

Francisco J. Marmolejo-Cossío

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RESEARCH DISCIPLINES

Algorithmic Game Theory, Computational Learning Theory, Decentralized Consensus Protocols, Mechanism Design for Social Good

EDUCATION

University of Oxford, Oxford, UK

- D.Phil. in Computer Science Oct 2015 – Apr 2020
 - Title: “Equilibrium Computation in Games and Strategic Aspects of Bitcoin Mining”
- M.Sc. in Mathematics and the Foundations of Computer Science Oct 2014 – Oct 2015

Harvard University, Cambridge, Massachusetts, USA

- A.B. in Mathematics and Minor in Neurobiology Sep 2008 – May 2012
 - Language Citation in Urdu/Hindi

EMPLOYMENT

Harvard University

- Postdoctoral Fellow Jul 2021 – Present

IOHK

- Research Fellow Apr 2020 – Present

University of Oxford

- Career Development Fellow and Senior Tutor in Computer Science (Balliol College) Sep 2019 – Jul 2021

Mahindra & Mahindra, Mumbai, India

- Deputy Manager (Ivy League Global Recruitment Program) Sep 2012 – Jun 2014

JOURNAL PUBLICATIONS

“Optimally Deceiving a Learning Leader in Stackelberg Games”

G. Birmpas, J. Gan, A. Hollender, **F. Marmolejo-Cossío**, N. Rajgopal, A. Voudouris.
To appear in *Journal of Artificial Intelligence Research (JAIR)*, Supersedes NeurIPS version below.

“Health Sentinel: A mobile crowdsourcing platform for self-reported surveys provides early detection of COVID-19 clusters in San Luis Potosí, Mexico”

S. Ruiz-Correa, R. López-Revilla, F. Díaz-Barriga, **F. Marmolejo-Cossío**, V. Robledo-Valero, E. Hernández-Huérffano, L. Álvarez-Rivera, M. Rangel-Martínez, M. Lutzow-Steiner, L. Ortiz-Vázquez, A. Mendoza-Lara M. Olivo-Rodríguez, M. Galván-Ramírez, A. Morales-Neria, V. Martínez-Donjuan, M. Cervantes-Irurzo, A. Comas-García, F. Maldonado, C. Aguilar-Acosta.

To appear in *International Journal of Medical Informatics*, Sep 2021.

“Concentrating Pooled COVID-19 Patient Lysates to Improve Reverse Transcription Quantitative PCR Sensitivity and Efficiency”

H. Sanghani, D. Nawrot, **F. Marmolejo-Cossío**, J. Taylor, J. Craft, E. Kalimeris, M. Andersson, S. Vasudevan.
In *Clinical Chemistry*. May 2021.

“Learning Convex Partitions and Computing Game-theoretic Equilibria from Best Response Queries”

P. Goldberg, **F. Marmolejo-Cossío**.
In *ACM Transactions on Economics and Computation (TEAC)*. Supersedes WINE version below. Mar 2021.

“Logarithmic Query Complexity for Approximate Nash Computation in Large Games”

P. Goldberg, **F. Marmolejo-Cossío**, and Z. Steven Wu.
In *Theory of Computing Systems (TOCS)*. Supersedes SAGT version below. Jan 2019.

CONFERENCE PUBLICATIONS

Highly-reviewed “top-tier” conferences.

“Optimal Testing and Containment Strategies for Universities in Mexico amid COVID-19”

L. Benavides-Vázquez, A. Guzmán-Gutiérrez, J. Jonnerby, P. Lazos, E. Lock, **F. Marmolejo-Cossío**, R. Tello-Ayala, N. Rajgopal.

To appear in *Proceedings of 1st ACM Conference on Equity and Access in Algorithms, Mechanisms and Optimization (EAAMO)*, October 2021.

“RPPLNS: Pay-per-last-N-shares with a Randomised Twist”

P. Lazos, F. Marmolejo-Cossío, X. Zhou, J. Katz.

In *Proceedings of 20th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, May 2021.

“Optimally Deceiving a Learning Leader in Stackelberg Games”

G. Birmpas, J. Gan, A. Hollender, F. Marmolejo-Cossío, N. Rajgopal, A. Voudouris.

In *Proceedings of Thirty-fourth Conference on Neural Information Processing Systems (NeurIPS)*, Dec 2020.

“Learning Strong Substitutes Demand via Queries”

P. Goldberg, E. Lock, F. Marmolejo-Cossío.

In *Proceedings of The 16th Conference on Web and Internet Economics (WINE)*, Dec 2020.

Nominated for Best Paper.

“Fairness and Efficiency in DAG-based Cryptocurrencies”

G. Birmpas, E. Koutsoupias, P. Lazos, F. Marmolejo-Cossío.

In *Proceedings of 24th International Conference on Financial Cryptography and Data Security (FC)*, Feb 2020.

“Competing (Semi)-Selfish Miners in Bitcoin”

F. Marmolejo-Cossío, E. Brigham, B. Sela, J. Katz.

In *Proceedings of 1st ACM conference on Advances in Financial Technologies (AFT)*, Oct 2019.

“Learning Convex Partitions and Computing Game-theoretic Equilibria from Best Response Queries”

P. Goldberg, F. Marmolejo-Cossío.

In *Proceedings of 14th Conference on Web and Internet Economics (WINE)*, Dec 2018.

Selected for special edition of *ACM Transactions on Economics and Computation (TEAC)*.

“Logarithmic Query Complexity for Approximate Nash Computation in Large Games”

P. Goldberg, F. Marmolejo-Cossío, and Z. Steven Wu

In *Proceedings of 9th International Symposium on Algorithmic Game Theory (SAGT)*, Sep 2016.

Selected for special edition of *Theory of Computing Systems (TOCS)*.

**REPORTS &
WORKSHOP
PUBLICATIONS**

“Novel Practices and Highlights from the Fourth Workshop on Mechanism Design for Social Good”

F. Marmolejo-Cossío, F. Monachou.

In *ACM SIGAI AI Matters*, Mar 2021.

“Diagnosticar para controlar: cómo maximizar el impacto en el uso de pruebas COVID-19 escasas”

F. Marmolejo-Cossío.

In *Consejo Potosino de Ciencia y Tecnología (COPOCYT) TecnoDisruptiva*. Jan 2021.

“Test and Contain: A Resource-Optimal Testing Strategy for COVID-19”

J. Jonnerby, P. Lazos, E. Lock, F. Marmolejo-Cossío, C. Ramsay, D. Sridhar.

In *Harvard AI for Social Good Workshop (2020)*.

**ONGOING
PROJECTS**

“Organizing COVID-19-safe AI workshops for high school students in Mexico”

E. Lock, F. Marmolejo-Cossío, N. Rajgopal, J. Jonnerby, S. Finster, M. González-Amador, F. Zeng, M. Hailemariam, S. Gupta, S. Ruiz-Correa.

“Incentivising Informative Experts for On-Chain Funding of Decentralised Software Updates”

M. Ciampi, N. Karagiannidis, P. Lazos, F. Marmolejo-Cossío.

“Fostering Decentralisation in Proof-of-Stake Mining Pools”

A. Kiayyas, E. Koutsoupias, F. Marmolejo-Cossío, A. Stouka.

TEACHING

University of Oxford

▪ Guest Lectures

- “Cryptocurrencies and Property Law”, *Law and Computer Science*
- “Online Learning, Mistake Bounds, and the Perceptron Algorithm”, *Advanced Machine Learning*

▪ College Tutorials

- Linear Algebra, Discrete Mathematics, Computational Learning Theory, Models of Computation, Design and Analysis of Algorithms, Algorithms and Data Structures, Imperative Programming, Functional Programming, Continuous Mathematics, Machine Learning, Introduction to Formal Proof, and Computational Game Theory.

Harvard University

▪ Course Assistant

- CS 220: Cryptography
- Math 112: Real Analysis

Fall 2011
Spring 2010

SUPERVISION	<p>Postdoctoral Supervision</p> <ul style="list-style-type: none"> ▪ Héctor Alonso Guzmán Gutiérrez, IPICyT Jan 2021 – Present <p>M.Sc. Thesis Supervision</p> <ul style="list-style-type: none"> ▪ Amrita Khandpur, University of Edinburgh Apr 2021 – Present ▪ Elizabeth Smith, University of Oxford Summer 2019 ▪ Leo Falcomer-Dawson, University of Oxford Summer 2017 <p>Undergraduate Thesis Supervision</p> <ul style="list-style-type: none"> ▪ Sarthak Jain, University of Oxford Dec 2020 – Present <p>REU Supervision</p> <ul style="list-style-type: none"> ▪ José Roberto Tello Ayala, ITAM May 2021 – Present
AWARDS & SCHOLARSHIPS	<ul style="list-style-type: none"> ▪ Best Paper Nomination, Conference on Web and Internet Economics (WINE) 2020 ▪ Computer Science Departmental Teaching Award 2019 ▪ Outstanding Tutor Nomination (university-wide) 2019 ▪ Mexican National Council of Science and Technology (CONACyT) Scholarship 2014 – 2019
GRANTS	<p>SIGAI Activities Grant 2021 Awarded \$1,200 from the ACM Special Interest Group on Artificial Intelligence (SIGAI) to fund the 4th Workshop on Mechanism Design for Social Good (MD4SG'20) which took place virtually due to the COVID-19 pandemic.</p> <p>Global Challenges in Economics and Computation 2020 – 2021 Awarded \$ 25,000 as PI from the ACM Special Interest Group on Economics and Computation (SIGecom) for project titled: "Maximising the Benefits of an Acutely Limited Number of COVID-19 Tests in San Luis Potosí, Mexico".</p>
INVITED TALKS	<p>"Mechanism Design for Social Good: Maximising the Utility of a Limited Number of COVID Tests", at the <i>QMNet Seminar</i>, University of Melbourne (upcoming), Nov 2021.</p> <p>"Fostering Geographical Diversity in Academic Conferences", at the <i>Diversity/PSOR/MIF: Diversity, Equity and Inclusion in OR/MS/Analytics: Innovations in Research and Practice Cluster</i>, INFORMS (upcoming), Oct 2021.</p> <p>"Optimal Testing and Containment Strategies for Universities in Mexico amid COVID-19", at the <i>1st ACM Conference on Equity and Access in Algorithms, Mechanisms and Optimization</i> (upcoming), Oct 2021.</p> <p>"Health Sentinel: A mobile crowdsourcing platform for self-reported surveys provides early detection of COVID-19 clusters in San Luis Potosí, Mexico", at the <i>1st ACM Conference on Equity and Access in Algorithms, Mechanisms and Optimization</i> (upcoming), Oct 2021.</p> <p>"ICWSM and the Global Research Community", at the <i>15th International Conference on Web and Social Media</i>, Invited Panelist, Jun 2021.</p> <p>"Mechanism Design for Social Good: Maximising the Utility of a Limited Number of COVID Tests", at the <i>ELLIS Human-Centric Machine Learning Workshop</i>, May 2021.</p> <p>"Los desafíos de la investigación en tiempos de pandemia: perspectivas desde ángulos diferentes (y complementarios)", at the <i>COPOCyT Interdisciplinary Seminar</i>, Mar 2020.</p> <p>"Mechanism Design for Social Good: Maximising the Utility of a Limited Number of COVID Tests", at the <i>Balliol College Alumni Forum</i>, Mar 2021.</p> <p>"Optimally Deceiving a Learning Leader in Stackelberg Games", at the <i>UC Boulder Theory Seminar</i>, Feb 2021.</p> <p>"Combating Disease Outbreaks: Preventing Future Shocks - Focus on Ebola and COVID-19", at the <i>Next Einstein Forum Global Gathering</i> (Panelist), Dec 2020.</p> <p>"Diseño de Mecanismos para el Bien Social: Optimizar el Beneficio de Pruebas COVID," at the <i>Semana ITI 2020 Virtual</i>, Politécnico SLP, Nov 2020.</p> <p>"App Centinela de la Salud, en combate al COVID-19," for the <i>Potosinian Institute of Science and Technological Research</i> (COPOCyT), Oct 2020.</p> <p>"Strategic and Structural Aspects of Bitcoin Mining," at the <i>Algorithms, Combinatorics, Game Theory and Optimization Seminar (AGCO)</i>, University of Chile, Oct 2020.</p> <p>"Mechanism Design for Social Good", at <i>Data Science Africa</i>, Jul 2020.</p>

- “**Optimally Deceiving a Learning Leader in Stackelberg Games,**” at the *Algorithms Seminar*, University of Liverpool Jun 2020.
- “**Maximising the Benefits of an Acutely Limited Number of COVID-19 Tests,**” at the *METECH Seminar*, Maastricht University, Jun 2020.
- “**Resource-optimal Testing Mechanisms for COVID-19,**” at the *Data Science Africa (DSA) COVID-19 Webinar*, Apr 2020.
- “**Fairness and Efficiency in DAG-based Cryptocurrencies,**” at the *24th Conference on Financial Cryptography and Data Security*, Sep 2016.
- “**Competing (Semi-)Selfish Miners in Bitcoin**” at the *The 1st ACM Conference on Advances in Financial Technology*, Oct 2018.
- “**Learning Convex Partitions and Computing Game-theoretic Equilibria from Best Response Queries,**” at the *The 14th Conference on Web and Internet Economics (WINE)*, Dec 2018.
- “**Computing Approximate Equilibria via Best Response Queries,**” at the *The 1st UK Workshop on Algorithmic Game Theory and Mechanism Design*, Mar 2018.
- “**Logarithmic Query Complexity for Approximate Nash Computation in Large Games,**” at the *The 9th International Symposium on Algorithmic Game Theory (SAGT)*, Sep 2016.

ACADEMIC SERVICE

Mechanism Design for Social Good (MD4SG)

- Organizer Jan 2020 – Present
- Latin America and Carribean Working Group Coordinator Jan 2021 – Present
- Development Working Group Coordinator Jan 2019 – Jan 2020

Program Chair

- MD4SG 2020

General Chair

- EAAMO 2021

Global Diversity Chair

- WINE 2021

Program Committee

- EC 2021, NeurIPS 2020, MD4SG 2019

Reviewer

- ICML, ICLR, NeurIPS, EC, WINE, SAGT, COLT, SODA

LANGUAGES

- Native Proficiency: English and Spanish
- Fluent: French
- Advanced Proficiency: Urdu/Hindi and Italian
- Basic Proficiency: Turkish and Portuguese