick Papadakis and Erik Winfree. One-dimensional boundaries for DNA tile self-assembly. In Proceedings of the 9th Annual Conference on DNA-Based Computation, 2003.

INVITED PAPERS	Dominic Scalise and Rebecca Schulman. Chemical reaction networks: Colour by number. *Nature Chemistry*, 5 986–987, 2013.

Rebecca Schulman. Beyond Biology: Designing a New Mechanism for Self-Replication and Evolution at the Nanoscale. In Proceedings of the Conference on Genetics and Evolutionary Computation (GECCO), 2011.

HONORS AND AWARDS	• NSF CAREER Award, 2012

- NSF CAREER Award, 2012
- Turing Centenary Scholar Award, 2012
- Miller Institute Postdoctoral Fellowship, 2008
- Sherwood Chang Award for Student Excellence in the Origin of Life, 2008
- Excellent Student Paper Award, DNA Computing 12, 2006
- Philanthropic Education Organization (PEO) Scholar, 2006
- Best Paper Award, VIIIth European Conference on Artificial Life (out of 94 papers), 2005
- National Science Foundation Graduate Research Fellowship (Scientific Computing), 1999
- Exceptional Student Researcher Award, National Institutes of Health, 1995

SELECTED INVITED PRESENTATIONS	**Origins 2013** Max Planck Institute of Molecular and Cell Biology	Dresden, Germany, July 2013

Workshop on the Programmable Self-Assembly of Matter New York, NY, June–July 2013

Computability in Europe Milan, Italy, June 2013

Mind, Mechanism and Mathematics Workshop in Honor of Alan Turing

Gordon Conference on Liquid Crystals   Bidderford, Maine, June 2013

Princeton University   Princeton New Jersey, May 2013
Workshop on Algorithms and the Natural Sciences

Ecole Fédérale Polytechnique de Lausanne (EPFL)   Lausanne, Switzerland, March 2013
CECAM Workshop on Self-Assembly

Johns Hopkins School of Medicine   Baltimore, Maryland, November 2012
Department of Molecular Biology and Genetics

University of Maryland   College Park, Maryland, May 2012
Department of Computer Science

Johns Hopkins University   Baltimore, Maryland, April 2012
Department of Computer Science

Johns Hopkins University   Baltimore, Maryland, February 2012
Laboratory for Computational Sensing and Robotics

Johns Hopkins University   Baltimore, Maryland, February 2012
Nanoscience Group, Environmental Engineering

Johns Hopkins University   Baltimore, Maryland, October 2011
Condensed Matter Physics

University of Maryland   College Park, Maryland, September 2011
Chemistry and Biochemistry

Genetic and Evolutionary Computation Conference   Dublin, Ireland, July 2011
Keynote Lecture

Molecular Programming Project Workshop   Friday Harbor, Washington, June 2011

Max Planck Institute for Intelligent Systems   Stuttgart, Germany, March 2011

Columbia University   New York, NY, March 2011
Special Joint Chemistry and Electrical Engineering Seminar

University of Pennsylvania   Philadelphia, PA, February 2011
Chemical and Biomolecular Engineering / Electrical and Systems Engineering

University of Southern California   Los Angeles, CA, February 2011
Computer Science

University of California, Santa Barbara   Santa Barbara, CA, January 2011
Mechanical Engineering

Golden Gate Polymer Forum   Mountain View, CA, October 2010

Molecular Foundry User Meeting   Berkeley, CA, October 2010

Carnegie Mellon University   Pittsburgh, PA, September 2010
Electrical and Computer Engineering

University of Southern California   Los Angeles, CA, September 2010
Joint Engineering Seminar

Gordon Conference on Nanofabrication   Tilton, New Hampshire, July 2010

California Institute of Technology   Pasadena, CA, March 2010
Chemical Engineering

University of Pennsylvania   Philadelphia, PA, March 2010
Condensed Matter Physics

Columbia University   New York, NY, March 2010
Electrical Engineering

Johns Hopkins University   Baltimore, MD, February 2010
Chemical and Biomolecular Engineering

Chemical Emergence 2.0   Anchorage, AK, June 2009

University of Washington, Seattle   Seattle, February 2008
Computer Science

Workshop on Embodied Evolution   Venice, Italy, May 2007

Weizmann Institute   Rehovot Israel, July 2005

SELECTED
CONTRIBUTED
ORAL CONFERENCE
PRESENTATIONS

American Institute of Chemical Engineers 2013 Meeting   San Francisco, November 2013

American Institute of Chemical Engineers 2012 Meeting   Pittsburgh, October 2012

ACS National Meeting   Philadelpha, August 2012

ACS Colloids and Surface Science Meeting   Baltimore, June 2012

Materials Research Society   San Francisco, April 2012
Presentation time doubled by the organizers, who were extremely interested in the topic.

Robotics: Science and Systems, 2010   Zaragoza, Spain, June 2010

DNA Computing 16   Hong Kong, China, June 2010

Foundations of Nanoscience   Alta, Utah, April 2009

Meeting of the Americal Chemical Society   Boston, Massachusetts, August 2007

DNA Computing 12   Seoul, Korea, June 2006

VIIth European Conference on Artificial Life   Canterbury, UK, September 2005

DNA Computing 10   Milan, Italy, June 2004

Conference on Modern Materials and Technologies   Acireale, Italy, June 2004

Teaching

Professor   September - December 2013
540.305 Modeling and Data Analysis for Chemical and Biomolecular Engineers, Chemical and Biomolecular Engineering

Professor   January - May 2013
540.405/605 Design of Biomolecular Systems, Chemical and Biomolecular Engineering

Professor   August - December 2011
540.449/649 Logic and Decision Making in Biomolecular Systems, Chemical and Biomolecular Engineering

Teaching Assistant   October - December 2004
Neural Computation, California Institute of Technology

Recitation Instructor and Head Teaching Assistant   September - December 2003
Introduction to Computer Science, California Institute of Technology

Recitation Instructor and Head Teaching Assistant   September - December 2002
Introduction to Computer Science, California Institute of Technology