

# Max Springer

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**Research Interests**      Algorithmic Game Theory, Auction and Mechanism Design,  
Fair Allocation, Combinatorics, Machine Learning

**Education**      **University of Maryland**      College Park, MD  
PhD in Applied Mathematics      August 2020 – Present  
MS in Applied Mathematics      Awarded in May 2022  
Advisor: Professor MohammadTaghi Hajiaghayi

**Cornell University**      Ithaca, NY  
BA in Mathematics, concentration in Biology      August 2015 – May 2019  
Minors in Biological Sciences & Cognitive Science

**Accepted Publications**      **Generalized Reductions: Making any Hierarchical Clustering Fair and Balanced with Low Cost**

M. Knittel, M. Springer, J. Dickerson and M.T. Hajiaghayi  
*40<sup>th</sup> International Conference on Machine Learning (ICML) - July 2023*

**Analysis of a Learning Based Algorithm for Budget Pacing**  
M.T. Hajiaghayi and M. Springer\* ([arXiv](#))  
*22<sup>nd</sup> AAMAS Conference - May 2023*

**Optimal Sparse Recovery Using Decision Stumps**  
K. Banihashem, M.T. Hajiaghayi and M. Springer\*  
*37<sup>th</sup> AAAI Conference on Artificial Intelligence - February 2023*

**Online Algorithms for the Santa Claus Problem**  
M.T. Hajiaghayi, M.R. Khani, D. Panigrahi and M. Springer\*  
*36<sup>th</sup> Conference on Neural Information Processing Systems - December 2022*

**A Machine Learning Approach for Predicting Impaired Consciousness in Absence Epilepsy**  
M. Springer, A. Khalaf, ... and H. Blumenfeld  
*Annals of Clinical and Translational Neurology (ACTN) - July 2022*

**The Pulse: Transient fMRI Signal Increases in Subcortical Arousal Systems During Transitions in Attention**  
R. Li, J.H. Ryu, P. Vincent, M. Springer, ... and H. Blumenfeld  
*NeuroImage - May 2021*

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\* authors appear in alphabetical order

## Submitted Papers

### **Price of Class Fairness in Online Matching**

S.C. Jahan, M.T. Hajiaghayi, M. Sharify, S. Shin and M. Springer\*

*Symposium on Discrete Algorithms (SODA) 2024*

### **Dynamic Metric Embedding into $\ell_p$ Space**

K. Banhashem, M.T. Hajiaghayi, D. Kowalski, J. Olkowski and M. Springer\*

*Symposium on Discrete Algorithms (SODA) 2024*

### **Almost Envy-Free Allocations of Indivisible Goods or Chores with Entitlements**

M.T. Hajiaghayi, M. Springer and H. Yami\*

*37<sup>th</sup> Conference on Neural Information Processing Systems*

### **Almost Tight Guarantees for Online Nash Social Welfare Maximization**

K. Banhashem, M.T. Hajiaghayi, E. Moreno, S. Shin and M. Springer\*

*37<sup>th</sup> Conference on Neural Information Processing Systems*

### **A Nash Equilibrium Approach to Missing Data Imputation**

K. Banhashem, M.T. Hajiaghayi and M Springer

*37<sup>th</sup> Conference on Neural Information Processing Systems*

### **Improved Oracle Based Algorithms for Adversarial Contextual Bandits**

K. Banhashem, M.T. Hajiaghayi, S. Shin, and M. Springer\*

*37<sup>th</sup> Conference on Neural Information Processing Systems*

### **Fair and Polylog Approximate Low-Cost Hierarchical Clustering**

M. Knittel, M. Springer, J. Dickerson, M.T. Hajiaghayi

*37<sup>th</sup> Conference on Neural Information Processing Systems*

### **Estimating Insulin Sensitivity and Beta-Cell Function from the Oral Glucose Tolerance Test: Validation of a new Insulin Sensitivity and Secretion (ISS) Model**

J. Ha, S. Chung, M. Springer, ..., A. Sherman

*American Journal of Physiology*

## Presentations

### **EEG and Machine Learning in Prediction of Impaired Responses to Visual Stimuli During Interictal Epileptiform Discharges**

*75<sup>th</sup> American Epilepsy Society Meeting - December 2021*

### **Analysis of a Learning Based Algorithm for Budget Pacing**

*Facebook Operations Research Workshop - October 2021*

### **A Machine Learning Approach for Classification of Spike-Wave**

## **Discharges in Absence Epilepsy**

74<sup>th</sup> American Epilepsy Society Meeting - December 2020

## **Driving Safety in Patients with Generalized SWD but no Clinical Seizures: Evaluation with a Realistic Driving Simulator**

73<sup>rd</sup> American Epilepsy Society Meeting - December 2019

Honors and Awards	AAAS Mass Media Fellowship Semi-Finalist	2023
	Nokia Bell Lab's Outstanding Innovation Award	Summer 2022
	Recipient of Aziz / Osborn Gold Medal in Teaching Excellence	2021 - 2022
	Recipient of NSF Graduate Research Fellowship (NSF GRFP)	March 2022
	Recipient of University of Maryland Dean's Fellowship	August 2020
Research Experience	<b>Hajiaghayi Research Group</b>	December 2020 – Present
	University of Maryland (College Park), Department of Computer Science	
	Advisor: Professor MohammadTaghi Hajiaghayi	
	Research focuses on fair division problems and approximate algorithms.	
	<b>AI Research Lab</b>	May 2022 – August 2022
	Nokia Bell Labs	
	Advisor: Dr. Matthew Andrews	
	Research focuses on computer vision for automation of industrial monitoring.	
	<b>Laboratory of Biological Modeling</b>	May 2021 – August 2021
	National Institutes of Diabetes and Digestive Kidney Diseases (NIDDK)	
	Advisor: Dr. Arthur Sherman	
	Research focuses on analysis of dynamical systems model of Type 2 Diabetes.	
	<b>Blumenfeld Lab</b>	May 2019 – August 2020
	Yale University School of Medicine, Department of Neurology	
	Advisor: Dr. Hal Blumenfeld	
	Formulated machine learning classification algorithm for epileptiform discharges from large-scale set of scalp EEG data.	
	<b>Integrative Cancer Dynamics Unit</b>	May 2018 – May 2019
	National Cancer Institute, National Institutes of Health	
	Advisor: Dr. Orit Lavi	
	Worked on dynamical systems model of cell cycle and tumorigenesis.	

**Computational Physiology Laboratory**      January 2017 – January 2018  
Cornell University, Department of Neurobiology and Behavior  
Advisor: Professor Christiane Linster  
Investigated the physiological effects and behavioral role of serotonin within the rodent olfactory bulb.

Teaching experience

**Lecturer and Head Teaching Assistant (UMD)**      Fall 2022  
DATA/MSML 602: Principles of Data Science  
Presented lectures on various topics concerning Python implementation of data science principles. Devised course assignments and exams.

**Graduate Teaching Assistant (UMD)**      Fall 2021  
MATH 140: Calculus I  
Held twice weekly recitations for topics covered in lecture. Course topics: Limits continuity, derivatives and applications of the derivative, integration, etc...

**Graduate Teaching Assistant (UMD)**

Spring 2021

MATH 141: Calculus II

Held twice weekly recitations for topics covered in lecture. Course topics: techniques of integration, differential functions, sequences & series, etc...

**Graduate Teaching Assistant (UMD)**

Fall 2020

MATH 135: Mathematics for Life Sciences

Held twice weekly recitations for topics covered in lecture. Course topics: descriptive statistics, probability, discrete time modeling.

**Services****External Reviewer**

Conferences: ESA '21, ITCS '22, AAAI '22, AISTATS '22, ICML '22, NeurIPS '22, ICML '23, NeurIPS '23

**Skills****Programming**

Proficient in: MATLAB, Python, Java, R.

**Languages:** English (native), German (advanced), Italian (limited)