

M. Ángeles Serrano

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Short Bio

M. Ángeles Serrano obtained her Ph.D. in Physics at the Universitat de Barcelona (UB) in 1999 with a thesis about gravitational wave detection. In 2000, she also received her Masters in Mathematics for Finance at the CRM-Universitat Autònoma de Barcelona. After four years in the private sector as IT consultant and mutual funds manager, Prof. Serrano returned to academia in 2004 to work in the field of Network Science. Subsequently, she was a researcher at Indiana University (USA), the École Polytechnique Fédérale de Lausanne (Switzerland), IFISC Institute (Spain), and held a Ramón y Cajal research associate appointment at UB until October 2015. The results of her investigations are summarized in major peer reviewed international scientific journals -including Nature, PNAS, PRL, ...-, book chapters, and conference proceedings. Prof. Serrano leads and participates in several research projects at the international and national levels. She is also actively involved in advising and research supervision. She serves in evaluation panels and program scientific committees, and acts as a reviewer in several international journals. In February 2009, she obtained the Outstanding Referee Award of the American Physical Society. She is a Founder Member of Complexitat, the Catalan Network for the study of Complex Systems, and Promoter and Board Member of UBICS, the Universitat de Barcelona Institute of Complex Systems.

Education

- **July 2000**, M. D. in Mathematical Finance, UAB-IEC, Barcelona, Spain
- **June 1999**, Ph. D. in Theoretical Physics, University of Barcelona, Spain
- **September 1994**, BSc. D. in Physics, University of Barcelona, Spain

Academic Professional Experience

- **October 2015 - Present**, ICREA Research Professor, Dept. Física de la Matèria Condensada and UB Institute of Complex Systems, Universitat de Barcelona, Spain.
- **March 2009 - October 2015**, *Ramón y Cajal* Research Associate, Dept. Física Fonamental, Universitat de Barcelona, Spain. May 2014-October 2015, Universitat de Barcelona Talent Retention Programme.
- **April 2008 - February 2009**, Postdoctoral Researcher, CSIC JAE Doc, IFISC (CSIC-UIB), Palma de Mallorca, Spain. Supervisor: Maxi San Miguel

- **January 2007 - March 2008**, Postdoctoral Researcher, DELIS project, Institut de Théorie des Phénomènes Physiques, Ecole Polytechnique Fédérale de Lausanne, Switzerland. Supervisor: Paolo De Los Rios
- **March 2006 - August 2006**, Visiting Guest Scientist, Complex Network Lagrange Laboratory, Institute for Scientific Interchange (ISI) Foundation, Turin, Italy. Supervisor: Alessandro Vespignani
- **February 2005 - December 2006**, Postdoctoral Researcher, School of Informatics, Indiana University, Bloomington, USA. Supervisor: Alessandro Vespignani
- **January 2004 - December 2004**, Postdoctoral Researcher, COSIN Project, Fundació Bosch i Gimpera, Universitat de Barcelona, Spain. Supervisor: Albert Díaz-Guilera

Nonacademic Professional Experience

- **June 2001 - December 2003**, Investment Manager, Mutual Funds Specialist and Quantitative Analyst, Catalunya Caixa Inversió S.G.I.I.C. S.A., Madrid-Barcelona, Spain.
- **March 2000 - May 2001**, Information Technologies Consultant, Information Highway Group S.L., Barcelona, Spain
- **September 1997 - April 1998**, Secondary School Teacher, Fundació Lleó XIII, Barcelona, Spain

Honors and Awards

- **Outstanding Referee of the American Physical Society**, 2009
- **Lipper-Cinco Días Fund Award 2004** to mutual fund Caixa Catalunya Dinámico FIMF

Habilitations and Fellowships

- **Senior Lecturer**, National Agency for Quality Assessment and Accreditation (ANECA), January 2015
- **I3 Programme Certificate**, Ministry of Economy and Competitiveness, ANEP (Spanish National Evaluation and Foresight Agency), April 2013
- **Accreditation of Research**, Catalan University Quality Assurance Agency (AQU Catalunya), February 2010
- **Ramón y Cajal Fellow** of the Spanish Ministry of Science, March 2009
- **Accreditation for tenure-track lecturer**, Catalan University Quality Assurance Agency (AQU Catalunya), 2004
- **FPI doctoral fellowship**, Ministerio de Educación y Ciencia, Spain, 1998-1999

Professional Services

Organization of Conferences and Schools

Co-Chair of the International School on Network Science NetSci 2017, June 19-20, 2017, Indianapolis, Indiana, USA

Co-Chair of the Minisymposium on Chemical Networks, Engineering of Chemical Complexity International Conference 2017, 9th edition, June 19-22, Vilanova i la Geltrú, Barcelona, Spain

Member of the Local Committee of the ECCS13 European Conference on Complex Systems, September 16-20, 2013, Barcelona, Spain

Chair of II Jornada Complexitat.cat, Catalan Networks for the Study of Complex Systems, May 24, Barcelona, Spain

Member of the Local Committee of the BCNetWORKSHOP 2008 Trends and Perspectives in Complex Networks, December 10-12, 2008, Barcelona, Spain

Participation in Program Committees

CompleNet 2016, International Workshop on Complex Networks, March 23-25, Bourgogne, France

NetSci X 2016, International School and Conference on Network Science, January 11-13, Wroclaw, Poland

Summer Solstice 2015 International Conference on Discrete Models of Complex Systems, June 17-19, Toronto, Canada

CompleNet 2015, International Workshop on Complex Networks, March 25-27, New York, USA

CompleNet 2014, International Workshop on Complex Networks, March 12-14, Bologna, Italy

Summer Solstice 2014 International Conference on Discrete Models of Complex Systems, June 22-25, Ljubljana, Slovenia

Joint CRM-Imperial College School and Workshop in Complex Systems 2013, 8-13 April, Bellaterra, Spain

CompleNet 2013, International Workshop on Complex Networks, March 13-15, Berlin, Germany

Summer Solstice 2013 International Conference on Discrete Models of Complex Systems, June 27-29, Gdansk, Poland

CompleNet 2012, International Workshop on Complex Networks, March 7-9, Florida, USA

Summer Solstice 2011 International Conference on Discrete Models of Complex Systems, June 9-10, Turku, Finland

CompleNet 2010, International Workshop on Complex Networks, October 13-15, Rio de Janeiro, Brazil

CompleNet 2009, International Workshop on Complex Networks, May 26-28, 2009, Catania, Italy

BCNetWORKSHOP 2008 Trends and Perspectives in Complex Networks, December 10-12, 2008, Barcelona, Spain

Participation in PhD Dissertation Committees

Dr. Oleguer Sagarra Pascual, UB, Spain, July 2016

Dr. Kaj Kolja Kleineberg, UB, Spain, June 2016

Dr. Pablo Fleurquin Amorós, IFISC (CSIC-UIB), Spain, March 2016

Dr. Mario Gutiérrez Roig, UB, Spain, January 2016

Dr. Juan Ignacio Deza, UPC, Spain, February 2015

Dra. Esther Ibáñez Marcelo, UPC, Spain, December 2014

Dr. Przemyslaw A. Grabowicz, IFISC (CSIC-UIB), Spain, January 2014

Dr. Xavier Castelló, IFISC (CSIC-UIB), Spain, April 2010

Dra. Marta Sánchez de la Lama, IFCA (CSIC-UC), Spain, July 2009

Dr. Michele Catanzaro, UPC, Spain, July 2008

Hiring Committees For Official Agencies and Institutions

Postdoctoral Fellowships: Mobility stays for young doctors in foreign countries "José Castillejo", Ministry of Education, ANEP (Spanish National Evaluation and Foresight Agency), Spain, 2012

Postdoctoral Fellowships: CSIC JAE-Doc Program, Spain, 2008-2011

Postdoctoral Fellowships: Subprogramme "Juan de la Cierva" MICINN, ANEP (Spanish National Evaluation and Foresight Agency), Spain, 2010.

Predocctoral Fellowships: CSIC JAE-Predoc Program, Spain, 2008-2011.

Other Committees

University of Barcelona Institute of Complex Systems, Promoter member and Board and Standing Committee member, 2016.

Complexitat.cat, Catalan Network for the Study of Complex Systems (www.complexitat.cat)
Founding member, Treasurer, and member of the Permanent Scientific Committee, 2015.

Equality Commission, Facultat de Química, Universitat de Barcelona, 03/2010-02/2012.

Reviewer

Referee for the Following Journals

Physical Review X, Physical Review Letters, Physical Review E, Scientific Reports, New Journal of Physics, Europhysics Letters, European Physical Journal B, Journal of Physics A , Journal of Statistical Mechanics: Theory and Experiment, Royal Society Interface, PLOS One, Network Science, Advances in Complex Systems, IEEE Communication Letters, EPJ Data Science, Reports on Mathematical Physics, Physica A, Journal of Economic Dynamics and Control, Applied Energy

Book Proposals

Oxford University Press

International Conferences

IEEE TIC-SCH-SENCES International Conference, APFA5 International Conference, SigmaPhi International Conference

Research Projects

DFG Deutsche Forschungsgemeinschaft, German Research Foundation, Germany, 2016

Vienna Science and Technology Fund, Austria, 2016

Marsden Fund, The Royal Society of New Zealand, New Zealand, 2016

Plan Estatal Físicas y Ciencias del Espacio, Spanish National Evaluation and Foresight Agency (ANEP), 2012, 2013, 2015

Complexity Program of the Physical Sciences Division of the Netherlands Organisation for Scientific Research (NWO), 2010

United States-Israel Binational Science Foundation, USA, 2007

Intellectual Property

PULSAR, portfolio optimization software

Gerard Torrent Gironella and M. Ángeles Serrano Moral

Registre Provincial de la Propietat Intellectual de Barcelona, no. B-37245 02/2000/822.

<http://www.generacio.com/aac/index.html>

Grants

2016-2019 *Adaptabilidad y Cooperación en Sistemas Biosociales en la Multiescala II*, Ministerio de Economía y Competitividad (FIS2016-76830-C2-2-P), 100.000€. **Principal investigator**

2013-2019 *Mapping complexity: Embedding networks in hidden metric spaces*, James S. McDonnell Foundation, USA (JSMF GRANT NO. 220020363), 450.000 \$. **Principal investigator**

2014-2016 *Evolución espacio-temporal de topologías complejas en las TIC, sistemas biológicos y materiales bioestructurados*, Ministerio de Economía y Competitividad (FIS2013-47282-C2-1-P), 47.000€. **Co-Principal Investigator**

2014-2016 *Complexity Lab Barcelona*
Generalitat de Catalunya (2014SGR608), 30.000€. **Co-Investigator**

2012-2016 *Decentralized Online Social Networks iSocial*, European Commission (FP7-PEOPLE-2012-ITN 316808), 382.444,46€ (node UB). **Co-investigator**

- 2012-2016** *Foundational Research on Multilevel Complex networks and Systems MULTIPLEX*, European Commission (FP7-ICT-2011-8 317532), 374.955€ (node Catalunya). **Co-investigator**
- 2012-2015** *multi-Layer Spatiotemporal Generalized Networks LASAGNE*, European Commission (FP7-ICT-2011-8 318132), 198.443€ (node UB). **Co-investigator**
- 2011-2014** *Estructura, Redes y Motivos ('motifs') Celulares*, Ministerio de Ciencia e Innovación (BFU2010-21847-C02-02), 66.550€. **Co-Investigator**
- 2009-2014** *Self-Organized Complexity and Self-Assembling Materials*, Generalitat de Catalunya (SOC&SAM2009SGR1055). **Co-Investigator**
- 2010-2013** *Discovering Hyperbolic Metric Spaces Hidden Beneath the Internet and Other Complex Networks*, National science Foundations (NSF CNS-0964236). **External Collaborator**
- 2009-2011** *Additonal funding, Ramón y Cajal contract*, Ministerio de Ciencia e Innovación (RYC-2008-027245). **Principal Investigator**
- 2007-2010** *Estructural y procesos dinámicos en sistemas físicos auto-ensamblados*, Ministerio de Ciencia y Tecnología (FIS2007-66485-C02-01). **Co-Investigator**
- 2008-2009** *BCNetWORKSHOP 2008 Trends and Perspectives in Complex Networks*, Ministerio de Ciencia y Tecnología (FIS2008-01732-E/FIS). **Co-Investigator**
- 2008-2009** *Ajuts accions mobilitzadores: BCNetWorkShop 2008-Trends and Perspectives in Complex Network Science*, Agència de Gestió d'Ajuts Universitaris i de Recerca, Generalitat de Catalunya, AGAUR (2008ARCS100120). **Co-Investigator**
- 2004-2008** *Dynamically Evolving, Large-Scale Information Systems DELIS*, FET Open Project of the EU Commission (DELIS IST-2002 001907). **Postdoctoral Investigator**
- 2002-2005** *Coevolution and Self-Organization in Dynamical Networks COSIN*, FET Open Project of the EU Commission (COSIN IST-2001-33555). **Postdoctoral Investigator**
- 1998-2000** *Gravitació i Cosmologia Relativistes i Sistemes Estocàstics*, Comissionat per a Universitats i Recerca, Generalitat de Catalunya (1998SGR00015). **Predoctoral Investigator**
- 1997-2000** *Relatividad General Clásica*, Secretaría de Estado de Educación, Universidades, Investigación y Desarrollo (PB96-0384). **Predoctoral Investigator**

Selected Publications

- G. García-Pérez, M. Boguñá, A. Allard, M. Á. Serrano
The hidden hyperbolic geometry of international trade: World Trade Atlas 1870-2013, **Scientific Reports** **6**, 33441 (2016)
- O. Güell, F. A. Massucci, F. Font-Clos, F. Sagués, M. Á. Serrano, *Mapping High-growth Phenotypes in the Flux Space of Microbial Metabolism*, **J. R. Soc. Interface** **12**, 20150543 (2015)
- O. Güell, F. Sagués, and M. A. Serrano,
Essential plasticity and redundancy of metabolism unveiled by synthetic lethality analysis
PLoS Computational Biology **10**, e1003637 (2014)

- F. Papadopoulos, M. Kitsak, M. A. Serrano, D. Krioukov, and M. Boguñá
Popularity versus similarity in growing networks, **Nature** **489**, 537-540 (2012)
- M. A. Serrano, D. Krioukov and M. Boguñá, *Percolation in self-similar networks*,
Physical Review Letters **106**, 048701 (2011)
- M. A. Serrano, A. Flammini, F. Menczer, *Modeling the structure of written text*
PLOS ONE **4**, e5372 (2009)
- M. A. Serrano, M. Boguñá, and A. Vespignani, *Extracting the multiscale backbone of complex weighted networks*, **Proceedings of the National Academy of Sciences USA** **106**, 6438 (2009)
- M. A. Serrano, D. Krioukov and M. Boguñá, *Self-similarity of complex networks and hidden metric spaces*, **Physical Review Letters** **100**, 078701 (2008)
- M. A. Serrano and M. Boguñá, *Percolation and Epidemic Thresholds in Clustered Networks*
Physical Review Letters **97**, 088701 (2006).
- M. Ángeles Serrano and Marián Boguñá, *Topology of the world trade web*
Physical Review E **68**, 015101(R) (2003)

Publications

M. A. S. is an author of a number of publications in major peer reviewed international scientific journals, book chapters, and conference proceedings. Among those: 1 article in Nature, 2 article in Nature Physics, 1 article in the Proceedings of the National Academy of Sciences USA, 4 articles in Physical Review Letters, 1 in Nature Communications, 6 in Nature Scientific Reports, 1 in PLOS Computational Biology, 2 in J. Royal Society Interface, 10 in Physical Review E. She published in different fields including Physics, Biology, Economy, and Computer Science. These publications gather more than 1519 citations according to the ISI Web of Science database (Cited Reference Search), and more than 3116 according to Google Scholar (as of February 8, 2017).

Preprints

- K.-K. Kleineberg, L. Buzna, F. Papadopoulos, M. Boguñá, M. Á. Serrano,
Geometric correlations mitigate the extreme vulnerability of multiplex networks against targeted attacks
arXiv preprint arXiv:1702.02246. Submitted
- J. Haerter, A. Díaz-Guilera, M. Á. Serrano,
Noise-Induced Polarization Switch in Single and Multiplex Complex Networks
arXiv preprint arXiv:1608.00428. Submitted
- O. Güell, F. Sagués, M. Á. Serrano
Detecting the Escherichia coli metabolic backbone
arXiv preprint arXiv:1412.3353v4. Submitted

Journals

- A. Allard, M. Á. Serrano, G. García-Pérez, M. Boguñá,
The hidden geometry of weighted complex networks, **Nature Communications** **8**, 14103 (2017)
- G. García-Pérez, M. Boguñá, A. Allard, M. Á. Serrano
The hidden hyperbolic geometry of international trade: World Trade Atlas 1870-2013, **Scientific Reports** **6**, 33441 (2016)

- K.-K. Kleineberg, M. Boguñá, M. Á. Serrano, F. Papadopoulos, *Hidden geometric correlations in real multiplex networks*, **Nature Physics** (2016), doi:10.1038/nphys3812
- F. Vazquez, M. Á. Serrano, M. San Miguel, *Rescue of endemic states in interconnected networks with adaptive coupling*, **Scientific Reports** **6**, 29342 (2016)
- O. Güell, F. A. Massucci, F. Font-Clos, F. Sagués, M. Á. Serrano, *Mapping High-growth Phenotypes in the Flux Space of Microbial Metabolism*, **J. R. Soc. Interface** **12**, 20150543 (2015)
- M. Á. Serrano, L. Buzna, M. Boguñá, Escaping the avalanche collapse in self-similar multiplexes, **New Journal of Physics** **17**, 053033 (2015)
- G. García-Pérez, M. Boguñá, M. Á. Serrano, *Regulation of burstiness by network-driven activation*, **Scientific Reports** **5**, 9714 (2015)
- M. Boguñá, L. F. Lafuerza, R. Toral, M. Á. Serrano, *Simulating non-Markovian stochastic processes*, **Physical Review E** **90**, 042108 (2014)
- G. García-Pérez, M. Á. Serrano, M. Boguñá, *Complex architecture of primes and natural numbers*, **Physical Review E** **90**, 022806 (2014)
- O. Güell, F. Sagués, and M. Á. Serrano, *Essential plasticity and redundancy of metabolism unveiled by synthetic lethality analysis*, **PLoS Comput. Biol.** **10**, e1003637 (2014)
- M. Á. Serrano, M. Jurado, and R. Reigada, *Negative-feedback self-regulation contributes to robust and high-fidelity transmembrane signal transduction*, **Journal of the Royal Society Interface** **10**, 20130581 (2013)
- P. Colomer-de-Simón, M. Á. Serrano, M. G. Beiró, J. I. Alvarez-Hamelin, and M. Boguñá *Deciphering the global organization of clustering in real complex networks* **Scientific Reports** **3**, 2517 (2013)
- F. Papadopoulos, M. Kitsak, M. Á. Serrano, M. Boguñá, and D. Krioukov, *Popularity versus similarity in growing networks*, **Nature** **489** 537-540 (2012)
- M. Á. Serrano, M. Boguñá, and F. Sagués, *Uncovering the hidden geometry behind metabolic networks*, **Molecular Biosystems** **8**, 843-850 (2012)
- K. Klemm, M. Á. Serrano, V. M. Eguíluz, and M. San Miguel, *A measure of individual role in collective dynamics*, **Scientific Reports** **2**, 292 (2012)
- O. Güell, F. Sagués, and M. Á. Serrano, *Predicting effects of structural stress in a genome-reduced model bacterial metabolism*, **Scientific Reports** **2**, 621 (2012)
- A. Saumell-Mendiola, M. A. Serrano, and M. Boguñá, *Epidemic spreading on interconnected networks*, **Physical Review E** **86**, 026106 (2012)
- O. Güell, F. Sagués, G. Basler, Z. Nikoloski, and M. Á. Serrano, *Assessing the significance of knockout cascades in metabolic networks*, **Journal of Computational Interdisciplinary Sciences** **3**, 1-9 (2012)
- M. Á. Serrano, D. Krioukov, and M. Boguñá, *Percolation in self-similar networks* **Physical Review Letters** **106**, 048701 (2011)
- M. Á. Serrano and F. Sagués, *Network-based scoring system for genome-scale metabolic reconstructions*, **BMC Systems Biology** **5**, 76 (2011)
- M. A. Serrano, M. Boguñá, and A. Vespignani, *Extracting the multiscale backbone of complex weighted networks*, **PNAS** **106**, 6438 (2009)

- M. Á. Serrano, A. Flammini, and F. Menczer, *Modeling the structure of written text* **PLOS ONE 4**, e5372 (2009)
- M. Á. Serrano, K. Klemm, F. Vazquez, V. M. Eguiluz, and M. San Miguel *Conservation laws for voter-like models on random directed networks* **Journal of Statistical Mechanics-Theory And Experiment P10024** (2009)
- M. Á. Serrano, *Rich-club vs rich-multipolarization phenomena in weighted networks* **Physical Review E 78**, 026101 (2008)
- M. Á. Serrano and P. De Los Rios, *Structural efficiency of percolated landscapes in flow networks*, **PLOS ONE 3**, e3654 (2008)
- M. A. Serrano, D. Krioukov and M. Boguñá, *Self-similarity of complex networks and hidden metric spaces*, **Physical Review Letters 100**, 078701 (2008)
- M. Á. Serrano and P. De Los Rios, *Interfaces and the edge percolation map of random directed networks*, **Physical Review E 76**, 056121 (2007)
- M. Ángeles Serrano, Ana Magitman, Marián Boguñá, Santo Fortunato, and Alessandro Vespignani, *Decoding the structure of the WWW: a comparative analysis of web crawlers* **ACM transactions on the Web 1**, 10 (2007)
- M. Á. Serrano, *Phase transition in the globalization of trade* **Journal of Statistical Mechanics-Theory And Experiment L01002** (2007)
- M. Ángeles Serrano, Marián Boguñá, and Alessandro Vespignani, *Patterns of dominant flows in the world trade web*, **Journal of Economic Interaction and Coordination 2**, 111 (2007)
- M. Ángeles Serrano and Marián Boguñá, *Percolation and Epidemic Thresholds in Clustered Networks* , **Physical Review Letters 97**, 088701 (2006)
- M. Ángeles Serrano, Marián Boguñá, and Romualdo Pastor-Satorras, *Correlations in weighted networks*, **Physical Review E 74**, 055101(R) (2006)
- M. Ángeles Serrano and Marián Boguñá, *Clustering in complex networks. II. Percolation properties*, **Physical Review E 74**, 056115 (2006)
- M. Ángeles Serrano and Marián Boguñá, *Clustering in complex networks. I. General formalism*, **Physical Review E 74**, 056114 (2006)
- V. Colizza, A. Flammini, M. Á. Serrano, and A. Vespignani, *Detecting rich-club ordering in complex networks*, **Nature Physics 2**, 110-115 (2006)
- M. Ángeles Serrano, Marián Boguñá, and Albert Díaz-Guilera, *Modeling the Internet* **European Physical Journal B 50**, 249 (2006)
- M. Ángeles Serrano, Marián Boguñá, and Albert Díaz-Guilera, *Competition and Adaptation in an Internet Evolution Model*, **Physical Review Letters 94**, 038701 (2005)
- M. Ángeles Serrano and Marián Boguñá, *Tuning clustering in random networks with arbitrary degree distributions*, **Physical Review E 72**, 036133 (2005)
- Marián Boguñá and M. Ángeles Serrano, *Generalized percolation in random directed networks* **Physical Review E 72**, 016106 (2005)
- M. Ángeles Serrano and Marián Boguñá, *Topology of the world trade web* **Physical Review E 68**, 015101(R) (2003)
- S. M. Merkowitz, J. A. Lobo, M. Á. Serrano, *Errors in the inverse problem solution for a noisy spherical GW antenna*, **Classical and Quantum Gravity 16**, 3035-3046 (1999)

J. A. Lobo, M. Á. Serrano, *The Resonator Problem in a Spherical GW Detector*, **Classical and Quantum Gravity** **14**, 1495-1498 (1997)

J. A. Lobo, M. Á. Serrano, *The Multiple Resonator Problem in a Spherical GW Antenna: its General Solution and New Interesting Layouts*, **Europhysics Letters** **35**, 253-258 (1996)

J. A. Lobo, M. Á. Serrano, *New Ideas for a Transducer Layout in a Spherical GW Antenna* **Nuclear Physics (Proc. Suppl.) B** **48**, 116 (1996)

Book Chapters and Conference Proceedings

Environmental dependence of the activity and essentiality of reactions in the metabolism of Escherichia coli

Oriol Güell, M. Ángeles Serrano and Francesc Sagués in Engineering of Chemical Complexity II, Alexander S Mikhailov and Gerhard Ertl eds., World Scientific Lecture Notes in Complex Systems 12 (2014). ISBN: 978-981-4616-12-6. Pages 39-56

The World Trade Web: Structure, evolution and modeling

M. Ángeles Serrano, Diego Garlaschelli, Marián Boguñá, and Maria Loffredo in Complex Networks. G. Caldarelli Ed, Encyclopedia of Life Support Systems (EOLSS) (UNESCO-EOLSS Publishers, 2010). eISBN: 978-1-84826-322-2, ISBN: 978-1-84826-772-5
Pages: E6-200-05-1 - E6-200-05-48

Correlations in complex networks

M. Ángeles Serrano, Marián Boguñá, Romualdo Pastor-Satorras, and Alessandro Vespignani in Structure and Dynamics of Complex Networks. From Information Technology to Finance and Natural Science. G. Caldarelli and A. Vespignani Eds. (World Scientific, Singapur, 2007). ISBN: 978-981-270-664-5. Pages: 35-66

Weighted configuration model

M. Angeles Serrano and Marián Boguñá, in Science of Complex Networks: from Biology to the Internet and WWW. CNET2004 American Intitute of Physics Conference proceedings, (2005). ISBN: 978-0735402621. Pages: 101-107

The Resonator Problem in a Spherical GW Antenna

J. A. Lobo, M. Á. Serrano in Proceedings of the first international workshop Omnidirectional Gravitational Radiation Observatory. W. F. Veloso, O. D. Aguiar and N. S. Magalhaes Eds. (World Scientific, Singapore, 1997). ISBN: 9810232098. Pages: 201-204

Title: Spherical GW Antenna: the Mathematical Theory for the Resonator Problem

J. A. Lobo, M. Á. Serrano in Proceedings of the Spanish Relativistic Meeting, Relativistic Astrophysics and Cosmology ERE95. Buitrago, E. Mediavilla and A. Oscoz Eds. (World Scientific, Singapore, 1995). ISBN: 981023189X. Pages: 95-102

Editorial Notes

X. Dimitropoulos, M. Á. Serrano, D. Krioukov, *On Cycles in AS Relationships* **ACM SIGCOMM Computer Communication Review** **38**, 103-104 (2008)

Ph. D. Thesis

M. Á. Serrano, *The motion sensing problem in spherical gravitational wave detectors*
Universitat de Barcelona (1999) ISBN: 84-475-2246-6

Science Magazines

Xarxes complexes en biologia cel·lular, M. Á. Serrano, M. Sales-Pardo, T. Alarcón, R. Guimerà, F. Sagués,
Revista de Física (Ed. Institut d'Estudis Catalans) 5 (2) 23-28 (2015)

Sistemes socioeconòmics i financers, J. Duch, M. Gutiérrez-Roig, J. Masoliver, M. Montero, J. Perelló, M. Á. Serrano,
Revista de Física (Ed. Institut d'Estudis Catalans) 5 (2) 38-44 (2015)

Participation in Workshops, Conferences, and Symposiums

Invited Speaker

Network geometry and gravity models in complex networks
Symposium Leiden Networks Days, Leiden, The Netherlands, 23 September 2016

The hidden geometry of complex networks
Distinguished Keynote Speaker at CCS 2016, Conference on Complex Systems, Beurs Van Berlage, Amsterdam, The Netherlands, 19-22 September 2016

Network geometry: expanding the heritage of Newton's gravity law
Network Geometry and Topology Workshop, Satellite Meeting of NetSci 2016 International Conference on Network Science, Seoul, South Korea, May 30 - June 3, 2016

Mapping complexity: Embedding networks in hidden metric spaces
Symposium Honoring John T. Bruer on his leadership at James S. McDonnell F, St. Louis, Missouri, USA, May 28-29, 2015

Mapping the World Trade Web
10th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Special Session Interacting population on social, economic and ecological networks
Madrid, Spain, July 7-11, 2014

The Mapping Complexity Project
James S. McDonnell Foundation 2014 Studying Complex Systems Scholars and Postdoctoral Fellows Meeting, Atlanta, USA, May 28-30, 2014

Networks meet Geometry: the SI model and beyond
Fises'12, XVIII Congreso de Física Estadística, Palma de Mallorca, Spain, October 18-20, 2012

Networks meet Geometry: the SI model
Aalto Complex Networks Factory Workshop, Porvoo, Finland, June 7-8, 2012

Cartography of metabolic networks: the SI model
NOLINEAL 2012, Universidad de Zaragoza, Zaragoza, Spain, June 4-6, 2012

Language structure, bursty words, and topicality in large web datasets
Workshop on Web Epistemics, Center of Interdisciplinary Research ZiF
Bielefeld, Germany, February 15-17, 2012

Uncovering the hidden geometry behind complex networks
Geometry of large networks, American Institute of Mathematics AIM
Palo Alto, California, USA, Oct 31 Nov 4, 2011

Uncovering the hidden geometry behind metabolic networks
Net-Works 2011 International Conference, Complex Networks: structure, applications and related topics, El Escorial, Madrid, Spain, October 26-28, 2011

Uncovering the hidden geometry behind metabolic networks: from hierarchical random graphs to the SI model
Summer Solstice 2011 International Conference on Discrete Models of Complex Systems
Turku, Finland, June 9-10, 2011

Uncovering the hidden geometry behind complex networks: The SI model
III Workshop MODELICO-CM, Modelización y Simulación de Sistemas Complejos
Madrid, Spain, May 6, 2011

A complex networks approach to genome-scale metabolic reconstructions
First joint CRM-VHIR workshop on mathematical modelling and Biomedicine: Enabling collaboration between mathematics and biology, Barcelona, Spain, April 27, 2011

Uncovering the hidden geometry behind complex networks: The SI model
Encuentro IBERSINC: Red de Dinámica y Sincronización en Redes
Barcelona, Spain, March 18, 2011

Self-similarity of complex networks and hidden metric spaces
TERA-NET: Towards Evolutive Routing Algorithms for scale-free internet-like NETWORKS
Bordeaux, France, July 5, 2010

Rich clubs in weighted networks
Summer Solstice 2009 International Conference on Discrete Models of Complex Systems.
Gdansk, Poland, June 22-24, 2009

Self-similarity of complex networks and hidden metric spaces
Sigma Phi International Conference in Statistical Physics
Kolympari-Creta, Greece, 14-18 Julio, 2008

Structural efficiency of percolation landscapes in flow networks
Workshop on Theoretical Aspects and Models of Large, Complex and Open Information Networks, ISI Foundation,, Torino, Italy, Nov 19-21, 2007

Percolation properties of complex networks with weak and strong clustering
March Meeting of the American Physical Society (MAR07), Denver, USA, March 5-9, 2007

Tuning Clustering in Random Networks
EXYSTENCE Thematic Institute, Interfacing Networks: from behavioral networks to info structures and infrastructures, ISI Foundation, Torino, Italy, Jan 21 - Feb 9, 2006

Contributed Talks

Essential Plasticity and Redundancy of Metabolism Unveiled by Synthetic Lethality Analysis
International Conference on Systems Biology ICSB 2016, Barcelona, Spain, September 16-20, 2016

Escaping the avalanche collapse in self-similar multiplexes
NetSci2015 International School and Conference on Network Science, Zaragoza, Spain, June 1-5, 2015

Mapping complexity: embedding networks in hidden metric spaces

European Conference on Complex Systems ECCS14, Lucca, Italy, September 22-26, 2014

Uncovering the hidden geometry behind metabolic networks

Engineering of Chemical Complexity International Conference, Berlin, Germany, July 4-8, 2011

Uncovering the hidden geometry behind metabolic networks

Conference: The XII International Congress on Molecular Systems Biology
Lleida, Spain, May 9-12, 2011

Network-based reaction scores for metabolic reconstructions

Conference: Systems Biology: Bridging the Gaps between Disciplines, 6th Meeting of the
Spanish Systems Biology Network (REBS 2010), Barcelona, Spain, Dec 9-10, 2010

Rich clubs in weighted networks

NetSci International Workshop and Conference on Complex Networks and their Applications
Venice, Italy Jun 29 Jul 3, 2009

A generative model of text documents capturing bursts and similarity

Extreme Events: Theory, Observations, Modeling, and Prediction, Trends in Complex Systems
IFISC - MPIPES, Palma de Mallorca, Spain, Nov 10-14, 2008

Structural efficiency of percolation landscapes in flow networks

Dynamics and evolution of biological and social networks, IFISC (CSIC-UIB)
Palma de Mallorca, Spain, Feb 18-20, 2008

Dominant interactions and diffusion experiments in weighted networks. The case of the WTW

Complex Networks: from Biology to Information Technology, StatPhys 23 Satellite
Pula, Italy, Jul 2-6, 2007

Correlations in Weighted Networks

New Directions in Complex Systems NDCOS, Istanbul, Turkey, Sept 3-9, 2006

Tuning Clustering in Random Networks

Dynamics on Complex Networks and Applications, Max Planck Institute for the Physics of
Complex Systems, Dresden, Germany, Feb 27 - Mar 3, 2006

Modeling the Internet

Sigma Phi International Conference in Statistical Physics
Kolimbari, Crete, Greece, Aug 13-18, 2005

The Resonator Problem in a Spherical GW Antenna

Spanish Relativity Meeting ERE95, Instituto de Astrofísica de Canarias
La Laguna, Tenerife, Spain, Sept 4-7, 1995

Posters

Mapping Metabolic Networks to Hidden Metric Spaces

12th CRG Symposium, Biological Control Networks, Barcelona, Spain, October 30-31, 2013

Network-based scoring system for genome-scale metabolic reconstructions

XIV Congreso de Física Estadística FisEs'11, Barcelona, Spain, Jun 2-4, 2011

*The Large Scale Structure of Biological Networks Revisited: Changing Focus in Bow Ties from
Nodes to Edges*

5th Meeting of the Spanish Network of Systems Biology (REBS)
Madrid, Spain, Dec 13-15, 2009

Generalized Percolation in Random Directed Networks
FisEs'06 XIV Congreso de Física Estadística, Universidad de Granada
Granada, Spain, Sept 14-16, 2006

Generalized percolation in random directed networks
Conference on Complex Networks: Evolution and Statistical Properties COSIN2005
Salou, Spain, Mar 14-18, 2005

Impact and Media

My works have been featured in different scientific books, among those (selected):

The Butterfly Defect: How Globalization Creates Systemic Risks, and What to Do about It
Ian Goldin, Mike Mariathasan (Princeton University Press, 2014)

Sociophysics: An Introduction
Parongama Sen, Bikas K. Chakrabarti (Oxford University Press, 2013)

Decoding Complexity: Uncovering Patterns in Economic Networks
James Glattfelder (Springer, 2012)

Handbook of Optimization in Complex Networks: Theory and Applications
My T. Thai, Panos Pardalos (Springer, 2012)

Statistical and Machine Learning Approaches for Network Analysis
Matthias Dehmer, Subhash C. Basak (John Wiley & Sons, 2012)

The Structure of Complex Networks: Theory and Applications
Ernesto Estrada (Oxford University Press, 2011)

Decision Making: A Psychophysics Application of Network Science
Paolo Grigolini, Bruce J. West (World Scientific, 2011)

Mathematics of Complexity and Dynamical Systems
Robert A. Meyers (Springer, 2011)

Econophysics: An Introduction
Sitabhra Sinha, Arnab Chatterjee, Anirban Chakraborti, Bikas K. Chakrabarti (John Wiley & Sons, 2010)

Globalisation and Emerging Economies: Brazil, Russia, India, Indonesia, China and South Africa
OECD (OECD Publishing, 2009)

and also in popular science books

Redes Complejas
R. Solé (Tusquets Editores, Barcelona, 2009)

The paper *A. Allard, M. Á. Serrano, G. García-Pérez, M. Boguñá, The hidden geometry of weighted complex networks, Nature Communications 8, 14103 (2017)*

FEATURED IN: Research Highlights, Nature Physics 13, 109 (2017)
Hidden influence

The paper *G. García-Pérez, M. Boguñá, A. Allard, M. Á. Serrano, The hidden hyperbolic geometry of international trade: World Trade Atlas 1870-2013, Scientific Reports 6, 33441 (2016)*

FEATURED IN: *Revista Española de Física*, vol 30 n° 4, 2016
Geometría oculta en las relaciones comerciales

The paper *G. García-Pérez, M. Boguñá, M. Á. Serrano, Regulation of burstiness by network-driven activation, Scientific Reports 5, 9714 (2015)*

FEATURED IN: *Revista Española de Física*, vol 29 n° 3, 2015
Explosiones de actividad en redes complejas

The paper *O. Güell, F. A. Massucci, F. Font-Clos, F. Sagués, M. Á. Serrano, Mapping High-growth Phenotypes in the Flux Space of Microbial Metabolism, J. R. Soc. Interface 12, 20150543 (2015)*

FEATURED IN: *Atlas of Science*, November 26, 2015
[What is really driving our need for food, besides the pleasure of taste?](#)

The paper *G. García-Pérez, M. A. Serrano and M. Boguñá, Complex architecture of primes and natural numbers, Physical Review E 90, 022806 (2014)*

FEATURED IN: *NewScientist* March 2014
[Prime number enigma could be solved by simple networks](#)

The paper *F. Papadopoulos, M. Kitsak, M. A. Serrano, M. Boguñá and D. Krioukov, Popularity versus similarity in growing networks, Nature 489, 537-540 (2012)*

FEATURED IN: *Nature News&Views, Nature 489 (2012)*

FEATURED IN: *Research Highlights, Nature Physics 8 (2012)*

The paper *V. Colizza, A. Flammini, M. A. Serrano, A. Vespignani, Detecting rich-club ordering in complex networks, Nature Physics 2, 110-115 (2006)*

FEATURED IN: *News&Views Nature Physics 2 (2006)*

FEATURED IN: *Research Highlights, Nature Physics 439 (2006)*

The following papers has been selected for the *Virtual Journal of Biological Physics Research*

*Correlations in weighted networks, PRE 74 055101(R) (2006);
VJBIO, Statistical and Nonlinear Physics section, 12 (5) (2006)*

*Clustering in complex networks. I. General formalism, PRE 74, 056114(2006);
VJBIO, Statistical and Nonlinear Physics section, 12 (11) (2006)*

*Percolation and Epidemic Thresholds in Clustered Networks, PRL 97 088701 (2006);
VJBIO, Statistical and Nonlinear Physics section, 12 (5) (2006)*

*Tuning clustering in random networks with arbitrary degree distributions, PRE 72, 036133 (2005);
VJBIO, Statistical and Nonlinear Physics section, 10 (7) (2005).*

The paper *Topology of the World Trade Web*, PRE 68, 015101 (2003) by M. A. Serrano and M. Boguñá

REPRINTED IN: *The Economics of Networks (The International Library of Critical Writings in Economics 221)*, M. Cason and M. Della Giusta (Edward Elgar Publishing, 2008), ISBN 978-1847203656

HIGHLIGHTED IN: APS Physics tip sheets 36, 30 July 2003.

SELECTED: Paper of the month Econophysics Forum, February 2003.

The paper *Decoding the structure of the WWW: a comparative analysis of Web crawls on ACM Transactions on the Web 1, 10 (2007)* by Serrano et al. featured in

TRN (Technology Research News) November 2005

[Search engines share the wealth](#)

My nomination as Outstanding Referee of the American Physical Society featured in

el Periódico, March 16, 2009

[La ciencia fortalece el proceso para filtrar la mala investigación](#)

[La ciència enforteix el procés per filtrar la mala recerca](#)

The Conference *BCNetWORKSHOP 2008, Trends and Perspectives in Complex Networks* featured in

el Periódico, December 22, 2008

[La teoría de los 'seis grados' se abre un hueco en la ciencia](#)

[La teoria dels 'sis graus' es fa un lloc en la ciència](#)

Supervision and Teaching

PhD Thesis

A network-based approach to cell metabolism: from structure to flux balances,
Dr. Oriol Güell Riera, Universitat de Barcelona, February 2015. Grade: Excellent *Cum Laude*

Complex networks and hidden metric spaces,
Ph. D. Candidate: Guillermo García Pérez, Universitat de Barcelona. Expected date of completion: end 2017

Master Thesis

Navigability of time-varying networks embedded in hidden metric spaces,
Elisenda Ortiz Castillo, Master on Advanced Physics 2014-2015, Universitat de Barcelona, January 2016

Bistability and oscillations in repressilator interconnected networks,
Héctor Albalad Alcalá, Master on Advanced Physics 2014-2015, Universitat de Barcelona, June 2015

The complex architecture of primes and natural numbers,
Guillermo García Pérez, Master on Advanced Physics 2014-2015, Universitat de Barcelona,
January 2015

Global epidemic spreading processes in coupled networks,
Anna Saumell Mendiola, Master on Computational and Applied Physics 2011-2012, UB-UPC
Universitat de Barcelona, September 2011

Bachelor's Degree Final Projects and other

Threshold models and latency states in complex networks,
Aitor Marín Buznego, Universitat de Barcelona, June 2017, currently under supervision

Hierarchies in complex networks embedded in hidden metric spaces,
Robert Cañellas, June 2017, currently under supervision

Analyzing the backbones of fossil fuels international trade networks,
Maurici Victory Molné, Universitat de Barcelona, September 2015

A complex networks approach to the statistics of prime numbers,
Guillermo García Pérez, Universitat de Barcelona, June 2013. Extraordinary Award

Modelos dinámicos en redes complejas, CSIC JAE-Intro Collaboration Fellowship
Pablo Gonzalez de Prado Salas, IFISC, Instituto de Física Interdisciplinar y Sistemas
Complejos, 2008

Regular Courses Universitat de Barcelona

- | | |
|------------------|---|
| 2016-2017 | – Biologia de Sistemes Computacional; Màster en Modelització Computacional Atomística i Multiescala en Física, Química i Bioquímica; 10h
– Complex Systems; Màster en Física Avançada; 20h |
| 2015-2016 | – Biologia de Sistemes Computacional; Màster en Modelització Computacional Atomística i Multiescala en Física, Química i Bioquímica; 10h
– Complex Systems; Màster en Física Avançada; 20h
– Física, 1er semestre; Grau de Ciències Biomèdiques; 30h |
| 2014-2015 | – Complex Systems; Màster en Física Avançada; 20h
– Física, 1er semestre; Grau de Ciències Biomèdiques; 60h
– Projecte final de grau; Grau de Física; 8h |
| 2013-2014 | – Complex Systems; Màster en Física Avançada; 20h
– Física, 1er semestre; Grau de Ciències Biomèdiques; 60h
– Pràctiques Curriculars Externes; Grau de Física; 8h |
| 2012-2013 | – Física, 1er semestre; Grau de Ciències Biomèdiques; 60h
– Càlcul d'una variable, 1er semestre; Grau d'Enginyeria Electrònica de Telecomunicació i Enginyeria Biomèdica; 15h
– Projecte final de grau; Grau de Física; 8h |
| 2011-2012 | – Càlcul de varies variables, 2n semestre; Grau d'Enginyeria Electrònica de Telecomunicació i Enginyeria Biomèdica; 8h
– Informàtica Aplicada, 1er semestre; Grau d'Enginyeria Química; 30h
– Bioenergètica i Transport, 3er semestre; Grau de Bioquímica; 9h |

- 2010-2011** – Informàtica Aplicada, 1er semestre; Grau d'Enginyeria Química ; 30h
– Recursos Informàtics, 2n semestre; Grau de Química; 33,5h
– Bioenergètica i Transport, 3er semestre; Grau de Bioquímica; 18h
- 2009-2010** – Recursos Informàtics, 2n semestre; Grau de Química; 36h
– Bioenergètica i Transport, 3er semestre; Grau de Bioquímica; 6h

Invited Lectures

Joint CRM-Imperial College School in Complex Systems,
Centre Recerca Matemàtica CRM, 8-13 April, 2013.

Introduction to complex system, postgraduate course,
School of Informatics, Indiana University, fall 2006.

Gestió de carteres, M.D. in Mathematical Finance,
Centre de Recerca Matemàtica UAB-IEC, 2003-2004.

Other relevant information

Maternity leaves

From February 17th 2013 to June 8th 2013

From September 17th 2009 to December 12th 2009