

# MARINA KNITTEL

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## RESEARCH INTERESTS

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My research focuses on graph algorithms for (1) scalable machine learning, (2) market and diffusion modeling, and (3) classical problems in computer science (i.e., matching, coloring, etc.). Some of my previous works include distributed and streaming edge coloring, distributed and fair hierarchical clustering, and multi-agent games of influence. I am currently working on distributed matching, partitioning methods for high-dimensional geometry, and a stable marriage model for the faculty hiring market.

## EDUCATION

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**University of Maryland, College Park**

College Park, MD

*PhD in Computer Science*

*Expected: May 2023*

*MS in Computer Science, 3.97 GPA*

*May 2020*

**Advisors:** Prof. MohammadTaghi Hajiaghayi and Prof. John Dickerson

**Coursework:** Approximation Algorithms, Modern Discrete Probability, Algorithms in Machine Learning, Computational Geometry, Algorithmic Lower Bounds, Computational Linguistics, Quantum Information Theory, Computational Genomics

**Harvey Mudd College**

Claremont, CA

*B.S. in Computer Science and Mathematics, 3.75 GPA*

*May 2018*

**Advanced Coursework:** Advanced Algorithms, Computational Complexity, Graph Theory, Convex Set Theory, Machine Learning, Artificial Intelligence, Logic, Advanced Linear Algebra

## HONORS AND AWARDS

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<b>External</b>	ARCS Endowment Award	2021-2022
	AAMAS Student Scholarship	2020
<b>University of Maryland</b>	Dean's Fellow	2018 - 2020
	Class of '94 Award	2018
<b>Harvey Mudd College</b>	High Distinction	2018
	Honors in Computer Science	2018
	Honors in Mathematics	2018
	Dean's List	2015 - 2018
<b>Palo Alto High School</b>	Sandra Forsythe Memorial Scholarship	2014

## PUBLICATIONS AND PRESENTATIONS

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<sup>abc</sup>Denotes that authors are listed **alphabetically**. This is convention in theoretical computer science.

Computer science traditionally uses competitive conferences (15-30% accepted) as the main publication venue.

### Conference:

1. *[Submitted]* <sup>abc</sup>MohammadTaghi Hajiaghayi, Marina Knittel, Hamed Saleh, and Hsin-Hao Su, "Massively Parallel Constant-round Tree Contraction".
2. *[In Prep]* <sup>abc</sup>AmirMohsen Ahanchi, Alexandr Andoni, MohammadTaghi Hajiaghayi, Marina Knittel, and Peilin Zhong, "Massively Parallel Tree Embeddings for High Dimensional Spaces".

3. *[In Prep]* Marina Knittel, Samuel Dooley, and John P. Dickerson, “The Binary Affiliate Matching Problem: Approval-Based Matching with Applicant-Employer Relations”.
4. *abc*Fotini Christia, Michael Curry, Constantinos Daskalakis, Erik Demaine, John P. Dickerson, MohammadTaghi Hajiaghayi, Adam Hesterberg, Marina Knittel, and Aidan Millif, “Scalable Equilibrium Computation in Multi-agent Influence Games on Networks”. The Association for the Advancement of Artificial Intelligence (AAAI), 2020.
5. *abc*Sara Ahmadian, Alessandro Epasto, Marina Knittel, Ravi Kumar, Mohammad Mahdian, Benjamin Moseley, Sergei Vassilvitskii, Philip Pham, and Yuyan Wang. “Fair Hierarchical Clustering”. The Conference on Neural Information Processing Systems (NeurIPS), 2020.
6. *abc*MohammadTaghi Hajiaghayi and Marina Knittel, “Matching Affinity Clustering: Improved Hierarchical Clustering at Scale with Guarantees”. The International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2020. Extended abstract.
7. *abc*Soheil Behnezhad, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, Marina Knittel, and Hamed Saleh, “Streaming and Massively Parallel Algorithms for Edge Coloring”. The 27th Annual European Symposium on Algorithms (ESA), 2019.
8. Jordan R. Abrahams, David A. Chu, Grace Diehl, Marina Knittel, Judy Lin, William Lloyd, James C. Boerkoel Jr., and Jeremy Frank, “DREAM: An Algorithm for Mitigating the Overhead of Robust Rescheduling”. The 29th International Conference on Automated Planning and Scheduling (ICAPS), 2019.
9. Hoaxing Du, Yi Sheng Ong, Marina Knittel, Ross Mawhorter, Ivy Liu, Gianluca Gross, Reiko Tojo, Ran Libeskind-Hadas, and Yi-Chieh Wu, “Multiple Optimal Reconciliations with Gene Duplication, Loss, and Coalescence”. The 17th Asia Pacific Bioinformatics Conference (APBC), 2019.

### **Presentations:**

1. “Scalable Equilibrium Computation in Multi-agent Influence Games on Networks”. AAAI-21. Full talk and short talk.
2. “Fair Hierarchical Clustering”. NeurIPS-20. Short talk.
3. “Matching Affinity Clustering: Improved Hierarchical Clustering at Scale with Guarantees”. AAMAS-20.
4. “Fair Hierarchical Clustering”. The Sets & Partitions Workshop at NeurIPS-19.
5. “Trade-offs Between Communication, Rescheduling, and Success Rate in Uncertain Multi-Agent Schedules”. IntEX Workshop at ICAPS-18.

### **Workshop Papers, etc.:**

1. *abc*Sara Ahmadian, Alessandro Epasto, Marina Knittel, Ravi Kumar, Mohammad Mahdian, and Philip Pham. “Fair Hierarchical Clustering”. The Sets & Partitions Workshop at the 33rd Conference on Neural Information Processing Systems (NeurIPS), 2019. Workshop; subsumed by conference submission.
2. *abc*Soheil Behnezhad, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, Marina Knittel, and Hamed Saleh, “Edge Coloring: MPC and Streaming Algorithms”. The 33rd International Symposium on Distributed Computing (DISC), 2019. Brief announcement; subsumed by ESA-19 paper.
3. David A. Chu, Grace Diehl, Marina Knittel, Judy Lin, Liam Lloyd, James C. Boerkoel Jr., and Jeremy Frank, “Trade-offs Between Communication, Rescheduling, and Success Rate in Uncertain Multi-Agent Schedules”. The Integrated Planning, Acting and Execution Workshop (IntEx) at

The 28th International Conference on Automated Planning and Scheduling (ICAPS), 32-40, 2018.  
Workshop; subsumed by ICAPS-19 paper.

## WORK AND ACADEMIC EXPERIENCE

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### **Amazon**

*Research Scientist Intern*

May 2020 - August 2020

*Seattle, WA*

- Learned and evaluated dense embeddings of ads metadata for click-through rate prediction
- Parsed and vectorized complex boolean expressions as a part of ads metadata

### **Google LLC**

*Software Engineering Intern*

May 2019 - August 2019

*Seattle, WA*

- Developed and bounding efficient algorithms for hierarchical clustering without over-representation
- Migrated and improved open sourced tools for graph regularization using Keras (TensorFlow)

### **Facebook, Inc.**

*Software Engineering Intern*

May 2018 - August 2018

*Menlo Park, CA*

- Developed, trained, and tuned new neural network models for suggesting Instagram accounts to follow
- Incorporated handling for sparsed, crossed, and bucketized features in the training pipeline

### **NASA Ames & Harvey Mudd College**

*Senior Capstone Project Manager and Member*

August 2017 - June 2018

*Claremont, CA*

- Led a team of 5 in a research-based project in scheduling algorithms
- Researched new methods for optimizing multi-agent system rescheduling with limited communication
- Theoretically and experimentally verified effect of communication on success

### **Rutgers University**

*REU Scholar in Theoretical Computer Science*

May 2017 - August 2017

*Piscataway, New Jersey*

- Summer 2017 NSF-funded REU position under Professor Eric Allender at DIMACS
- Studied the Minimum Circuit Size Problem, Kolmogorov Random Strings and the Polynomial Hierarchy
- Modified the Turing machine to produce a hierarchy almost isomorphic to the Polynomial Hierarchy

### **Harvey Mudd College**

*Researcher in Computational Biology*

August 2016 - May 2018

*Claremont, CA*

- Developed a new algorithm for fast and effective reconciliation for non-binary phylogenetic trees
- Proved various mathematical properties of a data structure used in phylogenetic reconciliation research
- Analyzed effectiveness of the binary phylogenetic tree reconciliation algorithm

### **Bloomberg LP**

*Software Engineering Intern*

May 2016 - July 2016

*New York City, NY*

- Built a service to assume a front end process and lighten client machine processing load
- Gained a deeper understanding of computer systems, C++, and elegant and adaptable coding practices

### **Harvey Mudd College**

*Researcher in Web Development*

June 2015 - May 2016

*Claremont, California*

- Improved a research websites appeal and functionality (HTML, CSS, Javascript, PHP and Drupal)
- Trained new researchers in web development and coding practices to join the web development team

**Napses***Web Development Intern*

May 2014 - August 2014

*Santa Barbara, CA*

- Programmed a blog in JavaScript (jQuery), HTML, and CSS, using Bootstrap for a start-up

**TEACHING EXPERIENCE**

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**Teaching Assistant***University of Maryland, College Park*

September 2018 - December 2019

*College Park, MD*

- Courses: Discrete Structures, Cryptography
- Responsibilities: Lead recitations, hold tutoring hours, grade tests

**Grader and Tutor***Harvey Mudd College*

January 2015 - May 2018

*Claremont, CA*

- Courses: Algorithms, Computational Complexity, Machine Learning, Data Structures & Program Development, Introductory Computer Science, Multivariable Calculus
- Responsibilities: Hold tutoring hours, grade homeworks

**Homework Hotline Tutor***Harvey Mudd College*

September 2014 - December 2016

*Claremont, CA*

- Provided free over-the-phone tutoring for K-12 students

**SERVICE, WORKSHOPS, AND LEADERSHIP**

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**Conference/Journal Review****External**

SIDMA (2021), AAAI (2020), Algorithmica (2019)

Google CSRMP Class of 2021

2021

CRA-WP Grad Cohort for Women

2021

**University of Maryland**

LGBTQ+ Event Coordinator

2019 - Now

CATS Theory Lecture Organizer

2019 - Now

Executive Committee Member

2018 - Now

CS Women Mentor

2018 - 2020

Graduate Admissions Volunteer

2018 - 2019

**Harvey Mudd College**

Committee for Activities Planning Member

2017 - 2018

Women in Math Club President

2017 - 2018

LGBTQ+ Club Mentor

2017 - 2018

Dorm President

2016 - 2017

Dorm Treasurer

2015 - 2016