

## Ameya A. Velingker

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CONTACT INFORMATION	Ameya Velingker 3729 McIntosh Drive Orefield, PA 18069	<i>Telephone (US):</i> (617) 329-1593 <i>E-mail:</i> ameyav@gmail.com <i>Website:</i> <a href="http://www.ameyavelingker.com">http://www.ameyavelingker.com</a>
CURRENT POSITION	<b>Collaborateur Scientifique (Research Scientist)</b> Theory of Computation Laboratory School of Computer and Communication Sciences (IC) École Polytechnique Fédérale de Lausanne (EPFL)	
RESEARCH INTERESTS	My research broadly encompasses topics relating to <i>foundations of data science and communication</i> , with applications to areas such as <i>machine learning</i> and <i>signal processing</i> . Specific topics of focus include:  Algorithms for big data Kernel methods for machine learning/numerical linear algebra Streaming algorithms and sketching Compressed sensing Error-correcting codes Information theory	
EDUCATION	<b>Carnegie Mellon University</b> , Pittsburgh, PA USA Ph.D. in Computer Science Dissertation: <i>New Directions in Coding Theory: Capacity and Limitations</i> Advisors: Venkatesan Guruswami and Gary Miller 2011 – 2016  <b>Carnegie Mellon University</b> , Pittsburgh, PA USA M.Sc. in Computer Science 2011 – 2016  <b>Trinity College, University of Cambridge</b> , Cambridge, UK MASt (Master of Advanced Study) in Mathematics 2010 – 2011  <b>Harvard University</b> , Cambridge, MA USA S.M. in Computer Science A.B. in Mathematics 2006 – 2010	
EMPLOYMENT	<b>École Polytechnique Fédérale de Lausanne</b> <i>Collaborateur Scientifique (Research Scientist)</i> Host: Michael Kapralov	<b>September 2016 – present</b>
	<b>Microsoft Research India</b> <i>Research Intern</i> Host: Satyanarayana Lokam	<b>May 2015 – August 2015</b>
	<b>Carnegie Mellon University</b> <i>Graduate Research Assistant</i>	<b>2011 – 2016</b>

## APPOINTMENTS

- Long-Term Visitor at the Simons Institute  
for the Theory of Computing** **January 2015 – May 2015**  
Invited to attend the Information Theory program for Spring 2015
- Visiting Research Fellow at Harvard University** **January 2014 – August 2014**  
Host: Jelani Nelson
- Visitor at Microsoft Research New England** **January 2014 – June 2014**  
Worked on theoretical computer science research relating to error-correcting codes

HONORS AND  
AWARDS

- Hertz Fellowship Finalist** **2012**  
One of 50 students in the U.S. to advance to the final round
- Gates Cambridge Scholar** **2010 – 2011**  
One of 80 students in the world to receive a scholarship for graduate study in Cambridge, UK
- Honorable Mention in the William Lowell Putnam Competition** **2009, 2010**  
Ranked in the top 80 of competitors
- Semifinalist in the I<sup>3</sup> Harvard College Innovation Challenge** **2010**  
One of 20 entrepreneurial projects to advance to the semifinals
- Siebel Scholar** **2010**  
One of 80 graduate students among the country and 5 Harvard graduate students
- Finalist in ACM International Collegiate Programming Contest** **2007**  
Member of Harvard University Computing Team
- Semifinalist in Intel Science Talent Search (STS)** **2006**
- Member of U.S. Physics Team** **2005**  
One of 24 students across the country to be selected
- Clay Mathematics Institute Junior Fellow** **2005**  
One of 12 students across the country to be invited to attend the Clay Research Academy  
Studied combinatorics under the direction of Richard Stanley of MIT
- Silver Medalist in the Asian Pacific Mathematical Olympiad (APMO)** **2005**
- Semifinalist in the Siemens-Westinghouse Competition** **2004**  
Selected for a mathematics project done jointly with Maria Monks
- Winner of the USA Mathematical Olympiad (USAMO)** **2004**  
Scored in the top 12 of all high-school students across the nation
- Finalist in the USA Computing Olympiad (USACO)** **2003**  
Scored in the top 14 of all high-school students across the nation

**Random Fourier Features for Kernel Ridge Regression: Approximation Bounds and Statistical Guarantees**

(with H. Avron, M. Kapralov, C. Musco, C. Musco, and A. Zandieh)  
*ICML 2017.*

**Streaming Complexity of Approximating Max 2CSP and Max Acyclic Subgraph**

(with V. Guruswami and S. Velusamy)  
*APPROX 2017.*

**Towards Constructing Ramanujan Graphs Using Shift Lifts**

(with K. Chandrasekaran)  
*Linear Algebra and its Applications*, volume 529, 2017. Also *arXiv:1502.07410*.

 **$(1 + \Omega(1))$ -Approximation to MAX-CUT Requires Linear Space**

(with M. Kapralov, S. Khanna, and M. Sudan)  
*SODA 2017.*

**Bridging the Capacity Gap Between Interactive and One-Way Communication**

(with B. Haeupler)  
*SODA 2017.* Also *ECCC TR16-090* and *arXiv:1605.08792*.

**On the Sensitivity Conjecture for Read- $k$  Formulas**

(with M. Bafna, S. Lokam, and S. Tavenas)  
*MFCS 2016.* Also *ECCC TR16-132*.

**Communication with Partial Noiseless Feedback**

(with B. Haeupler and P. Kamath)  
*RANDOM 2015.*

**Approximating Data-Sensitive Distances**

(with M. Cohen, B. Fasy, G. Miller, A. Nayyeri, and D. Sheehy)  
*WADS 2015.* Also *arXiv:1502.08048*.

**An Entropy Sumset Inequality and Polynomially Fast Convergence to Shannon Capacity Over All Alphabets**

(with V. Guruswami)  
*CCC 2015.* Also *ECCC TR14-165* and *arXiv:1411.6993*.

**Limitations on Testable Affine-Invariant Codes in the High-Rate Regime**

(with V. Guruswami, M. Sudan, and C. Wang)  
*SODA 2015.* Also *ECCC TR14-067*.

**A Fast Algorithm for Well-Spaced Points and Approximate Delaunay Graphs**

(with G. Miller and D. Sheehy)  
*SoCG 2013.*

**Restricted Isometry of Fourier Matrices and List Decodability of Random Linear Codes**

(with M. Cheraghchi and V. Guruswami)  
*SODA 2013.* Also *SIAM Journal of Computing* 42(5), pp. 1888-1914, 2013 and *ECCC TR12-082*.

**Meshing  $\log n$  Dimensions in Polynomial Time**

(with G. Miller and D. Sheehy)  
Extended abstract in *CG:YRF 2012*.

**On an Exact Formula for the Coefficients of Han's Generating Function**

Accepted for publication in *Annals of Combinatorics*.

MANUSCRIPTS

**On the Erdős-Straus Conjecture: Properties of Solutions to Its Underlying Diophantine Equation**

(with M. Monks)

Semifinalist in Siemens Westinghouse Competition.

EXPOSITORY  
PAPERS

My Favorite Problem: An Unconventional Inequality, October 2008. *Harvard College Math Review*.

TALKS

Bridging the Capacity Gap Between Interactive and One-Way Communication, *SODA 2017*. Barcelona, Spain, January 2017.

Bridging the Capacity Gap Between Interactive and One-Way Communication, *École Polytechnique Fédérale de Lausanne*, Theory Reading Group. Lausanne, Switzerland, October 2016.

Bridging the Capacity Gap Between Interactive and One-Way Communication, *Rutgers University*. New Brunswick, New Jersey, USA, April 2016.

Bridging the Capacity Gap Between Interactive and One-Way Communication, *University of Texas at Austin*, ACT Seminar. Austin, Texas, USA, March 2016.

Polar Codes over  $q$ -ary Alphabets and Polynomially Fast Convergence to Shannon Capacity, *Microsoft Research India*, Theory Coffee Seminar. Bengaluru, India, August 2015.

Polar Codes over  $q$ -ary Alphabets and Polynomially Fast Convergence to Shannon Capacity, *Indian Institute of Science*, Algorithms and Complexity reading group. Bengaluru, India, August 2015.

Polar Codes over  $q$ -ary Alphabets and Polynomially Fast Convergence to Shannon Capacity, *Simons Institute for the Theory of Computing*, workshop on *Coding: From Practice to Theory*. Berkeley, CA, USA, February 2015.

Polar Codes over  $q$ -ary Alphabets and Polynomially Fast Convergence to Shannon Capacity, *SP-CodingSchool*. Campinas, Brazil, January 2015.

Limitations on Testable Affine-Invariant Codes in the High-Rate Regime, *SODA 2015*. San Diego, CA, USA, January 2015.

Polar Codes over  $q$ -ary Alphabets and Polynomially Fast Convergence to Shannon Capacity, *CMU Theory Lunch*. Pittsburgh, PA, USA, November 2014.

A Fast Algorithm for Well-Spaced Points and Approximate Delaunay Graphs, *SoCG 2013*. Rio de Janeiro, Brazil, June 2013.

Meshing  $\log n$  Dimensions in Polynomial Time, *CMU ACO Seminar*. Pittsburgh, PA, USA, September 2012.

Meshing  $\log n$  Dimensions in Polynomial Time, *CG:YRF 2012*. Chapel Hill, NC, USA, June 2012.

On an Exact Formula for the Coefficients of Han's Generating Function, *2009 AMS/MAA Joint Mathematics Meetings*. Washington, D.C., USA, January 2009.

