Sami Davies

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Department of Computer Science
Northwestern University

Education

University of Washington 2016 - 2021
M.S. in Mathematics, 2019
Ph.D. in Mathematics, 2021

University of Illinois at Chicago 2015-2016
M.S. in Mathematics

Carnegie Mellon University 2011-2015
B.S. in Mathematical Sciences, Minor in Economics
College and University Honors

My Research in Three Sentences

I design algorithms for a wide range of problems in combinatorial optimization. My PhD focused on classic questions in approximation algorithms. For my post doctoral work, I am most interested in developing theoretical foundations for learning-augmented algorithms.

Publications

1. Sami Davies, Samir Khuller, Shirley Zhang. "Balancing Flow Time and Energy Consumption," SPAA 2022.
2. Sami Davies, Arya Mazumdar, Soumyabrata Pal, Cyrus Rashtchian. "New Lower Bounds on the Total Variation Distance Between Mixtures of Two Gaussians," ALT 2022.
3. Sami Davies, Janardhan Kulkarni, Thomas Rothvoss, Sai Sandeep, Jakub Tarnawski, Yihao Zhang. "On the Hardness of Scheduling with Non-Uniform Communication Delays," SODA 2022.
4. Sami Davies, Miklós Z. Rácz, Benjamin Schiffer, Cyrus Rashtchian. "Approximate Trace Reconstruction: Algorithms," ISIT 2021.
5. Sami Davies, Janardhan Kulkarni, Thomas Rothvoss, Jakub Tarnawski, Yihao Zhang. "Scheduling with Communication Delays via LP Hierarchies and Clustering II: Weighted Completion Times on Related Machines," SODA 2021.
6. Sami Davies, Janardhan Kulkarni, Thomas Rothvoss, Jakub Tarnawski, Yihao Zhang. "Scheduling with Communication Delays via LP Hierarchies and Clustering," FOCS 2020.
7. Sami Davies, Thomas Rothvoss, Yihao Zhang. "A Tale of Santa Claus, Hypergraphs and Matroids," SODA 2020.
8. Sami Davies, Miklós Z. Rácz, Cyrus Rashtchian. "Reconstructing Trees from Traces," COLT 2019. Full version to appear in the Annals of Applied Probability
9. Sami Davies, Chenxiao Xue, Carl R. Yerger, "Algorithms for finding knight's tours on Aztec diamonds," *Involve, a Journal of Mathematics*, Vol. 10 (2017), No. 5, 721-734.

Invited participation and internships

IDEAL Workshop on Algorithms for Massive Data Sets May 2022
Evanston, IL (Hybrid)
Virtual talk on learning-augmented algorithms

CanaDAM (Canadian Discrete and Algorithmic Mathematics) May 2021
Virtual talk on scheduling with communication delays

Microsoft Research Intern Summer 2020
Redmond, WA (virtual)
Hosted by Janardhan Kulkarni and Jakub Tarnawski in the Algorithms group

Dagstuhl Seminar in Scheduling February 2020
Shloss Dagstuhl

Nebraska Conference for Women in Mathematics February 2019
University of Nebraska Lincoln

Women in Theory June 2018
Harvard University

Leadership Alliance Summer Research Program Summer 2014
Brown University
Examining Euler Equations. Joint work with Johnny Guzman, Gopal Yalla

Summer Undergraduate Applied Mathematics Institute Summer 2013
CMU
Patterns of the Bhargava Defined Factorial. Joint work with Joe Gault and Gregory Johnson.

Awards and Fellowships

CI Fellow 2021-2021
Northwestern University
Awarded funding for a two-year postdoctoral fellowship

Tanzi-Egerton Fellow 2020
University of Washington
Awarded to an outstanding female, senior graduate student in mathematics

Microsoft Research Dissertation Grant 2020
Microsoft Research
Awarded to 10 graduate students in computer science across the US to support them in finishing their Ph.D. work

McKibben and Merner Endowed Fellowship in Mathematics 2017-2019
University of Washington
Awarded to two students who were exceptional in their preliminary exams and first year courses

Teaching

I taught the following courses:

Math 107	Math in Society	FEPPS Summer 2018
CSE 311	Foundations of Computing I	UW Spring 2020

I served as a teaching assistant for the following courses:

Math 111	Algebra with Applications	UW Fall 2017
Math 124	Calculus I	UW Winter & Spring 2017
Math 126	Multivariable Calculus	UW Fall 2016
Math 121	Pre-Calculus	UIC Fall 2015 & Spring 2016
21-241	Matrices and Linear Transformations	CMU Spring 2015

Service and outreach

External Reviewer
SODA 2020, ICALP 2020, *IEEE Transactions on Information Theory*, MFCS 2020, ISAAC 2020, *Operations Research*, PODS 2021, WADS 2021, ICALP 2021, STOC 2022, ICALP 2022, ESA 2022, *Discrete Mathematics*

Northwestern Junior Theorists Workshop December 2021
Co-organized a workshop that highlighted rising theoretical computer scientists
https://theory.cs.northwestern.edu/events/2021-junior-theorists-workshop/

Washington Directed Reading Program 2018-2021
Mentor for the WDRP, which pairs undergraduate students with graduate student mentors for independent reading project. Helped conceive and write grants for the WDRP in summer 2018

Mastery Learning Hour 2021
Math tutor for K-12 students. Provide support to students remotely during COVID-19 pandemic.

Freedom Education Project Puget Sound (FEPPS) 2017-2019
Tutor during fall and winter of 2017. Course instructor during the summer of 2018 at the Washington Corrections Center for Women.

Math Circle 2018
Instructor spring of 2018.

Assocation for Women in Math 2016-2021
Member since 2016. Secretary of the UW student chapter 2018-2019 academic year.