Stefanos Leonardos

Current Position:	**King's College London** Lecturer in Machine Learning Department of Informatics
Contact Details:	stefanos.leonardos@kcl.ac.uk; sleonardos@outlook.de [**professional website**], [**personal website**], [**google scholar**]
Personal:	Born in Athens, Greece, December 1981.

Research Experience

2022-   **King's College London**
- Lecturer in Machine Learning

2018-22   **Singapore University of Technology & Design**
- Research Fellow – Algorithmic Game Theory, Dynamical Systems, Blockchain Economics

2019-20   **University of Crete**
- Adjunct Researcher: Innovation licensing, cross ownership and optimal taxation policies

2014-17   **National and Kapodistrian University of Athens**
- Doctoral Researcher: Optimization of stochastic systems under partial information

Education

PhD	**Game Theory** • Excellent. Advisor: Costis Melolidakis	N&K University of Athens,	**2017**
MSc	**Statistics & Operations Research** • Valedictorian 10/10	N&K University of Athens,	*2013
Diploma	**Mathematics** • Distinction 1.0/1.0	Technical University of Darmstadt,	**2009**
BSc, Hons	**Business Information Systems**	Athens University of Economics & Business,	**2004**

*Compulsory military service: 2009-2010

Research & Teaching Interests

Research   Cryptoeconomics, artificial intelligence, machine learning, game dynamics
Teaching   Machine learning, deep learning, game theory, multi-agent learning

Awards & Scholarships

2024 • King's Education Award - Nominee
2023 • Editors-In-Chief selected 2023 featured article **(ACM-TEAC)**
      • King's Recognition Award
2021 • Spotlight Paper: 35th Conference on Neural Information Processing Systems **(NeurIPS-21)**
      • Best Paper Award: IEEE Transactions in Engineering Management **(IEEE-TEM)**
      • Best Paper Award: 35th AAAI Conference on Artificial Intelligence **(AAAI-21)**
2020 • SUTD Outstanding Teaching Assistant Award
      • Best Paper Award: 3rd Annual Decentralized Conference
2019 • Best Paper Award: 1st IEEE Conference on Blockchain and Cryptocurrency **(IEEE-ICBC)**
      • Best Poster Award at SUTD Research Fest
      • Best Paper Award: 1st Conference on Mathematical Research for Blockchain Economy **(MARBLE)**

2018   **Lake Como School of Advanced Studies** Summer School Fellow "Game Theory and Voting Systems".
         Maastricht University, Fifth EPICENTER Spring Course in Epistemic Game Theory
2017   **Greek Institution of State Scholarships (IKY)**: Kindly declined (due to economic criteria)

2013–16   **Alexander S. Onassis, Public Benefit Foundation**: Scholarship for doctoral studies
2008–09   **Socrates–Erasmus Fellowship:** Darmstadt & Athens. Grade: 10/10 (24 ECTS)
         Scuola Matematica Interuniversitaria: Summer School Fellow "Dynamical Systems".

Academic Service

Committees
- [**MARBLE**]   International Conference on Mathematical Research for Blockchain Economy (**Co-chair**)
- [**NeurIPS-24**]   Annual Conference on Neural Information Processing Systems (**Area Chair**)
- [**AAMAS**]   International Conference on Autonomous Agents and Multiagent Systems (**Senior PC**)
- [**ECAI-24**]   European Conference on Artificial Intelligence (**Senior PC**)

- [**IJCAI-23, -24**]   International Joint Conference on Artificial Intelligence
- [**EC-24**]   ACM Conference on Economics and Computation
- [**WINE**]   Conference on Web and Internet Economics
- [**SAGT-22**]   International Symposium on Algorithmic Game Theory
- [**ICDCS-22**]   IEEE International Conference on Distributed Computing Systems
- [**BSCI-24**]   ACM International Symposium on Blockchain and Secure Critical Infrastructure

Editor
- [**IET Blockchain**]   Special Issue on Mathematical Research for Blockchain Economy, 2023-24

Reviewer

- **Journals**: Management Science • IEEE Transactions in Engineering Management • European Journal of Operational Research • Annals of Operations Research • IEEE Access • Financial Innovation • Frontiers in Blockchain • Review of Industrial Organization • ACM Transactions on Economics and Computation • Algorithmica • IEEE Transactions on Automatic Control • Theoretical Computer Science • Applied Economics

- **Conferences**: Symposium on Theory of Computing [**STOC**] • Financial Cryptography & Data Security [**FC**] • ACM Advances in Financial Technologies [**AFT**] • International Conference on Machine Learning [**ICML**] • International Conference on Learning Representations [**ICLR**]

Teaching

2022-24	**King's College London**
	• 7CCSMPNN: Pattern Recognition, Neural Networks and Deep Learning (Module Co-leader)
	• 7CCSMGPR: Group Project – Impact Accelerator (Academic Advisor)
2020-21	**Singapore University of Technology and Design**
	• Instructor: 40.316 Game Theory (Fast track, online)
	• Teaching Assistant: 40.316 Game Theory
2011-17	**Arnos, Private Institute for Higher Education** in Athens
	• E-learning & Instructor: Probability, Statistics, Operations Research, Quality Control
2012-14	**National and Kapodistrian University of Athens, Department of Mathematics**
	• Teaching Assistant: Game Theory, Probability I, II
2006-08	**Technical University of Darmstadt, Department of Mathematics**
	• Teaching Assistant: Functional Analysis

Students

	PhD – 1st advisor	
2024-	**Charalambos Kleitsikas**, *Phase shifting and crash aware cryptocurrency trading*	(full time)
	Zihao Li, *Addressing distributional shift in offline reinforcement learning*	(full time)
2023-	**Fei Wu**, *A proposer-builder separation method to solve the problem of MEV in Ethereum*	(full time)
	Desmond Chan, *Mechanisms with heterogeneous rationality in dynamic environments*	(full time)
	Rajan Duggal, *Deep RL for option pricing, hedging and insurance applications*	(part time)
2022-	**Stefan Roesch**, *New methods for incentivising cooperation in self-interested agents*	(full time)
	PhD – 2nd advisor	
2023-	**Asad Rahman**, *Financial model construction and validation using machine learning*	(part time)
2022-	**Usman Islam**, *Compositional approaches to multi-agent learning*	(full time)

	Undergraduate	
2023	**Pedro Braga, Yasith Medagama Disanayakage, Artemiy Malyshau**	
	KCL, King's Undergraduate Research Fellowships, Joint output: [C16].	
2020-21	**Shyam Sridhar**	
	SUTD, Undergraduate Research Opportunities Programme, Joint output: [C13, C12, C10].	

Journal Publications

[J16] S. Leonardos, C. Koki & C. Melolidakis
A Generalization of the Increasing Generalized Failure Rate Unimodality Condition
Annals of Operations Research, (2023). [DOI]

[J15] S. Leonardos, I. Sakos, C. Courcoubetis & G. Piliouras
Catastrophe by Design in Population Games: Destabilizing Wasteful Locked-in Technologies
ACM Transactions on Economics and Computation, journal version of **[C5]**, (2023). [DOI]
[Editors-In-Chief selected 2023 featured article]

[J14] S. Leonardos & G. Piliouras
Exploration-Exploitation in Multi-Agent Learning: Catastrophe Theory Meets Game Theory
Artificial Intelligence Journal, invited journal version of **[C6]**, (2022). [DOI]

[J13] C. Koki, S. Leonardos & G. Piliouras
Exploring the Predictability of Cryptocurrencies via Bayesian Hidden Markov Models
Research in International Business and Finance, (2021). [DOI]

[J12] S. Leonardos, E. Petrakis, P. Skartados & G. Stamatopoulos
Partial Passive Ownership Holdings and Licensing
Economics Letters, (2021). [DOI]

[J11] S. Leonardos, C. Melolidakis & C. Koki
Monopoly Pricing in Vertical Markets with Demand Uncertainty
Annals of Operations Research, (2021). [DOI]

[J10] S. Leonardos, C. Melolidakis
On the Mean Residual Life of Cantor-Type Distributions: Properties and Economic Applications
Austrian Journal of Statistics, (2021). [DOI]

[J9] Y. Dimitrakopoulos, A. Economou & S. Leonardos
Strategic Customer Behavior in a Queueing System with Alternating Information Structure
European Journal of Operational Research, (2020). [DOI]

[J8] S. Leonardos, D. Reijsbergen, G. Piliouras
PREStO: A Systematic Framework for Blockchain Consensus Protocols
IEEE Transactions in Engineering Management, (2020). [DOI]
[Best Paper Award]

[J7] S. Leonardos & C. Melolidakis
On the Equilibrium Uniqueness in Cournot Competition with Demand Uncertainty
The B.E. Journal of Theoretical Economics, (2020). [DOI]

[J6] V. Buterin, D. Reijsbergen, S. Leonardos & G. Piliouras
Incentives in Ethereum's Hybrid Casper Protocol
International Journal of Network Management, (2020). [DOI]

[J5] S. Leonardos, D. Reijsbergen, G. Piliouras
Weighted Voting on the Blockchain: Improving Consensus in Proof of Stake Protocols
International Journal of Network Management, (2020). [DOI]

[J4] C. Koki, S. Leonardos & G. Piliouras
Do Cryptocurrency Prices Camouflage Latent Economic Effects? A Bayesian Hidden Markov Approach
Future Internet, (2020). [DOI]

[J3] S. Leonardos & C. Melolidakis
Endogenizing the Cost Parameter in Cournot Oligopoly
International Game Theory Review, (2020). [DOI]

[J2] S. Leonardos & C. Koki
Coalitions & Voting Power in the Greek Parliament of 2012: A Case-Study
Homo Oeconomicus, (2019). [DOI]

[J1] S. Leonardos & C. Melolidakis
On the Commitment Value and Commitment Optimal Strategies in Bimatrix Games
International Game Theory Review, (2018). [DOI]

CONFERENCE PUBLICATIONS

[C18] I. Sakos, S. Leonardos, S. A. Stavroulakis, W. Overman, I. Panageas, G. Piliouras
Beating Price of Anarchy and Gradient Descent without Regret in Potential Games
[ICLR-24] 12th International Conference on Learning Representations (2024). (to appear)

[C17] S. Roesch, S. Leonardos & Y. Du
Selfishness Level Induces Cooperation in Sequential Social Dilemmas (Extended Abstract)
[AAMAS-24] 23rd Conference on Autonomous Agents and Multiagent Systems (2024). **[kclpure]**

[C16] G. Chionas, P. Braga, S. Leonardos, C. Ventre, G. Piliouras & P. Krysta
Who gets the Maximal Extractable Value? A Dynamic Sharing Blockchain Mechanism (Extended Abstract)
[AAMAS-24] 23rd Conference on Autonomous Agents and Multiagent Systems (2024). **[kclpure]**

[C15] D. E. Matsunaga, J. Lee, J. Yoon, S. Leonardos, P. Abbeel, K.-E. Kim
AlberDICE: Addressing OOD Joint Actions in Offline MARL via Alternating Stationary DICE
[NeurIPS-23] Advances in Neural Information Processing Systems 36, (2023). **[DOI]**

[C14] D. Reijsbergen, S. Leonardos, B. Monnot & G. Piliouras
Optimality Despite Chaos in Fee Markets
[FC-23] Financial Cryptography and Data Security, (to appear). **[DOI]**

[C13] S. Shridhar, S. Leonardos, Y.K. Cheung & G. Piliouras
Griefing Factors and Evolutionary In-Stabilities in Blockchain Mining Games
[MARBLE-22] 3rd Conference on Mathematical Research for Blockchain Economy, (2023). **[DOI]**

[C12] Y.K. Cheung, S. Shridhar, S. Leonardos & G. Piliouras
Market Equilibria and Risk Diversification in Blockchain Mining Economies
[MARBLE-22] 3rd Conference on Mathematical Research for Blockchain Economy, (2023). **[DOI]**

[C11] S. Leonardos, I. Panageas, W. Overman & G. Piliouras
Global Convergence of Multi-Agent Policy Gradient in Markov Potential Games
[ICLR-22] 10th International Conference on Learning Representations, (2022). **[OpenReview]**

[C10] D. Reijsbergen, B. Monnot, S. Sridhar, S. Leonardos, S. Skoulakis & G. Piliouras
Transaction Fees on a Honeymoon: Ethereum's EIP-1559 One Month Later
[IEEE Blockchain-2021] 4th IEEE International Conference on Blockchain, (2021). **[DOI]**

[C9] S. Leonardos, B. Monnot, D. Reijsbergen, S. Skoulakis & G. Piliouras
Dynamical Analysis of the EIP-1559 Ethereum Fee Market
[AFT-21] 3rd ACM conference on Advances in Financial Technologies, (2021). **[DOI]**

[C8] S. Leonardos, G. Piliouras & K. Spendlove
Exploration-Exploitation in Multi-Agent Competition: Convergence with Bounded Rationality
[NeurIPS-21] Advances in Neural Information Processing Systems 35, (2021). **[DOI]**
[Spotlight Paper]

[C7] Y.K. Cheung, S. Leonardos & G. Piliouras
Learning in Markets: Greed Leads to Chaos but Following the Price is Right
[IJCAI-21] 30th International Joint Conference on Artificial Intelligence, (2021). **[DOI]**

[C6] S. Leonardos & G. Piliouras
Exploration-Exploitation in Multi-Agent Learning: Catastrophe Theory Meets Game Theory
[AAAI-21] 35th AAAI Conference on Artificial Intelligence, (2021). **[DOI]**
[Best Paper Award]

[C5] S. Leonardos, I. Sakos, C. Courcoubetis & G. Piliouras
Catastrophe by Design in Population Games: Destabilizing Wasteful Locked-in Technologies
[WINE-20] 16th Conference on Web and Internet Economics, (2020). **[arXiv] [DOI]**

[C4] C. Koki, S. Leonardos & G. Piliouras
Do Cryptocurrency Prices Camouflage Latent Economic Effects? A Bayesian Hidden Markov Approach
[Decentralized-19] 3rd Annual Decentralized Conference, (2019). **[DOI]**
[Best Paper Award]

[C3] N. Leonardos, S. Leonardos and G. Piliouras
Oceanic Games: Centralization Risks and Incentives in Blockchain Mining
[MARBLE-19] 1st Conference on Mathematical Research for Blockchain Economy, (2019). **[DOI]**
[Best Paper Award]

[C2]   S. Leonardos, D. Reijsbergen, G. Piliouras
Weighted Voting on the Blockchain: Improving Consensus in Proof of Stake Protocols
[IEEE ICBC-19] 1st IEEE International Conference on Blockchain and Cryptocurrency, (2019). [**DOI**]
[**Best Paper Award**]

[C1]   V. Buterin, D. Reijsbergen, S. Leonardos & G. Piliouras
Incentives in Ethereum's Hybrid Casper Protocol
[IEEE ICBC-19] 1st IEEE International Conference on Blockchain and Cryptocurrency, (2019). [**DOI**]

REFEREED WORKSHOPS – PREPRINTS – BOOK CHAPTERS

[W5]   F. Wu, T. Thiery, S. Leonardos & C. Ventre
Strategic Bidding Wars in On-chain Auctions
[CCE-23] Columbia CryptoEconomics (CCE) Workshop, (2023). [**arXiv**]

[W4]   S. Leonardos, G. Piliouras & K. Spendlove
Exploration-Exploitation in Multi-Agent Competition: Convergence with Bounded Rationality
[NeurIPS-21] Workshop on Learning in Presence of Strategic Behavior (StratML), (2021). [**arXiv**]

[W3]   S. Leonardos, I. Panageas, W. Overman & G. Piliouras
Convergence of Policy Gradient in Markov Potential Games
[NeurIPS-21] Workshop on Learning in Presence of Strategic Behavior (StratML), (2021).
[ICML-21] Workshop on Reinforcement Learning Theory, (2021). [**arXiv**]

[W2]   Y.K. Cheung, S. Leonardos, G. Piliouras & S. Sridhar
Allocation of Mining Resources in the Blockchain Economy,
[WINE-20] Workshop on Game Theory in Blockchain, (2020). [**abstract**]

[W1]   B. Monnot, Q. Z. Hum, C.S. M. Koh, S. Leonardos & G. Piliouras
Ethereum's Transaction Fee Reform in EIP 1559
[WINE-20] Workshop on Game Theory in Blockchain, (2020). [**abstract**]

[B3]   S. Leonardos & C. Koki
Political Indicators in Germany & Greece: Evolving Political Systems, Distinct Paths & a Mutual Future
German-Greek Yearbook of Political Economy (invited), Vol.3, pp:5–29, (2020). [**Book**]

[B2]   C. Koki, S. Leonardos & C. Melolidakis
Comparative Statics via Stochastic Orderings in a Two-Echelon Market with Upstream Demand Uncertainty
AIRO Springer Series, New Trends in Emerging Complex Real Life Problems, (2019). [**DOI**]

[B1]   C. Koki, S. Leonardos & C. Melolidakis
Measuring Market Performance with Stochastic Demand: Price of Anarchy and Price of Uncertainty
Belief Functions: Theory and Applications, Lecture Notes in Computer Science, (2018). [**DOI**]

Invited Talks (Selection)

2023	**London School of Economics** - Workshop on Game Theory and Machine Learning
	Workshop in Algorithm, Learning and Games (ALGA), @ Sicilly, Italy
	National University of Singapore @ **IMS** - Workshop in Games, Learning and Networks
	University of Oxford, @ Algorithms and Complexity Theory Seminar
	University of Leeds, @ School of Computing Colloquim
2022	**ETHconomics**, @ Devconnect Ethereum in Amsterdam
	IJTCS-22, Game Theory and Blockchain Track (online)
2021	**NeurIPS-21**, 35th Conference on Neural Information Processing Systems
	AFT-21, 3rd ACM Conference on Advances in Financial Technologies
	IJCAI-21, 30th International Joint Conference on Artificial Intelligence
	AAAI-21, 35th AAAI Conference on Artificial Intelligence (online)
	Athecrypt 2021, Athens Cryptography Days
	FOCODILE 2nd International Workshop on Foundations of Consensus and Distributed Ledgers
2020	**WINE 2020**, 16th Conference on Web and Internet Economics (online)
	ASSET 2020, Meeting of the Association of Southern European Economic Theorists (virtual)
	CRC 2020, 3rd Cryptocurrency Research Conference (online)
	FOCODILE, part of DisCoTec 2020 (online)
2019	**MARBLE 2019**, International Conference on Mathematical Research on Blockchain Economy
	University of Crete, invited talk on "Game Theory and Blockchains"
	Decentralized 2019, The Premier Blockchain Conference in Europe
	CRETE 2019, International Conference on Research on Economic Theory and Econometrics
	IEEE-ICBC, IEEE International Conference on Blockchain and Cryptocurrency, Seoul, South Korea
2018	**CRETE2018**, International Conference on Research on Economic Theory and Econometrics
	MCDA 2018, 12th Multicriteria Decision Aid Meeting
	OLIGO, Workshop 2018 in Piraeus
2017	**Stony Brook**, Center for Game Theory, 28th International Conference (contributed)
	Technion, 9th International Conference of the Israeli Chapter, GTS
	SDSU, Jerome J. Lohr College of Engineering

Consulting – Non Academic

2014–2015	**TERNA Energy, GEK Terna Group**
	• Statistical analysis with Matlab in *"Eagles and Bats conservation project, Idaho, US"*
2009	**EUREX Clearing AG, Gruppe Deutsche Börse**:
	• Internship, Clearing Business Development (4 months)
2009–2010	**Military Service**: Rhodos, Greece (1 year)

Memberships

- **Professional Bodies – Societies**

  MENSA Greece • AAAI Society • IEEE Transactions in Engineering Management Society • Game Theory Society • Hellenic Mathematical Society • Alumni Association of the German School of Athens
- **Graduate Student Union**, University of Athens, Mathematics Department: Elected trustee (2011-2013)
- **German School of Athens**, Apolytirio (Greek) & Abitur (German) graduation (1999): Excellent (19.2/20).

Computer Skills

- Python, Matlab, LaTeX, Mathematica.
- "Algorithms, a 4-Course Specialization", by Stanford University on Coursera, 2017. Grade: 100%.
- "Design & Analysis of Algorithms", graduate course by E. Markakis (AUEB), 2018. Grade: 9.5/10.

Languages

Greek (native), **German** (Abitur 1.7), **English** (Cambridge Certificate of Proficiency in English, IELTS 8.5/9)