

Esteban Moro

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Professional appointments

- 2024- Full Professor. Department of Physics and Network Science Institute. **Northeastern University**
- 2024- Research Affiliate. Media Lab. **Massachusetts Institute of Technology**
- 2019-2023 Research Scientist. SocioTechnical Systems Research Center. Schwarzman College of Computing. **Massachusetts Institute of Technology.**
- 2007-2023 Associate Professor. Department of Mathematics. School of Engineering. **Universidad Carlos III de Madrid, Spain.**
- 2016-2019 Visiting Professor. **MIT Media Lab.** School of Architecture + Planning. Massachusetts Institute of Technology.
- 2003-2007 Research Associate (Ramón y Cajal Fellow). Department of Mathematics. School of Engineering. **Universidad Carlos III de Madrid.**
- 2001-2003 Research Assistant. Department of Mathematics. School of Engineering. **Universidad Carlos III de Madrid (Spain).**
- 1999-2001 Research Associate (Marie Curie Fellow). Rudolf Peierls Centre for Theoretical Physics. Department of Physics. **University of Oxford (UK).**

Other Relevant Experience

- 2015-2018 Academic director at AFI Business School (Spain)
- 2015-2016 Associate Director of the Data Analytics Group at AFI (Spain)
- 1999-2005 Innovation Leader at Instituto de Ingeniería del Conocimiento (Spain).
- 2021- Scientific Committee, CARTO (USA).

Education

- 1994 BSc in Physics Universidad de Salamanca, Spain.
- 1995 MSc in Physics Universidad de Salamanca, Spain.
- 1999 Ph.D. in Physics Universidad Carlos III de Madrid, Spain.

Awards & Honors

- 2015 Excellence in Research Award, Universidad Carlos III de Madrid.
- 2013 Excellence in Research Award, Universidad Carlos III de Madrid.
- 2007 IBM Shared University Award.
- 2003 *Ramón y Cajal* fellowship, Ministerio de Ciencia, Spain.
- 1999 *Marie Skłodowska Curie* fellowship, European Commission, EU.

Peer-reviewed articles

(Student authors in bold, *- corresponding author)

- 2024 T. Fraser, T. Yabe, D.P. Aldrich, E. Moro. *The great equalizer? Mixed effects of social infrastructure on diverse encounters in cities.* Computers, Environment and Urban Systems **113**, 102173

- 2024 T. Yabe, M. Luca, K. Tsubouchi, B. Lepri, M.C. Gonzalez, E. Moro. *Enhancing human mobility research with open and standardized datasets*. *Nature Computational Science* **4**, 469–472.
- 2024 S. Wang*, Y. Zheng, G. Wang, T. Yabe, E. Moro*, A. Pentland. *Infrequent activities predict economic outcomes*. *Nature Cities* **1**, 305–314.
- 2024 **D. Martín-Corral**, M. García-Herranz, M. Cebrian, E. Moro*. *Social media sensors as early signals of influenza outbreaks at scale*. *EPJ Data Science* **13** (1), 43.
- 2024 **B. Garcia-Bulle**, A. L. Horn, B. M. Bell, M. Bahrami, B. Bozkaya, A. Pentland, K. de la Haye, and E. Moro*. *Effect of mobile food environments on fast food visits*. *Nature Communications* **15**, 2291.
- 2024 G. Cencetti, L. Lucchini, G. Santin, F. Battiston, E. Moro, A. Pentland, B. Lepri. *Temporal clustering of social interactions trades-off disease spreading and knowledge diffusion*, *Journal of the Royal Society Interface* **21** (210), 20230471
- 2024 M.R. Frank, E. Moro, T. South, A. Rutherford, A. Pentland, B. Taska, I. Rahwan. *Network constraints on worker mobility*. *Nature Cities* **1** (1), 94-104.
- 2023 A. L. Horn, B. M. Bell, **B. Garcia Bulle Bueno**, M. Bahrami, B. Bozkaya, Y. Cui, J. P. Wilson, A. Pentland, E. Moro, K. de la Haye. *Population mobility data provides meaningful indicators of fast food intake and diet-related diseases in diverse populations*. *npj Digit. Med.* **6**, 208.
- 2023 M. Pangallo, Marco Pangallo, Alberto Aleta, R Chanona, Anton Pichler, **David Martín-Corral**, Matteo Chinazzi, François Lafond, Marco Ajelli, Esteban Moro, Yamir Moreno, Alessandro Vespignani, J Doyne Farmer. *The unequal effects of the health–economy trade-off during the COVID-19 pandemic*. *Nature Human Behavior* doi:10.1038/s41562-023-01747-x.
- 2023 **Leng, Y.**, Dong, X., Moro, E. & Pentland, A. *Long-Range Social Influence in Phone Communication Networks on Offline Adoption Decisions*. *Inf. Syst. Res.* June 21. doi:10.1287/isre.2023.1231
- 2023 **Yanni Yang**, A. Pentland, and E. Moro*. *Identifying latent activity behaviors and lifestyles using mobility data to describe urban dynamics*. *EPJ Data Science* **12**, article number: 15.
- 2023 Takahiro Yabe, **Bernardo García Bulle Bueno**, Xiaowen Dong, Alex Pentland & Esteban Moro*, *Behavioral changes during the COVID-19 pandemic decreased income diversity of urban encounters*. *Nature Communications* **14**, article number 2310.
- 2023 **Zhuangyuan Fan**, **Tianyu Su**, Maoran Sun, Ariel Noyman, Fan Zhang, Alex ‘Sandy’ Pentland, Esteban Moro*, *Diversity beyond density: experienced social mixing of urban streets*. *PNAS Nexus*, pgad077.
- 2023 Ferran Larroya, Ofelia Díaz, Oleguer Sagarra, Pol Colomer Simón, Salva Ferré, Esteban Moro, Josep Perelló. *Home-to-school pedestrian mobility GPS data from a citizen science experiment in the Barcelona Area*. *Sci Data* **10**, 428.
- 2022 Alberto Aleta, **David Martin-Corral**, Michiel A. Bakker, Ana Pastore y Piontti, Marco Ajelli, Maria Litvinova, Matteo Chinazzi, Natalie E. Dean, M. Elizabeth Halloran, Ira M. Longini, Alex Pentland, Alessandro Vespignani*, Yamir Moreno*, Esteban Moro*. *Quantifying the importance and location of SARS-CoV-2 transmission events in large metropolitan areas*. *Proceedings of the National Academy of Sciences* **119**, e2112182119.
- 2022 **Tianyu Su**, **Maoran Sun**, **Zhuangyuan Fan**, Ariel Noyman, Alex Pentland, Esteban Moro*. *Rhythm of the streets: a street classification framework based on street activity patterns*. *EPJ Data Science* **11**, 43.
- 2021 Iñaki Ucar, Marco Gramaglia, Marco Fiore, Zbigniew Smoreda, Esteban Moro*. *News or social media? Socio-economic divide of mobile service consumption*. *Journal of the Royal Society Interface* **18**, 20210350.

- 2021 Esteban Moro*, **Dan Calacci**, Xiaowen Dong, Alex Pentland. *Mobility patterns are associated with experienced income segregation in large US cities*. Nature Communications **12**, 4633.
- 2021 Dhaval Adjodah, Yan Leng, Shi Kai Chong, P. M. Krafft, Esteban Moro, Alex Pentland. *Accuracy-Risk Trade-Off Due to Social Learning in Crowd-Sourced Financial Predictions*. Entropy **23**, 801.
- 2021 Ruth F. Hunter, Leandro Garcia, Thiago Herick de Sa, Belen Zapata-Diomed, Christopher Millett, James Woodcock, Alex 'Sandy' Pentland, Esteban Moro*. *Effect of COVID-19 response policies on walking behavior in US cities*. Nature Communications **12**, 3652.
- 2021 Esteban Moro*, **Morgan R. Frank**, Alex Pentland, Alex Rutherford, Manuel Cebrian, Iyad Rahwan. *Universal resilience patterns in labor markets*. Nature Communications **12**, 1972.
- 2021 Shahad Althobaiti, Saud Alghumayjan, Morgan R Frank, Esteban Moro, Ahmad Alabdulkareem, Alex Pentland. *Housing prices and the skills composition of neighborhoods*. Frontiers in Big Data **4**, 652153.
- 2020 Xiaowen Dong, Alfredo J. Morales, **Eaman Jahani**, Esteban Moro, Bruno Lepri, Burcin Bozkaya, Carlos Sarraute, Yaneer Bar-Yam, Alex Pentland. *Segregated interactions in urban and online space*. EPJ Data Science **9**, 20.
- 2020 Alberto Aleta, **David Martin-Corral**, Ana Pastore y Piontti, Marco Ajelli, Maria Litvinova, Matteo Chinazzi, Natalie E. Dean, M. Elizabeth Halloran, Ira M. Longini Jr, Stefano Merler, Alex Pentland, Alessandro Vespignani*, Esteban Moro*, Yamir Moreno*. *Modelling the impact of testing, contact tracing and household quarantine on second waves of COVID-19*. Nature Human Behaviour **4**, 964--971.
- 2019 Marcin Waniek, Kai Zhou, Yevgeniy Vorobeychik, Esteban Moro, Tomasz P Michalak, Talal Rahwan. *How to Hide One's Relationships from Link Prediction Algorithms*. Scientific Reports **9**, 12208.
- 2019 **Morgan R Frank**, David Autor, James E Bessen, Erik Brynjolfsson, Manuel Cebrian, David J Deming, Maryann Feldman, Matthew Groh, Jose Lobo, Esteban Moro, Dashun Wang, Hyejin Youn, Iyad Rahwan. *Toward understanding the impact of artificial intelligence on labor*. Proceedings of the National Academy of Sciences **116**, 201900949.
- 2018 David Garcia, Yonas Mitike Kassa, Angel Cuevas, Manuel Cebrian, Esteban Moro, Iyad Rahwan, Ruben Cuevas. *Analyzing gender inequality through large-scale Facebook advertising data*. Proceedings Of The National Academy Of Sciences **115**, 6958--6963.
- 2018 Patrick Baylis, Nick Obradovich, Yury Kryvasheyev, Haohui Chen, Lorenzo Coviello, Esteban Moro, Manuel Cebrian, James H Fowler. *Weather impacts expressed sentiment*. PLoS ONE **13**, e0195750.
- 2017 **Henry Navarro, Giovanna Miritello**, Arturo Canales, Esteban Moro*. *Temporal patterns behind the strength of persistent ties*. EPJ Data Science **6**, 97.
- 2016 Yury Kryvasheyev, Haohui Chen, Nick Obradovich, Esteban Moro, Pascal Van Hentenryck, James Fowler, Manuel Cebrian. *Rapid assessment of disaster damage using social media activity*. Science Advances **2**, e1500779.
- 2015 **S Nesic**, R Cuerno, E Moro*, L Kondic. *Fully nonlinear dynamics of stochastic thin-film dewetting*. Physical Review E, Statistical, nonlinear, and soft matter physics **92**, 061002.
- 2015 Jari Saramaki*, Esteban Moro*. *From seconds to months: an overview of multi-scale dynamics of mobile telephone calls*. European Physical Journal B **88**, 164.
- 2015 **Alejandro Llorente**, Manuel Garcia-Herranz, Manuel Cebrian, Esteban Moro*. *Social Media Fingerprints of Unemployment*. PLoS ONE **10**, e0128692.

- 2015 Talayeh Aledavood, Eduardo Lopez, Sam G B Roberts, Felix Reed-Tsochas, Esteban Moro, Robin I M Dunbar, Jari Saramaki. *Daily Rhythms in Mobile Telephone Communication*. PLoS ONE **10**, e0138098--.
- 2014 **S Nesic**, R Cuerno, E Moro*. *Macroscopic response to microscopic intrinsic noise in three-dimensional Fisher fronts*. Physical Review Letters **113**, 180602.
- 2014 Manuel Garcia-Herranz, Esteban Moro, Manuel Cebrian, Nicholas A Christakis, James H Fowler. Using friends as sensors to detect global-scale contagious outbreaks. PLoS ONE **9**, e92413.
- 2015 Yury Kryvasheyeu, Haohui Chen, Esteban Moro, Pascal Van Hentenryck, Manuel Cebrian. *Performance of social network sensors during Hurricane Sandy*. PLoS ONE **10**, e0117288.
- 2013 Alex Rutherford, Manuel Cebrian, Sohan D'souza, Esteban Moro, Alex Pentland, Iyad Rahwan. *Limits of social mobilization*. Proceedings Of The National Academy Of Sciences Of The United States Of America **110**, 6281--6286.
- 2013 **Giovanna Miritello**, Ruben Lara, Manuel Cebrian, Esteban Moro*. *Limited communication capacity unveils strategies for human interaction*. Scientific Reports **3**, 1950.
- 2013 Coco Krumme, **Alejandro Llorente**, Manuel Cebrian, Alex Sandy Pentland, Esteban Moro*. *The predictability of consumer visitation patterns*. Scientific Reports **3**, 1645.
- 2013 **Giovanna Miritello**, Esteban Moro*, Ruben Lara, Rocio Martinez-Lopez, John Belchamber, Sam G B Roberts, Robin I M Dunbar. *Time as a limited resource - Communication strategy in mobile phone networks*. Social Networks **35**, 89--95.
- 2012 Roger Guimera, **Alejandro Llorente**, Esteban Moro, Marta Sales-Pardo. *Predicting Human Preferences Using the Block Structure of Complex Social Networks*. PLoS ONE **7**, e44620.
- 2012 **Alex J Bladon**, Esteban Moro*, Tobias Galla. *Agent-specific impact of single trades in financial markets*. Physical Review E, Statistical, nonlinear, and soft matter physics **85**, 036103.
- 2012 **Przemyslaw A Grabowicz**, Jose J. Ramasco, Esteban Moro, Josep M Pujol, Victor M Eguiluz. *Social Features of Online Networks: The Strength of Intermediary Ties in Online Social Media*. PLoS ONE **7**, e29358.
- 2011 **Jose Luis Iribarren**, Esteban Moro*. *Branching dynamics of viral information spreading*. Physical Review E **84**, 046116.
- 2011 **Jose Luis Iribarren**, Esteban Moro*. *Affinity Paths and information diffusion in social networks*. Social Networks **33**, 134--142.
- 2011 **Giovanna Miritello**, Esteban Moro*, Ruben Lara. *Dynamical strength of social ties in information spreading*. Physical Review E **83**, 045102.
- 2009 Esteban Moro*, **Javier Vicente**, Luis G Moyano, Austin Gerig, J Doyne Farmer, Gabriella Vaglica, Fabrizio Lillo, Rosario N Mantegna. *Market impact and trading profile of hidden orders in stock markets*. Physical Review E **80**, 066102.
- 2009 **Jose Luis Iribarren**, Esteban Moro*. *Impact of human activity patterns on the dynamics of information diffusion*. Physical Review Letters **103**, 038702.
- 2008 Fabrizio Lillo, Esteban Moro, Gabriela Vaglica, Rosario N. Mantegna. *Specialization and herding behavior of trading firms in a financial market*. New Journal of Physics **10** (4), 043019.
- 2008 Gabriela Vaglica, Fabrizio Lillo, Esteban Moro, Rosario N. Mantegna. *Scaling laws of strategic behavior and size heterogeneity in agent dynamics*. Physical Review E **77** (3), 036110.
- 2007 Esteban Moro*, Henri Schurz. *Boundary preserving semianalytic numerical algorithms for stochastic differential equations*. SIAM Journal on Scientific Computing **29** (4), 1525-1549.

- 2006 JJ Ruiz-Lorenzo, Esteban Moro, Rodolfo Cuerno. *Single tensionless transition in the Laplacian roughening model*. Physical Review E **73** (1), 015103.
- 2005 Benny Davidovitch, Esteban Moro, Howard A. Stone. *Spreading of viscous fluid drops on a solid substrate assisted by thermal fluctuations*. Physical Review Letters **95** (24), 244505.
- 2004 Esteban Moro. *Numerical schemes for continuum models of reaction-diffusion systems subject to internal noise*. Physical Review E **70** (4), 045102.
- 2004 Esteban Moro. *Hybrid method for simulating front propagation in reaction-diffusion systems*. Physical Review E **69** (6), 060101.
- 2003 Esteban Moro. *Emergence of pulled fronts in fermionic microscopic particle models*. Physical Review E **68** (2), 025102.
- 2003 Tobias Galla, Esteban Moro*. *Defect formation in the Swift-Hohenberg equation*. Physical Review E **67** (3), 035101
- 2002 David Sherrington, Esteban Moro, Juan Pedro Garrahan, *Statistical physics of induced correlation in a simple market*. Physica A: Statistical Mechanics and its Applications **311** (3-4), 527-535.
- 2002 Luis Lopez-Diaz, Luis Torres, Esteban Moro. *Transition from ferromagnetism to superparamagnetism on the nanosecond time scale*. Physical Review B **65** (22), 224406.
- 2002 Douglas B. Abraham, Rodolfo Cuerno, Esteban Moro*. *Microscopic model for thin film spreading*. Physical Review Letters **88** (20), 206101.
- 2001 Rodolfo Cuerno, Esteban Moro*. *Dynamic renormalization group study of a generalized continuum model of crystalline surfaces*. Physical Review E **65** (1), 016110.
- 2001 Esteban Moro. *Internal fluctuations effects on Fisher waves*. Physical Review Letters **87** (23), 238303
- 2001 Luis Torres, Luis Lopez-Diaz, Esteban Moro, Carlos De Francisco, Oscar Alejos, *Micromagnetics of thermally activated switching in nonuniformly magnetized nanodots*. Journal of Magnetism and Magnetic Materials **226**, 1242-1244
- 2001 Juan Pedro Garrahan, Esteban Moro, David Sherrington. *Correlated adaptation of agents in a simple market: a statistical physics perspective*. Quantitative Finance **1** (2), 246.
- 2001 Esteban Moro, Rodolfo Cuerno. *Variational mean-field study of a continuum model of crystalline tensionless surfaces*. Physical Review E **63** (3), 036104.
- 2000 Angel Sánchez, Alan R. Bishop, Esteban Moro. *Roughening and super-roughening in the ordered and random two-dimensional sine-Gordon models*. Physical Review E **62** (3), 3219.
- 2000 Juan Pedro Garrahan, Esteban Moro, David Sherrington. *Continuous time dynamics of the thermal minority game*. Physical Review E **62** (1), R9.
- 1999 Till Kamppeter, Frank G. Mertens, Esteban Moro, Angel Sánchez, Alan R. Bishop. *Stochastic vortex dynamics in two-dimensional easy-plane ferromagnets: Multiplicative versus additive noise*. Physical Review B **59** (17), 11349.
- 1999 Luis Lopez-Diaz, Edward Della Torre, Esteban Moro. *The effect of thermal activation on the coercivity of domain walls*. Journal of Applied Physics **85** (8), 4367-4369.
- 1999 Esteban Moro, G Lythe. *Dynamics of defect formation*. Physical Review E **59** (2), R1303.
- 1998 Esteban Moro, A Sánchez, *Noise effects on synchronized globally coupled oscillators*. Europhysics Letters **44** (4), 409.
- 1997 Esteban Moro, Rodolfo Cuerno, Angel Sánchez. *Growth dynamics of crystalline tensionless surfaces*. Physical Review Letters **78** (26), 4982.
- 1996 Esteban Moro, Alfredo Valcarce, Humberto Garcilazo, Francisco Fernández. *Does the quark cluster model predict a $J^P = 0^-$ isospin-2 dibaryon resonance?* Physical Review C **54** (4), 2085.

Peer-Reviewed Conference Proceedings

(only in the last ten years; students in bold)

- 2022 **Berke, Alex**, Ronan Doorley, Kent Larson, and Esteban Moro. *Generating synthetic mobility data for a realistic population with RNNs to improve utility and privacy*. In Proceedings of the 37th ACM/SIGAPP Symposium on Applied Computing, pp. 964-967.
- 2022 Avi Chawla, Nidhi Mulay, Mohsen Bahrami, Vikas Bishnoi, Yatin Katyal, Esteban Moro, Ankur Saraswat, Alex Pentland. *Post-pandemic Economic Transformations in the United States of America*. In Proceedings of the 2022 IEEE International Conference on Data Mining Workshops (ICDMW), Orlando, FL, USA, 2022, pp. 1-5.
- 2021 Mulay, Nidhi, Vikas Bishnoi, Yatin Katyal, Mohsen Bahrami, Esteban Moro, Ankur Saraswat, and Alex Pentland. *Effects of stimulus checks on spending patterns of different economic groups*. In 2021 International Conference on Data Mining Workshops (ICDMW), pp. 873-877. IEEE, 2021.
- 2020 **Adjodah, Dhaval, Dan Calacci**, Abhimanyu Dubey, Anirudh Goyal, P. M. Krafft, Esteban Moro, and Alex Pentland. *Leveraging Communication Topologies Between Learning Agents in Deep Reinforcement Learning*. In Proceedings of the 19th International Conference on Autonomous Agents and Multiagent Systems (AAMAS), pp. 1738-1740.
- 2018 **Eaman Jahani**, Peter M Krafft, Yoshihiko Suhara, Esteban Moro, Alex Sandy Pentland. *ScamCoins, S*** Posters, and the Search for the Next BitcoinTM : Collective Sensemaking in Cryptocurrency Discussions*. Proceedings of the ACM on Human-Computer Interaction **2**, 79, 1--28.
- 2018 Dubey, Abhimanyu, Esteban Moro, Manuel Cebrian, and Iyad Rahwan. *Memesequencer: Sparse matching for embedding image macros*. In Proceedings of the 2018 World Wide Web Conference, pp. 1225-1235.
- 2017 **Jahani, Eaman**, Guillaume Saint-Jacques, Pål Sundsøy, Johannes Bjelland, Esteban Moro, and Alex Sandy Pentland. *Differential network effects on economic outcomes: A structural perspective*. In International Conference on Social Informatics, pp. 41-50. Springer, Cham.
- 2016 Kooti, Farshad, Esteban Moro, and Kristina Lerman. *Twitter session analytics: Profiling users' short-term behavioral changes*. In International Conference on Social Informatics, pp. 71-86. Springer, Cham.
- 2016 Aledavood, Talayeh, Eduardo López, Sam GB Roberts, Felix Reed-Tsochas, Esteban Moro, Robin IM Dunbar, and Jari Saramäki. *Channel-specific daily patterns in mobile phone communication*. In Proceedings of ECCS 2014, pp. 209-218. Springer, Cham, 2016.

Peer-Reviewed Book Chapters or Books

- 2022 Rosa Maria Benito, Chantal Cherifi, Hocine Cherifi, Esteban Moro, Luis M. Rocha, Marta Sales-Pardo, *Complex Networks & Their Applications X, Volume 1, Proceedings of the Tenth International Conference on Complex Networks and Their Applications*. Esteban Moro: Editor
- 2021 Rosa Maria Benito, Chantal Cherifi, Hocine Cherifi, Esteban Moro, Luis M. Rocha, Marta Sales-Pardo, *Complex Networks & Their Applications X, Volume 1, Proceedings of the Ninth International Conference on Complex Networks and Their Applications*. Esteban Moro: Editor

- 2018 Yan Leng, Xiaowen Dong, Esteban Moro, and Alex Pentland, "The Rippling Effect of Social Influence via Phone Communication Network", chapter in *Complex Spreading Phenomena in Social Systems*, Sune Lehmann, Yong-Yeol Ahn editors, Springer Nature, 2018.
- 2015 Esteban Moro, "Network Analysis", in *The Princeton Companion to Applied Mathematics*, Nicholas J. Higham editor, Princeton University Press, 2015.
- 2013 Giovanna Miritello, Ruben Lara, Esteban Moro, "Time allocation in social networks: correlation between social structure and human communication dynamics", in *Temporal Networks*, Petter Holme and Jari Saramäki, Editors, Springer, Berlin, Heidelberg, 2013.
- 2004 Esteban Moro, "The Minority Game: an introductory guide" chapter in "Advances in Condensed Matter and Statistical Physics", Elka Korutcheva and Rodolfo Cuerno editors, Nova Science Publishers, New York, 2004.

Peer-Reviewed Articles Under Review

(only in the last ten years; Student authors in bold, *- corresponding author)

- 2024 O Cabanas-Tirapu, L Danús, E Moro, M Sales-Pardo, R Guimerà, Human mobility is well described by closed-form gravity-like models learned automatically from data. arXiv preprint arXiv:2312.11281. Under review in Nature Communications
- 2023 T Yabe, **BGB Bueno**, M Frank, A Pentland, E Moro*, Behavior-based dependency networks between places shape urban economic resilience. In press in Nature Human Behavior.
- 2023 K. Minor, E. Moro, and N. Obradovich. *Adverse weather amplifies social media activity*. arXiv preprint arXiv:2302.08456. In press at Psychological Science.
- 2023 M Frank, YY Ahn, E Moro. AI exposure predicts unemployment risk. arXiv preprint arXiv:2308.02624.

Reports and Other Non-Peer Reviewed Publications

- 2023 Esteban Moro, *The city is not a static tree: understanding urban areas through the lens of real-time behavioral data*, ZARCH Journal of Interdisciplinary Studies in Architecture and Urbanism (19) 28-39.
- 2020 Esteban Moro, *Using big data to understand inequality in cities*, in Anand, P., Chiappero-Martinetti, E., Corneo, G., Mcknight, A., Moro, E., O'Brien, D., & Stuhler, J. (2020). Multidimensional perspectives on inequality: conceptual and empirical challenges. Publications Office of the European Union.

Patents

- 2021 Adjodah, D., Pentland, A.P., Moro, E., Leng, Y., Krafft, P., Calacci, D. and Dubey, A., Massachusetts Institute of Technology, 2021. *Methods and apparatus for communication network*. U.S. Patent 10,992,541.

Competitive Grants

- 2024-2027 Collaborative Research: SAI: Planning for Electric Vehicle Charging Infrastructure, NSF Strengthening American Infrastructure (2024). PI: Takahiro Yabe (NYU), Jing Li (Tufts), and Esteban Moro (Northeastern). Northeastern Award: \$150,271
- 2024-2027 SCC-IRG Track 2: Food Environment Dynamics (FED): Leveraging AI and Human Mobility Data to Address Disparities in Food Access and Improve Americans' Diets. PI:

	Abigail Horn (USC), Kayla de la Haye (USC), and Esteban Moro (Northeastern). Northeastern award: \$500,000
2023-2026	Mobility Data for Communities (MD4C): Uncovering Segregation, Climate Resilience, and Economic Development from Cell-Phone Records, NSF HNDS 2022 (awarded). PI: Dan O'Brien (NU), Esteban Moro (NU). \$950000.
2021-2022	Unequal socio-economic impact and recovery of COVID-19 in Mexico. MIT Sloan Latin America Office Seed Funds. PI: Esteban Moro (MIT), \$16,000.
2020-2023	Statistical Physics for cities: models of mobility and inequality. PID2019-106811GB-C32, Ministerio de Ciencia e Innovación (Spain). PI: Esteban Moro (UC3M), €32000.
2017-2020	Statistical Mechanics to model and predict human behavior. FIS2016-78904-C3-3-P. Ministerio de Economía y Competitividad (Spain). PI: Esteban Moro (UC3M), €36300.
2018-2019	MyBubble: Influence of Algorithms in Users Filter Bubbles (2018), MIT MISTI Global Seed Funds. PI: Iyad Rahwan (MIT), Rubén Cuevas (UC3M), Esteban Moro (UC3M) y Antonio Fernández Anta (IMDEA). \$33,000.
2014-2017	Statistical Mechanics for "Big Data": acquisition, analysis, and modelization. FIS2013-47532-C3-3-P. Ministerio de Economía y Competitividad (Spain). PI: Esteban Moro. (UC3M). €31460.
2005-2006	HI2004-0179 (2005), Mesoscopics of a stock market, Ministerio de Educación Ciencia y Deportes, Programa de Acciones Integradas España Italia (Spain). PI: Esteban Moro (UC3M), Rosario Mantegna (Univ. Di Palermo). €16000
2004-2007	Statistical mechanics and non-linear dynamics of complex systems. FIS2004-01001 (2004-2007). Ministerio de Educación Ciencia y Deportes (Spain). PI: Esteban Moro (UC3M). €12000.

Research contracts

2019-2021	Mobility Rich Census. Company: Ferrovial. From 1/9/2019 to 1/9/2021. PI: Esteban Moro, \$360000.
2017-2019	Computational social science applied to Location Based Services geolocation data. Company: Thasos INC. PI: Esteban Moro, \$87500.
2015	Analyzing the influence of Twitter in political elections. Company: Twitter Spain S.L. PI: Esteban Moro Egidio. €30000.
2015	Asesoramiento y consultoría sobre BigData. Company: AFI. Partners: AFI y UC3M. PI: Esteban Moro. €45000.
2014	The complexity of human tasks and individuals' performance. Company: University of Southern California. PI: Esteban Moro. €12000.
2014	Understanding social group formation and evolution in social networks. Company: XING AG. PI: Esteban Moro Egidio. €15000.
2009-2014	Analisis of Social Networks applied to industrial processes. Company: Instituto de Ingeniería del Conocimiento, Spain. PI: Esteban Moro. €80000.
2007	Diffusion Optimization in Social Networks. Company: IBM. PI: Esteban Moro. €37000.

Invited Lectures, Keynotes

(only in the last ten years)

- 2023 Keynote talk - *Understanding urban social resilience through behavioral mobility data*, International Conference on Computational Social Science (IC2S2), Copenhagen, Denmark, July 17-20.
- 2023 Keynote talk - *Resilience of complex social systems to global challenges through behavioral data*, Frontiers of Network Science, NYU Abu Dhabi, New York, May 18-19.
- 2023 Keynote talk - *Understanding urban resilience through behavioral data*, International School and Conference on Network Science, NetSci-X 2023, Buenos Aires, Argentina, February 7-10.
- 2022 Keynote talk - *You are where you eat: the effect of mobile food environments to fast food consumption*, Computational Social Science Satellite at Complex Systems Conference 2022, Palma de Mallorca, Spain, October.
- 2022 Invited talk - *Understanding urban resilience through behavioral mobility data*. TESCO Data Mashup, London, UK, September.
- 2022 Invited talk - *You are where you eat: the effect of mobile food environments to fast food consumption*. University of Southern California Public Health & Nutrition Research, June.
- 2022 Invited Lecture - *Understanding urban resilience through behavioral mobility data*. 7th KAIST GSI-IF 2022, Science of Inequality and Injustice, South Korea, July 5th.
- 2022 Invited talk - *Understanding urban inequality through behavioral mobility data*, invited talk to the Workshop on “Understanding the inequality in urban mobility and its implications”, Mansueto Institute of Urban Innovation, University of Chicago, June 16th.
- 2022 Keynote talk - *COVID-19 and Data: how to understand the pandemic using mobility data in our cities*, BIFI International Conference, June 7-9, Zaragoza, Spain.
- 2022 Invited talk - *Understanding resilience through behavioral mobility data*. “Technologies for Decision-Making in Humanitarian Context”, iMMAP Organization, Colombia.
- 2022 Invited talk - *Effect of COVID-19 response policies on walking behavior in US cities*. Centers for Disease Control and Prevention (CDC), Physical Activity and Health Branch, (online), June.
- 2021 Invited talk - *Universal resilience of labor networks*. “Complex Networks in Economics and Innovation”, Satellite workshop of NetSci’21, Indiana University Network Science Institute, July 5-10.
- 2021 Invited talk - *Understanding urban resilience through behavioral mobility data*, The Alan Turing Institute, “Using Mobility Data in Urban Science” Workshop, October.
- 2021 Invited talk - *COVID-19 and Data: How to Understand the Pandemic Using Mobility Data in Our Cities*, New College of Florida, March.
- 2021 Invited Masterclass - *COVID19 y datos: cómo seguir la pandemia utilizando datos de movilidad en nuestras ciudades*. Masterclass en AFI Escuela de Finanzas, Madrid, January 28.
- 2021 Invited webinar - *Resilient social systems in urban areas: from social segregation to labor markets*. KPMG Denmark, March 10
- 2021 Invited talk - *Universal resilience patterns in labor markets*, UC3M-Santander Big Data Insitute, Universidad Carlos III de Madrid, Spain, May 13.

- 2021 Invited talk - *Resilient social systems in urban areas: from social segregation to labor markets*. ANET Lab, Centre for Economic and Regional Studies, Eötvös Loránd Research Network, May 21.
- 2021 Invited talk - *Resilient social systems in urban areas: from social segregation to labor markets*. Digital Futures HiSS Project Workshop, KTH, Suecia, September 13.
- 2021 Invited webinar - *Inequality (and epidemics) in cities at high resolution*. Computational Social Science Laboratory, The Chinese University of Hong Kong, October 20.
- 2021 Invited talk - *Understanding urban resilience through behavioral mobility data*. University of Pittsburgh Computational Social Science Seminars, December 3.
- 2020 Invited talk - *The Atlas of Inequality*. DG Joint Research Center, European Commission, Ispra (Italy), January 24.
- 2020 Invited talk - *Segregation (and epidemics) in cities at high resolution*. Harvard Growth Lab, Harvard University, May 11.
- 2020 Invited talk - *El Atlas de desigualdad: entendiendo la segregación en nuestras ciudades con Big Data*, Spanish National Institute of Statistics, June 18.
- 2020 Invited talk - *Modelling the impact of testing, contact tracing, and household quarantine on second waves of COVID-19*. Colloquium on Computational Social Science/Computational Science and Informatics, Department of Computational and Data Sciences, George Mason University, September 18.
- 2020 Keynote talk - *Atlas of Inequality: segregation at high resolution in urban areas*, 7th Mobile Tartu 2020, Tartu, Estonia, June 30.
- 2020 Invited talk - *Segregation (and epidemics) in cities at high resolution*. Facebook, Palo Alto, California, October 15.
- 2020 Invited talk - *Resilient social systems in urban areas: from social segregation to labor markets*, “Merging social, economic and ecological networks for sustainable and resilient food systems” Symposium, Newcastle University, UK, December 7.
- 2019 Invited talk - *The Atlas of Inequality: segregation at high resolution*. Opportunity Insights Group Seminars, Harvard University, December 4.
- 2019 Invited talk - *The Atlas of Inequality: segregation at high resolution*. Data Science Seminars, Data Science Institute, Brown University, September 12.
- 2019 Invited Keynote - *The Atlas of Inequality: Understanding segregation at high resolution*, at “Network Science for Social Good”, Satellite workshop at NetSci 2019, Burlington, Vermont, May 27-31.
- 2019 Invited talk - *Urban behaviors and Segregation*. Department of Sociology, Harvard University, February 22.
- 2018 TED talk - *Overcoming urban isolation*, TEDx Cambridge, Cambridge, MA, September.
- 2018 Invited talk - *Cities at high resolution: understanding social segregation using encounter networks*. Center for Data Science NYU, New York City, March.
- 2018 Invited talk - *Cities at high resolution: understanding social segregation using encounter networks*. Unicef Innovation, New York City, March.
- 2018 Invited talk - *Cities at high resolution: understanding social segregation using encounter networks*, at “Network Interventions for the Social Good” workshop within the ICCS 2018 conference, Cambridge, MA. July 22-27.
- 2018 Invited talk - *The lifetime of strong ties*. Harvard T.H. Chan School of Public Health, February.
- 2017 Invited talk - *What comes first? Social strength or common friends?* Complex Systems Center, University of Vermont, May.

- 2017 Invited talk - *What comes first? Social strength or common friends?* Yale Institute for Network Science, May.
- 2017 Keynote talk - *The Lifetime of strong ties*. NERCCS 2018, 1st Northeast Regional Conference on Complex Systems, Binghamton, NY, April 12-13.
- 2017 Invited talk - *The Lifetime of strong ties*. University of Greenwich, London (UK), October.
- 2017 Invited talk - *Segregation networks in cities*, Insitute for Data Science, Imperial College, London (UK), November.
- 2017 Invited talk - *Segregation networks in cities*. Vodafone Research Lab, London (UK), November.
- 2016 Invited talk - *Are you a social explorer or a social keeper? Social strategies in dynamical networks*. Center for Complex Network Research, Northeastern University, Boston, August.
- 2016 Invited talk - *Pace of change in urban social networks*. DTU, Copenhagen, Denmark, June.
- 2016 Invited lecture - *Social and economic networks from (big-)data*. Lake Como School of Advanced Studies, Como, Italy, May 18.
- 2016 Invited talk - *Mining human behavior through proprietary and open data*. Vodafone Research Lab, London (UK), Abril.
- 2016 Invited lecture - *Dynamics in complex networks. Analyzing real-world (mobile) data*. Wroclaw University of Technology, Poland, January.
- 2015 Invited talk - *How does a tweet propagate? Information diffusion in social networks*. Ph.D. program in Physics, Universidad de Salamanca, Salamanca (Spain), March.
- 2015 Invited talk - *Social media fingerprints of unemployment*. IMDEA Networks, Madrid, June
- 2015 Invited talk - *Big problems and Data Science*. Telefónica Foundation, Madrid, Spain, March.
- 2014 Invited lecture - *Temporal Dynamics of human behavior in social networks*. Complex Networks Thematic School, Les Houches, France, April.
- 2014 Invited talk - *Are you a social keeper or a social explorer? The dynamics of human social behavior in communication networks*, Mathematics of Social Learning, UCLA, Los Angeles, January 6-10.
- 2013 Invited talk - *Using geolocalized big data for social good*. Universidad Politécnica de Madrid, Spain, November.
- 2013 Invited talk - *The geographical limits of social mobilization*. Barcelona digital, Barcelona, Spain, October.
- 2013 Invited talk - *Big Data and Human Behavior: social communication strategies*. BigDataCYL2013, Telefónica Digital, Boecillo, Spain, March.
- 2013 Invited talk - *Following information in social networks: how social structure and dynamics impact message transmission*. Jornadas MAVIR, UNED, Spain, March.
- 2012 Invited lectures - *Spreading on static and dynamical networks*. Aalto Complex Network Factory, Porvoo, Finland, June.
- 2011 Invited talk - *The dynamical strength of social ties in information spreading*. Aalto University, Finland, February.
- 2011 Invited talk - *The dynamical strength of social ties in information spreading*. Departament de Física Fonamental, Universidad de Barcelona, March 2011.
- 2011 Invited talk - *Market impact and Trading Strategies*. Departament de Física Fonamental, Universidad de Barcelona, March.
- 2011 Invited talk - *The dynamical strength of social ties in information spreading*. Yahoo Research Barcelona, Spain, June.

- 2011 Invited talk - *The dynamical strength of social ties in information spreading*. Department of Computer Science, University of California San Diego, August.

Oral Conference Presentations

(only in the last ten years, only as presenter)

- 2020 *Segregated behaviors in American Cities*, 6th International Conference on Computational Social Science (IC2S2), Massachusetts Institute of Technology, July 17-20.
- 2020 *Boston's invisible borders*, Boston Area Research Initiative (BARI) conference, Boston, March-July 2020.
- 2019 *Observing and overcoming Dunbar Cognitive Limitations in Financial Networks*, Lighting Talk in NetSci 2019, Burlington, Vermont, May 27-31.
- 2019 *Universal resilience of labor markets*, Lighting Talk in NetSci 2019, Burlington, Vermont, May 27-31.
- 2019 *News or Facebook? Regional socio-economical patterns of mobile service consumption*, Talk in Netmob19, Oxford, Reino Unido, July 8-10.
- 2019 *Economic Segregation of Encounter Networks in cities*, Talk in Netmob19, Oxford, Reino Unido, July 8-10.
- 2018 *Tie strength precedes social embeddedness*, 4th International Conference on Computational Social Science (IC2S2), Northwestern University, Evanston, July 12-15.
- 2018 *Economic Segregation of Encounter Networks in cities*, Netsci 2018, 11-15 June 2018, Paris. France.
- 2018 *Tie strength precedes social embeddedness*, Netsci 2018, 11-15 June 2018, Paris. France.
- 2018 *Tie strength precedes social embeddedness*, CompleNet 2018, March 4-8 2018, Boston, USA.
- 2017 *What comes first? Social Strength or common friends?*, NetSci2017, June 19-23 2017, Indianapolis, USA.
- 2017 *What comes first? Social Strength or common friends?*, Netmob 2017, April 5-7 2017, Milano, Italy.
- 2017 *Why people stop calling? The temporal weakness of decaying ties?* Netmob 2017, April 5-7 2017, Milano, Italy.
- 2015 *Temporal dynamics of social networks within cities*, Netmob 2015, MIT Media Lab, Cambridge, April 7-10.
- 2015 *Social media fingerprints of unemployment*, NetSci 2015, Zaragoza, Spain, June 1-5.
- 2014 *Using friends as sensors to detect global-scale contagious outbreaks*, European Conference on Complex Systems (ECCS) 2014, Lucca, Italy, September 22-26.
- 2014 *Social media and city dynamics*, European Conference on Complex Systems (ECCS) 2014, Lucca, Italy, September 22-26.
- 2014 *The dynamics of social networks within cities*, European Conference on Complex Systems (ECCS) 2014, Lucca, Italy, September 22-26.
- 2013 *The dynamics of human social behavior in communication networks*, European Conference on Complex Systems (ECCS) 2013, Barcelona, Spain, September 16-20.
- 2013 *Using friends as sensors to detect global-scale contagious outbreaks*, NetSci 2013, Copenhagen, Denmark, June 3-7,
- 2013 *Limited communication capacity unveils strategies for human interaction*, NetSci 2013, Copenhagen, Denmark, June 3-7.

- 2013 *Limited communication capacity unveils strategies for human interaction*, Netmob 2013, Boston, MA, May 1-3.
- 2012 *Agent-specific impact of single trades in financial markets*, “Market MicroStructure: confronting many viewpoints” workshop, Paris, France, December 10-13.
- 2012 *Social features of online networks: The strength of intermediary ties in online social media*, NetSci 2012, Chicago, June 18-22.
- 2012 *The evolution of communication ties*, NetSci 2012, Chicago, June 18-22.
- 2011 *Time allocation in social networks*. Netmob 2011, MIT Media Lab, Cambridge, MA, October 10-11.

Professional Organizations

Network Science Society
 Spanish Physics Society
 Association for Computing Machinery
 Boston Area Research Initiative

Master’s Thesis, Advisor

(only in the last 10 years)

- 2022 Tingyu Li, *Modeling the Efficacy of the 15-Minute City Using Large-Scale Mobility Data from the Perspective of Accessibility and User Choice: A Case Study on the Urban Food Environment*, Master of Engineering in Electrical Engineering and Computer Science, MIT May 2022.
- 2020 Srijith Poduval, *Simulating Income Segregation through Behavioral Adjustments using Mobile Location Data*, Master in Engineering in Electrical Engineering and Computer Science, MIT, May 2020.
- 2020 Juye Shirley Lu, *To Mirror or Not to Mirror – Modeling Relationships in Social Trading*, Master in Engineering in Electrical Engineering and Computer Science, MIT, May 2020.
- 2019 May Alhazzani, *Deep Embedding Approach to Classify Purpose of Trips between Cities from GPS Data*, Master of Science in Media Arts and Sciences, MIT, September 2019. Co-advisor.
- 2018 Katherine Botz, *Madrid City Location Intelligence using Big Data*, Master in Big Data, Universidad Carlos III de Madrid, June 2018.
- 2015 Henry Daniel Navarro Hernández, *The tie decay problem in social networks: Why do people stop calling?*, Master in Mathematical Engineering, Universidad Carlos III de Madrid, July 2015.

Doctoral Theses, Advisor

- 2024 Bernardo García Bulle Bueno, *Impact of social learning patterns of groups and individuals in health, educational, and societal systems*, co-advised with Prof. Sandy Pentland, IDSS, Massachusetts Institute of Technology, proposal expected June 2024.
- 2022 David Martin-Corral, *Mathematical models of digital epidemiology in social networks*, Universidad Carlos III de Madrid, December 2023.

- 2016 Llorente, Alejandro, *Mobility and interaction patterns in social networks*, Universidad Carlos III de Madrid, July 2016.
- 2015 Svetozar Nesic, *Stochastic Dynamics of Substrate-confined systems: Fisher fronts and Thin Liquid Films*, Universidad Carlos III de Madrid, June 2015.
- 2013 Miritello, Giovanna, *Temporal Patterns of Communication in Social Networks*, Universidad Carlos III de Madrid, December 2013.

Doctoral Theses, Reader

- 2022 Ariel Noyman, *CityScope: an urban modeling and simulation platform*, advised by Kent Larson, Program in Media Arts and Sciences, MIT, May 2022.
- 2021 Yuan Yuan, *Understanding and Reshaping Social Networks with Advanced Computational Techniques*, advised by Prof. Alex Pentland, IDSS MIT, September 2021.
- 2021 Tara Sowrirajan, *Collective Dynamics from Heterogeneous Interactions in Socioeconomic Networks*, Tara Sowrirajan, School of Engineering and Applied Sciences, Harvard University, May 2021.
- 2020 Lorenzo Lucchini, *The Impact Of Innovators' Behavior: a study on attractiveness and coordination*, Department of Information Engineering and Computer Science, University of Trento, Italy, February 2020.
- 2020 Yan Leng, *Collective Behavior over Social Networks with Data-driven and Machine Learning Models*, Program in Media Arts and Sciences, School of Architecture and Planning, MIT, May 2020.
- 2019 Alejandro Noriega Campero, *Human and Artificial Intelligence in Decision Systems for Social Development*, Program in Media Arts and Sciences, School of Architecture and Planning, MIT, September 2019.
- 2019 Daval D. K. Adjodah, *Social Inductive Biases for Reinforcement Learning*, Program in Media Arts and Sciences, School of Architecture and Planning, MIT, September 2019.
- 2017 Andrey Bogomolov, *Predictive Modeling of Human Behavior: Supervised Learning from Telecom Metadata*, Department of Information Engineering and Computer Science, Università Degli Studi Di Trento, Italy, March 2017.

Service to College and University

- 2019- Evaluuator of the MITS I See Fund Grants at the Massachusetts Institute of Technology.
- 2019- Organizer of the MIT Human Dynamics Computational Social Science seminars.
- 2005-2009 Director of the Ph.D. Program in Complex Systems at Universidad Carlos III de Madrid, Spain (2005-2009).

Service to the Community and Profession

- 2010- Member of the Journal of Statistical Mechanics: Theory and Experiment (JSTAT) Editorial Board. IOP Publishers.
- 2015- Member of the EPJ Data Science Editorial Board, Springer Nature.
- 2023- Member of the PNAS Nexus Editorial Board, OUP
- 2019-2022 General Chair of Complex Networks 2020 and 2021, Madrid, Spain.

2019-2020	Local Chair, International Conference on Computational Social Science (IC2S2), MIT, 2020.
2019-2020	Program Chair, Complex Networks 2019, Lisbon.
2019	General Chair Netmob 2019, University of Oxford, UK.
2017	General Chair Netmob 2017, Vodafone Italy, Milano, Italy.
2015	Program Chair Netsci 2015, Zaragoza, Spain.
2015	Organizer, General Chair of Netmob 2015, MIT, US.
2022	Program Committee Member of Netsci 2022, Shanghai, China.
2022	Program Committee Member of Complex Networks 2022.
2019	Senior Program Committee Member of Netsci 2019.
2019	Program Committee Member IC2S2 2019.
2019	Program Committee Member Netsci-X 2019, Santiago de Chile, Chile,
2018	Program Committee Member IC2S2 2018, Chicago, US.
2018	Program Committee Member of Complex Networks 2018, Cambridge, UK.
2018	Program Committee Member of Netsci 2018, Paris, France.
2018	Program Committee Member of CompleNet'18, Boston, US.
2018	Program Committee Member of NetSci-X 2018, Hangzhou, China.
2017	Program Committee Member of the Conference on Complex Systems. (CCS) 2017, Cancún, México.
2016	Program Committee Member of IC2S2 2016, Northwestern University, Chicago, US.
2016	Program Committee Member of Complex Networks 2016, Milan, Italy 2016.
2015	Program Committee Member of IC2S2 2015, Helsinki, Finland.
2007-2010	Editor, Revista Española de Física (Spanish Physics Society Proceedings), Spain.
2010-2015	Evaluator for the European Commission for the FP7 and H2020 Programs.
2010-	Evaluator for the Spanish Ministry of Science Research Programs.
2020-	Member of the Scientific Committee at CARTO.

Journal and Manuscript Review

Science, Nature, Nature Human Behavior, PNAS, Physical Review Letters, Nature Physics, Physical Review Letters, Nature Communications, Science Advances, Scientific Reports, PLoS ONE, EPJ Data Science, Physical Review E, Digital Health (SAGE), npj Urban Sustainability, Social Networks.

Teaching experience

26 years of teaching experience at undergraduate, graduate, and business school levels. More than 40 courses.

- Undergraduate programs:
 - Computer Science degree (Universidad Carlos II de Madrid).
 - Civil Engineering (Universidad Carlos III de Madrid).
 - Bio-Medical Engineering (Universidad Carlos III de Madrid).
 - Media Arts and Sciences (Massachusetts Institute of Technology).
 - Instructor and coordinator of courses. Typical enrollment ~100 students
 - Courses taught:
 - Linear Algebra: introduction to linear algebra. Years 2001 to 2016
 - Linear Algebra II: Advanced topics in linear algebra. Years 2001 to 2007

- Calculus: introduction to calculus. Years 1997-1998.
 - Calculus III: advanced topics in Calculus. Years 2001
 - Discrete Mathematics. Years 1995-1996.
 - Partial Differential Equations. Years 2006.
 - AI for Impact, Years 2020.
- Graduate programs:
 - Mathematical Engineering Ph.D. program (Universidad Carlos III de Madrid).
 - Complex Systems Ph.D. program. (Universidad Carlos III de Madrid).
 - Master in Big Data Analytics (Universidad Carlos III de Madrid) .
 - Master in Political and Electoral Analysis (Universidad Carlos III de Madrid)
 - Master in Data Science and Big Data in Finance (AFI Business School).
 - Theoretical Physics Ph.D. program (University of Oxford).
 - Instructor, coordinator, and designer of courses. Typical Enrollment ~20 students.
 - Director of the Ph.D. Program in Complex Systems at UC3M (2005-2009).
 - Courses taught:
 - Stochastic differential equations. Years: 2008, 2010. 2013, 2014, 2015.
 - Econophysics. Years: 2008, 2009, 2010.
 - Numerical methods in Complex Systems. Years: 2012
 - Complex Systems: Advanced Topics. Years: 2013.
 - Social Network Analysis. Years: 2015 and 2023.
 - Graph Analysis and data visualization applications. Years: 2015.
 - Network analysis and data visualization. Years: 2017-2022.
 - Introduction to Big data. Years: 2018 to present.
- MBA Programs:
 - Master in Data Science and Big Data in Finance (AFI Business School).
 - Data Analytics Certificate, MIT Sloan and Universidad de Chile (MIT).
 - Instructor, coordinator, and designer of courses.
 - Director of the AFI Master in Data Science and Big Data (2014-2015).
 - Courses taught:
 - Applications of Social Network Analysis to Finance. 2018 to present.
 - Location Intelligence. Years: 2018 to present.
 - Analysis of mobility data. Years: 2022.

Media coverage

(only in the last ten years)

2023 *The unequal effects of the health–economy trade-off during the COVID-19 pandemic.*

- [Epidemic-economic model provides answers to key pandemic policy questions](#), News & Events, University of Oxford
- [The unequal effects of the health-economy tradeoff during the COVID-19 pandemic](#), Behavioral and Social Sciences at Nature Research.
- [Epidemic-economic model provides answers to key pandemic policy questions](#), MIT SSRN NEWS.

2023 *Long-Range Social Influence in Phone Communication Networks on Offline Adoption Decisions.*

- [Phone communication spurs a cascading effect on social influence](#), Phys.org.
 - [Phone Lines of Connection](#). Big Ideas Story, McCombs School of Business.
- 2023 *Behavioral changes during the COVID-19 pandemic decreased income diversity of urban encounters*
- [Study: Covid-19 has reduced diverse urban interactions](#), MIT News.
 - [COVID made us retreat into our corners. A worrisome new study says we haven't left them](#), Boston Globe.
 - [Americans Have Become Less Willing to Explore Their Own Cities](#), CityLab Bloomberg.
 - [Americans are not exploring their own cities like they used to, study says](#), Fox 4 News
 - In Seattle, we're seeing the splitting of a city
<https://www.seattletimes.com/seattle-news/in-seattle-were-seeing-the-splitting-of-a-city/>, The Seattle Times.
 - [Study shows how pandemic decreased income diversity of urban encounters, even after lockdowns](#), Geek Wire.
- 2022 *You are where you eat: Effect of mobile food environments on fast food visits.*
- [How Big Data Could Solve Food Inequity](#), The Daily Beast
- 2022 *News or social media? Socio-economic divide of mobile service consumption.*
- [A new digital gap in internet usage between rich and poor people has been detected](#), Universidad Carlos III de Madrid News.
 - [A new digital gap in internet usage between rich and poor people has been detected](#), Eureka Alert, AAAS.
 - [Del correo y las noticias a Facebook y Youtube: así se usa internet según barrios ricos y pobres](#), El País.
- 2021 *Mobility patterns are associated with experienced income segregation in large US cities.*
- [Mobility patterns influence how we experience income segregation in our cities](#), MIT Media Lab News.
- 2021 *Universal resilience patterns in labor markets.*
- [Job connectivity improves resiliency in US cities, study finds](#), MIT News.
 - [Track how technology is transforming work](#), Nature Journal Comment.
- 2021 *Quantifying the importance and location of SARS-CoV-2 transmission events in large metropolitan areas*
- [Los móviles geolocalizados cuentan cómo funciona la distancia social en Nueva York](#), SiNC.
- 2021 *Effect of COVID-19 response policies on walking behavior in US cities*
- [Lockdowns reveal inequities in opportunities for walking activities](#), MIT News

- [Study: More people walked during the pandemic, but how much depended on their income level](#), Boston.com
 - [COVID-related lockdowns reveal inequities in opportunities for walking](#), Center for Public Health, Queen's University Belfast News.
- 2020 *Modeling the impact of social distancing, testing, contact tracing and household quarantine on second-wave scenarios of the COVID-19 epidemic*
- [Modeling the impact of testing, tracing, and quarantine](#), MIT News, September 8, 2020
 - [Measuring the Effectiveness of Coronavirus Social Distancing Policies](#), Wall Street Journal, April 10, 2020
 - [More waves of virus cases could follow the first, health experts warn](#), The Dallas Morning News, April 10, 2020
 - [Un estudio muestra que los test sin rastreo eficaz de contactos son insuficientes para frenar la oleada](#), El Pais, August 12, 2020
 - [The effectiveness of social distancing strategies in the face of an epidemic](#) Medical Xpress, March 27, 2020
 - [Lockdowns reveal inequities in opportunities for walking activities](#), MIT News
- 2018 *Analyzing gender inequality through large-scale Facebook advertising data*
- [Facebook Use Linked to Gender Equality](#), Scientific American
 - [Researchers are using Facebook data to study gender inequality](#), Mic
 - [New tool using Facebook data shows worldwide gender gap](#), Phys.org
 - [La brecha de género en Facebook refleja la desigualdad real](#), El País
- 2019 *Atlas of Inequality*
- ['Atlas Of Inequality' Shows Income Segregation Around Boston](#), WBUR.
 - [Dear White People: Moving To A Diverse Neighborhood Isn't Enough](#), WBUR
 - [The Atlas of Inequality and Cuebiq's data for good initiative](#), The Gov Lab.
 - [Visualizing where rich and poor people really cross paths—or don't](#), Fast Company.
- 2018 *Weather impacts expressed sentiment*
- [It's not just you: dark clouds are linked with darker moods](#), Newsweek
 - [Under the Weather? How social media sentiments reflect weather patterns](#), PLOS Research News
 - [The Way We Talk Online Is Impacted by Changing Weather, Study Finds](#), The Weather Channel
 - [Bad weather is 'more depressing than terrorist attack', study finds](#), Yahoo UK News
 - [When the weather is good, we are happier on social networks](#), Eureka News
 - [Weather associated with sentiments expressed on social media](#), Phys.org
 - [La temperatura de la felicidad es de 25 grados a mediodía y 10 por la noche](#), La Vanguardia
- 2016 *Rapid assessment of disaster damage using social media activity*

- [Twitter can predict hurricane damage as well as emergency agencies](#), Science Magazine
- [Twitter Storms Can Help Gauge Damage of Real Storms and Disasters](#), Study Says, Wall Street Journal
- [Why your tweets could really matter during a natural disaster](#), The Washington Post
- [Twitter May Be Faster Than FEMA Models for Tracking Disaster Damage](#), Smithsonian.com
- [Tweets about Hurricane Sandy were a good predictor of storm damage, study suggests](#), The Verge
- [Twitter-Aktivität zeigt Ausmaß der Schadenshöhe](#), Die Welt
- [Twitter sabe antes que nadie cuánto cuestan las catástrofes](#), El País
- [Twitter predice la severidad de los daños materiales de un huracán](#), La Vanguardia
- [Investigadores señalan a Twitter como una herramienta útil para mejorar la respuesta ante desastres naturales](#), LaInformación.com

2016 *Social media fingerprints of unemployment*

- [Twitter "Exhaust" Reveals Patterns of Unemployment](#), MIT Technology Review.
- [Tweets Tell Whether You Have A Job](#), InformationWeek.
- [Así tuitea España](#), El País (spanish).
- [What makes Spain tweet?](#) El País (english).
- [Cómo la gente usa Twitter revela datos claves de la economía](#), Clarín.
- [Los viajes de un día en España, resumidos en un vídeo de menos de 2 minutos](#), EuropaPress.
- [Los datos no mienten: donde se tuitea con más faltas de ortografía, hay más paro](#), El Confidencial.
- [El nuevo mapa de España según Twitter](#), La Voz de Galicia.
- [Crean mapa interactivo que refleja como nos movemos los españoles](#), Antena 3.
- [Cómo, cuándo y dónde se tuitea en España](#), Marketing Directo.
- [¿Cómo se tuitea en España?](#) Merca2.0.
- [Así nos movemos los españoles en un día normal](#),
- [Los secretos del pájaro azul](#), El País.
- [What Twitter can tell us about Unemployment](#), Bloomberg CityLab.
- [You can use Twitter activity to track unemployment](#), Engadget.
- [Interesting Research Using Twitter: The Unemployed Get Up Late And Can't Spell](#), Forbes.
- [Là où le chômage est fort, les utilisateurs de Twitter sont plus nombreux](#), L'Express.

2014 *Performance of Social Network Sensors during Hurricane Sandy*

- [Popular friends on social media can help save you from disasters](#), The Conversation.

2014 *Using Friends as Sensors to Detect Global-Scale Contagious Outbreaks*

- [The science of going viral](#), The Chronicle of Higher Education.
- [How to Use Twitter Friends as Sensors to Detect Disease Outbreaks](#), Technology Review MIT.

- [Going viral: How 'social contagion' begins and escalates](#), Yale News.
- [How 'social contagion' begins and escalates](#),
- [System detects global trends in social networks two months in advance](#), ScienceDaily.
- [Tus tuits predicen el futuro](#), Huffington Post.
- [Predicting contagious outbreaks using your most popular friends](#), FastCompany.

2014 *The predictability of consumer visitation patterns*

- [All real-world shoppers are zombies](#), Lifehacker.
- [Animales de costumbres a la hora de la compra](#), ABC.es
- [Consumers almost always buy in the same shops](#), EurekAlert.
- [Compramos casi siempre en las mismas tiendas](#), Puromarketing
- [Shopping habits predictable to a point](#), ABC Science.

2013 *Limits of social mobilization*

- [How social media mobilizes society](#), LiveScience
- [La movilización por redes sociales puede ser rápida, pero tiene límites](#), Muy Interesante.
- [Researchers root out the limits of social mobilization.](#)
- [Using social networks for mobilization has its limits](#), DiCyT
- [¿Son las Redes sociales una buena herramienta de movilización social en situaciones críticas ?](#) (radio), RTVE
- [Las movilizaciones en redes sociales son muy eficientes, si están dirigidas](#), Tendencias21.
- [Facebook passes research test for quick responses, collaboration](#), NBC News.
- [Social media has limited mobilisation power](#), ABC Science.