

CURRICULUM VITAE

GUIDO CALDARELLI, MPhil, PhD



Name: Guido Caldarelli
Position: Full Professor in Theoretical Physics, IMT Lucca
Birth: Lucca, April 8th 1967, Italian citizen
Personal Status: married, two children
Work address: Piazza S. Francesco 19, 55100 Lucca, Italy
Tel: +39-0583 4326-586, fax +39-0583 4326-545
E-mail: Guido.Caldarelli@imtlucca.it
WWW page: <http://www.guido.caldarelli.com>
Scholar profile: <http://scholar.google.com/citations?user=R2j03XAAAAJ&hl=it&oi=ao>

EDUCATION

24/10/1996 PHD PHYSICS, CONDENSED MATTER, final rank *laude at* SISSA/ISAS, Trieste (Italy)
14/10/1994 MPhil PHYSICS, final rank *30/30 cum laude at* SISSA/ISAS, Trieste (Italy)
16/07/1992 DEGREE IN PHYSICS final rank *110/110 cum laude at* Univ. "Sapienza", Rome (Italy)

POSITIONS

2014-now Full Professor Theoretical Physics (I fascia 02/B2 Fisica Teor. Materia)
2013-2014 Associate Professor Theoretical Physics (II fascia 02/B2 Fisica Teorica)
2012-2013 Fixed Term Professor in Theoretical Physics IMT Lucca (Italy)
2010 Academic Guest in the ETH Zurich (Switzerland)
2009- now Fellow of LIMS (London Institute of Mathematical Science) London (UK)
2008- now Chief Scientist Centro Ricerche LINKALAB in Cagliari (Italy)
2007 Visiting at University of Barcelona (Spain)
2005-2006 Visiting at École Normale Supérieure, Paris (France)
2004- 2011 Primo Ricercatore in CNR-INFN, and after in ISC-CNR Rome, (Italy)
2003- 2007 Member of "Centro Studi e Ricerche e Museo della Fisica Enrico Fermi" Rome (Italy)
1998- 2004 Assistant Prof INFN in Dep. Physics University "Sapienza" Rome (Italy)
1997-1998 Postdoc in TCM Group Cavendish Laboratory, University of Cambridge (UK)
1996-1997 Postdoc in the Department of Theoretical Physics, University of Manchester (UK)

GRANTS (~3.000.000 €)

2018-2019 Coordinator EU tender SMART 2017 / 0090 C. NOTICE 2017/S 142-291425
2017-2019 Bandi Regione Toscana POR/FSE
2016-2017 Coordinator Progetti Italia Israele "NECST"
2015-2018 Participant (STREP) FET "ShakerMaker" (687941)
2015-2018 Participant (STREP) FET "CoeGSS" (676547)
2015-2017 Participant (STREP) FET "SoBigData" (654024)
2015-2018 Participant EU FET Project "DOLPHINS"
2013-2016 Participant EU FET Project "SIMPOL"
2012-2016 Coordinator EU FET IP "MULTIPLEX" (www.multiplexproject.eu) (317532)
2011-2014 Coordinator project "Optimisation of Electric Grids" financed by ENEL
2011-2014 Participant (LIMS) in EU FET Project "PLEASED"(296582)
2010-2014 Participant (LIMS) in DTRA project on "Designing Network capable of Self-Healing"
2010-2014 Coordinator EU FET project "FOC" (<http://www.focproject.net>) (255987)
2004-2008 Participant EU Integrated Project (IP) "DELIS" (<http://delis.upb.de>) (001907)
2002-2005 Coordinator of the EU FET project "COSIN" (<http://www.cosinproject.org>) (33555)
2002-2004 Coordinator of a INFN "PAIS" project: "Statistical properties of Mars surface"
2001-2004 Partner in the EU FET Network of Excellence "EXYSTENCE"

ORGANIZATION

- **President of Complex Systems Society 2018-2020**
- **Scientific Committee for training of Italian Police Force 2016-now**
- **Board (Consiglio Direttivo) of IMT Alti Studi Lucca, 2015-now**
- **Board and Founder of Netsci Society (2007-now)**
- **Co-founder of Catchy s.r.l. (www.catchy.biz)**
- **Chairman of European Conference on Complex Systems (ECCS) 2014, Lucca Sept 22th-26th**
- **Chairman of conference "NETSCI09", Venice, June 28th - July 3rd 2009 (<http://www.netsci09.net>)**
- **Chairman of Statphys23 satellite on "COMPLEX NETWORKS", Pula (CA, Italy), July 2nd -6th 2007 (<http://www.complexnetworks.net>)**
- **Chairman of 5th School of Complexity "BIOLOGICAL NETWORKS", Erice (TP, Italy), October 9th -11th 2006 (<http://www.ccsem.infn.it/ef/emfsc2006/pdf/Caldarelli.pdf>)**
- **Organizer StatPhys21 satellite on "Fractal Phenomena & SOC", l'Habana, Cuba July 23rd-27th 2001**

PRIZES

- **Honorary Fellow of Network Science Society 2019**

TEACHING

- **Currently teaching PhD courses on Complex Networks Theory, Python Programming, Stochastic Processes (2011-now), IMT Lucca.**
- **PhD course on "Networks and Self-similar phenomena", in Department of Physics, Università "Sapienza" Rome, Italy (2004-2010).**
- **Lecturer course in Network Theory ETHZ Zurich 2010.**
- **Lecturer at undergraduate course in "Physics of Complex Systems" University "Sapienza" (2007-2011).**
- **Supervisor of PhD and undergraduate students (about 10) for their degree.**

PRESS RELEASE

- **Se vuoi capire il mondo devi pensare in rete *La Stampa* 13/01/2013**
- **Matematica della Rete, *Il sole24ore* 10/07/2010**
- **Il lato fisico del Web *Il sole24ore* 25/03/2010**
- **Prediction: a game of chance *Nature* 419, 787, 24/10/2002**
- **The Physics of the Trading Floor, *Nature*, 415, 3/1/2002**
- **Fire Spread Looks Fractal, *Nature News and Views*, 13/08/2001**
- **Kalkuliertes Eheglück, *Die Zeit*, 52, 2000**
- **What's love got to do with it? *New Scientist*, 2262, 38 2000**
- **Speculative Trading: Physicists' Forays into Finance, *Europhysics News*, 29, 4 1998**
- **In the Money, *New Scientist* 2111, 21, 6/12/1997**
- **Boom to Bust, *New Scientist* 2104, 12, 18/10/1997**

CITATIONS: 12902 GOOGLE SCHOLAR / 5429 WOS

- 1117 *Scale-free Networks* (2007) (Google Scholar)
- 413 *Physical Review Letters* 89 2673 (2002)
- 226 *Physical Review E* 68 046130 (2003)
- 210 *European Physical J. B* 38 363-371 (2004)
- 210 *J. of Econ. Dyn & Control* 32 259-278(2008)
- 206 *Physica A* 352 669-676 (2005)
- 189 *Nature* 423 165 (2003)
- 186 *Scientific Reports* 2 541 (2012)
- 162 *PNAS* 113, 554-559 (2016)
- 147 *J. of Theor. Biology* 193 345-358 (1998)
- 124 *Europhysics Letters* 52 386 (2000)
- 115 *Physical Review E* 74 036116 (2006)
- 109 *Europhysics Letters* 40 479 (1997)

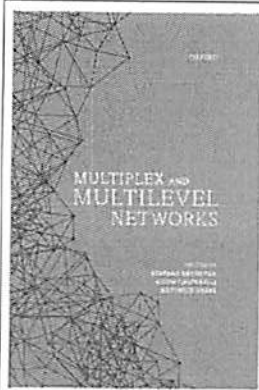
h-index (wos) = 37

h-index (Google Scholar) = 56

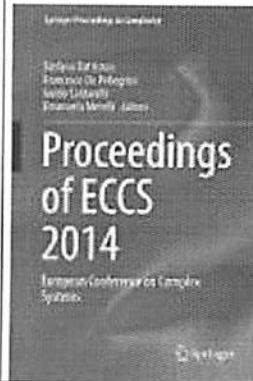
INVITED TALKS

- *Pathways to Complexity (Complenet 2017)*
- *Financial Networks Complex Networks Milan 2016*
- *Stability In Financial Networks (CSS'15 Tempe 2015)*
- *Financial Networks (Netsci15 Zaragoza 2015)*
- *Multiplex Networks* (Invited Session APS March Meeting 2014)
- *Fragility of Financial Systems* (Global System Science Conference, Brussels 10/06/13)
- *DebtRank, centrality in Complex Networks* (Invited speaker NetONet, Netsci12, Evanston, 19/05/12)
- *Random Hypergraphs and their application* (Invited speaker DPG Regensburg 26/03/2010)
- *Population Dynamics on Complex Food Webs* (ECCS 2010, Lisboa, 2 best paper)
- *Complex Hypergraphs* (Invited Speaker Netsci 10, Boston 12/05/10)
- *Lecturer of NETSCI School* (NETSCI 08, Norwich 23/6/07)
- *Lecturer of NETSCI School* (NETSCI 07, New York City 13/7/07)
- *Self-organized network evolution coupled to extremal dynamics* (STATPHYS 23, Genova 13/7/07)
- *Networks in Finance* (APFA5, Turin 24/06/06).
- *Statistical Properties of Wikipedia* (MPI Dresden 22/02/06).
- *River networks* (Application of Fractals, celebration of B. Mandelbrot 80th birthday, Trieste 18/11/2004)
- *Statistical properties of shareholding networks* (3rd NIKKEI Conference, Tokyo 11/11/2004)
- *Growing Network in Social Systems* (Statistical Physics National Conference, Parma 22/06/04).
- *Statistical properties of taxonomy trees* (Workshop on Scaling in Ecology, Santa Fé 19/02/04).
- *Models for Growing Networks* (School on Protein Interaction Networks, Bologna 10/02/04).
- *Statistical Physics of Growing Networks* (Geneve 19/11/03)
- *Statistical Properties of Financial Networks*
(Invited session, 23rd annual International conference CNLS, Los Alamos 14/05/03).
- *Energy flow in Food Webs* (Invited Session, March meeting APS Austin, 05/03/03)
- *Introduction to Complex Networks* (VII Conference on Computational Physics, Granada 10/09/02).
- *Network Properties in Food Webs* (XVIII SITGES Conference "Statistical Mechanics of Complex Networks, Sitges 14/06/02).
- *Graph Theory of Growing Networks* (Seminaires de Physique Statistique, EPFL Lausanne 18/03/2002)
- *A model for Growing Networks* (Satellite to StatPhys 21, l'Habana 24/07/01).
- *The Fractal Structure of Internet* (London School of Economics, London 13/10/00).
- *The Fractal Structure of Internet* (Workshop on Computational Physics, Granada 07/09/00).
- *The CAPM model, a numerical study on Portfolio choices* (Workshop on Finance, ICTP Trieste 02/09/00).
- *A numerical study on Portfolio choices* (Computing in Economics and Finance, Barcelona 08/07/00).
- *The fractal Structure of Internet* (Statistical Physics National Conference, Parma 21/06/00).
- *Self similar properties of brittle fractures* (Workshop on SOC, ICTP Trieste 03/03/00).
- *Segregation and Minimisation in Granular Media.* (INFM Workshop on Granular Media, Pisa 24/10/98).
- *Statistical mechanics of river networks* (Statistical Physics National Conference, Parma 24/06/96).
- *SOC model for river networks* (workshop on Disordered Systems, Villa Gualino, 22/10/95).
- *Fixed scale transformation for fractures* (Statistical Mechanics Conference, Trieste 15/03/95).

BOOKS



(EDS) S. BATTISTON,
G. CALDARELLI, A. GARAS
Multiplex and Multilevel
Networks
*Oxford University Press,
Oxford (2019)*



(EDS) S. BATTISTON, F.
DE PELLEGRINI G.
CALDARELLI, E. MERELLI
Proceedings of ECCS 2014
Springer (2016)

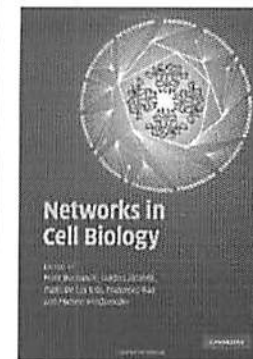


G. CALDARELLI, A. CHESSE
Data Science & Complex
Networks
*Oxford University Press,
Oxford (2016)*

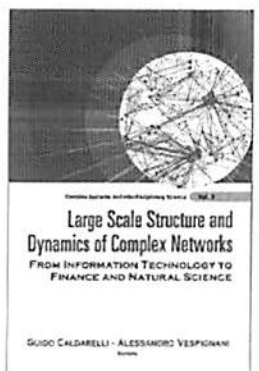


G. CALDARELLI,
M. CATANZARO
A Very Short Introduction to
Networks
*Oxford University Press,
Oxford (2012)*

G. CALDARELLI (Ed)
Encyclopedia of Life issue 6.200
"Complex Networks" *EOLSS, UNESCO (2010)*
<http://www.eolss.net>



(EDS) M. BUCHANAN,
G. CALDARELLI, P. DE LOS
RIOS, F. RAO, M. VENDRUSCOLO
Networks in Cell Biology
*Cambridge University
Press, Cambridge (2010)*



G. CALDARELLI, A.
VESPIGNANI (EDS)
Large Scale Structure and
Dynamics of Complex
Networks
*World Scientific, Singapore
(2007)*



G. CALDARELLI,
Scale-free Networks
*Oxford University Press,
Oxford (2007)*

PUBLICATIONS (<http://www.guidocaldarelli.com/index.php/publications>)

1. Detecting core-periphery structures by surprise J. van Lidth de Jeude, G. Caldarelli, T. Squartini *arXiv:1810.04717 submitted to EPL*
2. Thermodynamics of the Minimum Description Length on Community Detection J.I. Perotti, J.C. Tessone, A.C. Clauset, G. Caldarelli, *arXiv:1806.07005 submitted to Physical Review X*
3. Information load dynamically modulates functional brain connectivity during narrative listening L. Cecchetti, R. Mastandrea, G. Lettieri, G. Handjaras, A. Leo, P. Papale, T. Gili, N. Martini, D. Della Latta, D. Chiappino, G. Caldarelli, P. Pietrini, E. Ricciardi *Human Brain Mapping (submitted)*
4. Entropy-based approach to missing-links prediction F. Parisi, G. Caldarelli, T. Squartini *arXiv:1802.02064*
5. The Network of U.S. Mutual Fund Investments: Diversification, Similarity and Fragility throughout the Global Financial Crisis D. Delpini, S. Battiston, G. Caldarelli, M. Riccaboni *arXiv:1801.02205 Submitted to PLOS One*
6. Statistical Validation of financial time series via visibility graphs M. Serafino, A. Gabrielli, G. Caldarelli, G. Cimini, *arXiv:1710.10980 Submitted to PRE*
7. Network valuation in Financial Systems P. Barucca, M. Bardoscia, M. D'Errico, G. Visentin, S. Battiston, G. Caldarelli *SSRN:2795583 Submitted to Mathematical Finance*
8. Fragility and anomalous susceptibility of weakly interacting networks G. Rapisardi, A. Arenas, G. Caldarelli, G. Cimini *Physical Review E* 99, 030301(R) (2019)
9. The Grand-canonical ensemble of weighted networks A. Gabrielli, R. Mastrandrea, G. Caldarelli, G. Cimini *Physical Review E* 99, 042302 (2019)
10. The Multilayer Structure of Corporate Networks J. van Lidth de Jeude, T. Aste, G. Caldarelli *New Journal of Physics*, 21 025002 (2019).
11. Entropy-based randomisation of rating networks C. Becatti, G. Caldarelli, F. Saracco *Physical Review E* 99 022306 (2019).
12. Reconstructing Mesoscale Network Structure J. van Lidth de Jeude, R. Di Clemente, G. Caldarelli, F. Saracco, T. Squartini *Complexity* 5120581 (2019).
13. Changes to Gate Closure and its impact on wholesale electricity prices: the case of the UK A. Facchini, A. Rubino, G. Caldarelli G. Di Liddo, *Energy Policy* 125, 110-121 (2019).
14. Numerical assessment of the Percolation threshold using complement networks G. Rapisardi, G. Caldarelli, G. Cimini *Studies in Computational Intelligence*, 812, 820-827 (2019).
15. Bond and Site Color-avoiding Percolation in Scale-Free Networks A. Kadović, S. M. Krause, G. Caldarelli, V. Zlatić *PRE* 98 062308 (2018)
16. Optimal positioning of storage systems in microgrids based on complex networks centrality measures S. Korjani, A. Facchini, M. Mureddu, G. Caldarelli A. Damiano *Scientific Reports* 8 16658 (2018).
17. The Statistical Physics of Real-World Networks G. Cimini, T. Squartini, F. Saracco, D. Garlaschelli, A. Gabrielli, G. Caldarelli *Nature Physics Review* 1 52-70 (2019).
18. Structural changes in the interbank market across the financial crisis from multiple core-periphery analysis S. Kojaku, G. Cimini, G. Caldarelli, N. Masuda *J. Network Theory in Finance* 4, 33-51 (2018).
19. Blockchain Inefficiency in the Bitcoin Peers Network G. Pappalardo, T. Di Matteo, G. Caldarelli, T. Aste *EPJ Data Science* 7 30 (2018).
20. Physics of Humans, Physics for Society G. Caldarelli, S. Wolf, Y. Moreno *Nature Physics* 14 870 (2018).

21. Tackling information asymmetry in networks P. Barucca, G. Caldarelli, T. Squartini *J.Stat Phys* <https://doi.org/10.1007/s10955-018-2076-z> (2018).
22. Entropy-based approach to missing-links prediction F. Parisi, G. Caldarelli, T. Squartini *Applied Network Science* 3:17 (2018).
23. Reconstruction methods for networks: the case of economic and financial systems T. Squartini, G. Caldarelli, G. Cimini, A. Gabrielli, D. Garlaschelli *Physics Reports* [10.1016/j.physrep.2018.06.008](https://doi.org/10.1016/j.physrep.2018.06.008) (2018).
24. Multiple structural transitions in interacting networks G. Rapisardi, A. Arenas, G. Caldarelli, G. Cimini *Physical Review E* 98 012302 (2018).
25. River Landscapes and Optimal Channel Networks P. Balister, J. Balogh, E. Bertuzzo, B. Bollobás, G. Caldarelli, A. Maritan, R. Mastrandrea, R. Morris, and A. Rinaldo *PNAS* 115 6548-6553 (2018).
26. Critical field-exponents for secure message-passing in modular networks L.M. Shekthman, M.M Danziger, I. Bonamassa, S. Buldyrev, G. Caldarelli, V. Zlatic, S. Havlin *New J. of Physics* 20 053001 (2018).
27. From ecology to finance (and back?): recent advancements in the analysis of bipartite networks M. Straka, G. Caldarelli, T. Squartini, F. Saracco, *J.Stat Phys* <https://doi.org/10.1007/s10955-018-2039-4> (2018).
28. Case study of Lykke exchange: architecture and outlook R. Olsen, S. Battiston, G. Caldarelli, A. Golub, M. Nikulin, S. Ivliev, *Journal of Risk Finance* 19, 26-38 (2018).
29. A Complex Network approach for the estimation of the Energy, M. Mureddu, A. Facchini, A. Scala, G. Caldarelli, A. Damiano *Scientific Reports* 8 268 (2018).
30. Bayesian Networks Analysis of Malocclusion Data M. Scutari, P. Auconi, G. Caldarelli, L. Franchi *Scientific Reports* 7, 15236 (2017).
31. Enhanced capital-asset pricing model for the reconstruction of bipartite financial networks T. Squartini, A. Almog, G. Caldarelli, I. van Lelyveld, D. Garlaschelli, G. Cimini *Physical Review E*, 96 032315 (2017).
32. The Network of plants volatile organic compounds G. Vivaldo, E. Masi, C. Taiti, G. Caldarelli, S. Mancuso *Scientific Reports* 7 11050 (2017).
33. Grand canonical validation of the bipartite International Trade Network M. J. Straka, G. Caldarelli, F. Saracco, *Physical Review E*, 96 022306 (2017).
34. Debunking in a World of Tribes F. Zollo, A. Bessi, M. Del Vicario, A. Scala, G. Caldarelli, L. Shekthman, S. Havlin, W. Quattrociocchi *Plos One* 12 e0181821 (2017).
35. Organization and hierarchy of the human functional brain network lead to a chain-like core R. Mastrandrea, A. Gabrielli, F. Piras, G. Spalletta, G. Caldarelli, T. Gili *Scientific Reports* 7 4888 (2017).
36. Inferring monopartite projections of bipartite networks: an entropy-based approach, by F. Saracco, M. Straka, R. Di Clemente, A. Gabrielli, G. Caldarelli, T. Squartini, *New Journal of Physics* 19 053022 (2017).
37. Anatomy of news consumption on Facebook, A.L. Schmidt, F. Zollo, M. Del Vicario, A. Bessi, A. Scala, G. Caldarelli, H.E. Stanley, and W. Quattrociocchi, *PNAS* 114, 3035-3039 (2017).
38. The anatomy of the Brexit debate on Facebook, M. Del Vicario, F. Zollo, G. Caldarelli, A. Scala, W. Quattrociocchi *Social Networks* 50, 6-16 (2017).
39. How the Interbank market becomes systematically dangerous, M. Serri, G. Caldarelli, G. Cimini, *Journal of Network Theory in Finance* [Doi 10.21314/JNTF.2017.025](https://doi.org/10.21314/JNTF.2017.025) (2017).

40. Understanding interactions among cephalometrics variables during growth in untreated Class III subjects, P. Auconi, M. Scazzocchio, G. Caldarelli, M. Nieri, J.A. Mc Namara, L. Franchi *European Journal of Orthodontics* <https://doi.org/10.1093/ejo/cjw084> (2017).
41. Pathways towards instability in Financial Networks M. Bardoscia, S. Battiston, F. Caccioli, G. Caldarelli, *Nature Communications* 8 14416 (2017).
42. Modeling Confirmation bias and polarisation M. Del Vicario, A. Scala, G. Caldarelli, H.E. Stanley W. Quattrociocchi *Scientific Reports* 7 40391 (2017).
43. Echo chambers: emotional contagion and Group polarisation on Facebook M. Del Vicario, G. Vivaldo, A. Bessi, F. Zollo, A. Scala, G. Caldarelli, W. Quattrociocchi *Scientific Reports* 6, 37825 (2016).
44. Mitigating Cascades in Sandpile Models: an immunisation strategy for systemic risk? A. Scala, V. Zlatić G. Caldarelli, G. D'Agostino, *Eur. Phys. J. Spec. Top.* 225, 2017 (2016).
45. Islanding the power grid on the transmission level: less connections for more security M. Mureddu, G. Caldarelli, A. Damiano, A. Scala, H. Meyer-Ortmanns *Scientific Reports* 6, 34797 (2016).
46. Distress propagation in Complex Networks: the case of non-linear DebtRank, M. Bardoscia, F. Caccioli, J.I. Perotti, G. Vivaldo, G. Caldarelli *Plos One* 11, e0163825 (2016).
47. Users polarisation on Facebook and Youtube A. Bessi, F. Zollo, M. Del Vicario, M. Puliga, A. Scala, G. Caldarelli, B. Uzzi, W. Quattrociocchi, *Plos One*, 11, e0159641 (2016).
48. The Price of Complexity in Financial Networks, S. Battiston, G. Caldarelli, R. May, T. Roukny, J.E. Stiglitz *PNAS* 113 10031-10035 (2016).
49. Leveraging the network: a stress-test framework based on DebtRank, S. Battiston, M. D'Errico, S. Gurciullo, G. Caldarelli, ISSN (Online) 2196-7040, ISSN (Print) 2193-1402, DOI: 10.1515/strm-2015-0005 August 2016
50. Concurrent enhancement of percolation and synchronizaztion in adaptive networks Y-H. Eom, S. Boccaletti, G. Caldarelli, *Scientific Reports* 6 27111 (2016).
51. Network of plants how to measure similarities between plants G. Vivaldo, E. Masi, C. Pandolfi, G. Caldarelli, *Scientific Reports* 6 27077 (2016).
52. Coupling news sentiment with web browsing data predicts intra-day stock prices, G. Ranco, I. Bordino, G. Bormetti, G. Caldarelli, F. Lillo, M. Treccani, *Plos One* 11, e0146576 (2016)
53. The spreading of misinformation online, M. Del Vicario, A. Bessi, F. Zollo, F. Petroni, A. Scala, G. Caldarelli, H.E. Stanley, W. Quattrociocchi *PNAS* 113 554-559 (2016)
54. Cascades in interdependent flow networks A. Scala, P. G. De Sanctis Lucentini, G. Caldarelli, G. D'Agostino *Physica D* 323-324, 35-39 (2016)
55. Hierarchical mutual information for the comparison of hierarchical community structures in complex networks J.I. Perotti, C. J. Tessone, G. Caldarelli *Phys Rev. E* 62, 062825 (2015)
56. Viral misinformation the role of homophily and polarization, A. Bessi, F. Petroni, M. Del Vicario, F. Zollo, A. Anagnostopoulos, A. Scala, G. Caldarelli, W. Quattrociocchi *Proceedings of the 24th conference on the WWW* (2015)
57. Quantifying randomness in complex networks C. Orsini, M. Mitrović Dankulov, A. Jamakovic, P. Mahadevan, P. Colomer-de-Simón, A. Vahdat, K. E. Bassler, Z. Toroczkai, M. Boguñá, G. Caldarelli, S. Fortunato, D. Krioukov *Nature Communications* 6,8627 (2015)
58. Hyperbolicity measures "Democracy" in Real-World Networks, M. Borassi, A. Chessa, G. Caldarelli, *Physical Review E* 92, 032812 (2015)
59. Emotional Dynamics in the age of misinformation, F. Zollo, P.K. Novak. M. Del Vicario, A. Bessi, I. Mozetic, A. Scala, G. Caldarelli, W. Quattrociocchi *Plos One* 10 e0138740 (2015)
60. The Effect of Twitter sentiment on stock prices returns, G. Ranco, D. Aleksovski, G. Caldarelli, M. Gracar, I. Mozetic *Plos One* 10 0138441 (2015).

61. Green power grids: how energy from renewable sources affects network and markets, M. Mureddu, G. Caldarelli, A. Chessa, A. Scala, A. Damiano *Plos One* 10 0135312 (2015)
62. Trends of Narrative in the Age of misinformation, A. Bessi, F. Zollo, M. Del Vicario, A. Scala, G. Caldarelli, W. Quattrociocchi, *Plos One* 10, e0134641 (2015)
63. Twitter-based analysis of the dynamics of collective attention to political parties, Y-H. Eom, M. Puliga, J. Smailović, I. Mozetič, G. Caldarelli, *Plos One* 10, e0131184 (2015)
64. DebtRank: A microscopic foundation for Shock propagation, M. Bardoscia, S. Battiston, F. Caccioli, G. Caldarelli, *Plos One* 10, e0130406/e0134888 (2015)
65. Reconstructing topological properties of complex networks using the fitness model, G. Cimini, T. Squartini, N. Musmeci, M. Puliga, A. Gabrielli, D. Garlaschelli, S. Battiston, G. Caldarelli, *Lecture Notes in Computer Science (Socinfo 2014)* 8852, 323-333 (2015).
66. Science vs Conspiracy: collective narratives in the age of (mis)information, A. Bessi, M. Coletto, G.A. Davidescu, A. Scala, G. Caldarelli, W. Quattrociocchi, *Plos One* 10, e0118093 (2015)
67. Social Determinants of content selection in the age of (mis)information, A. Bessi, G. Caldarelli, M. Del Vicario, A. Scala, W. Quattrociocchi, *Lecture Notes in Computer Science* 8851, 259-268 (2014)
68. An agent based approach for the development of EV fleet Charging Strategies in Smart Cities, M. Mureddu, A. Scala, A. Chessa, G. Caldarelli, M. Musio, A. Damiano, 2014 IEEE International Electric Vehicle Conference, IEVC (2014)
69. Integrating the electric grid and the commuter network through a 'vehicle to grid' concept: A Complex Networks Theory approach, A. Chessa, G. Caldarelli, A. Damiano, A. Scala, 2014 IEEE International Electric Vehicle Conference, IEVC (2014)
70. Complex networks for data-driven medicine: the case of Class III dentoskeletal disharmony A. Scala, P. Auconi, M. Scazzocchio, G. Caldarelli, J.A. McNamara, L. Franchi, *New Journal of Physics* 16, 115017 (2014)
71. Power grids, smart grids and complex Networks A. Scala, G. Caldarelli, A. Chessa, A. Damiano, M. Mureddu, S. Pahwa, C. Scoglio, W. Quattrociocchi *Nonlinear Phenomena in Complex Systems: from nano to macro scale*, NATO Science for Peace and Security Series C-Environmental Security 97-110 (2014)
72. Credit Default Swaps networks and systemic risk, M. Puliga, G. Caldarelli, S. Battiston, *Scientific Reports* 6, 6822 (2014)
73. The Rise of China in the International Trade Network: a community core detection approach, S. Zhou, F. Cerina, A. Chessa, G. Caldarelli, M. Riccaboni, *PLOS One* 9, e105496 (2014)
74. Opinion dynamics on Interacting Networks media competition and social influence, W. Quattrociocchi, G. Caldarelli, A. Scala *Scientific Reports* 4, 4938 (2014)
75. A Multi-level Geographical Study of Italian Political Elections from Twitter Data, G. Caldarelli, A. Chessa, F. Pammolli, G. Pompa, M. Puliga, M. Riccaboni, G. Riotta, *PLOS One* 9, e95809 (2014)
76. Self-Healing Networks: Redundancy and Structure W. Quattrociocchi, G. Caldarelli, A. Scala, *PLOS One* 9, e87986 (2014)
77. Systemic Risk in Financial Networks, S. Battiston, G. Caldarelli, *Journal of Financial Managements Markets and Institutions* 1, 129-154 (2013)
78. Default Cascades in Complex Networks: Topology and Systemic Risk T. Roukny, H. Bersini, H. Pirotte, G. Caldarelli, S. Battiston, *Scientific Reports* 3, 2759 (2013)
79. Optimal scales in Weighted Networks Diego Garlaschelli, Sebastian E. Ahnert, Thomas M. A. Fink, Guido Caldarelli *Lecture Notes in Computer Science* 8238, 346-359 (2013)

80. Measuring the Intangibles a Metrics for the Economics Complexity of Countries and Products M. Cristelli, A. Gabrielli, A. Tacchella, G. Caldarelli, L. Pietronero, *PLOS One* 8, e70726 (2013)
81. Low-Temperature Behaviour of Social and Economic Systems, D. Garlaschelli, S.E. Ahnert, T.M. Fink, G. Caldarelli, *Entropy* 15, 3238-3259 (2013)
82. Economic Complexity: Conceptual grounding of a new metrics for global competitiveness, A. Tacchella, M. Cristelli, G. Caldarelli, A. Gabrielli, L. Pietronero, *Journal of Economic Dynamics and Control* 37, 1683–1691 (2013)
83. Evolution of Controllability in Interbank Networks (& Supp.Info) D. Delpini, S. Battiston, M. Riccaboni, G. Gabbi, F. Pammolli, G. Caldarelli, *Scientific Reports* 3 1626 (2013)
84. Bootstrapping Topological Propertoes and Systemic Risk of Complex Networks Using the Fitness Model N. Musmeci, S. Battiston, G. Caldarelli, M. Puliga, A. Gabrielli *Journal of Statistical Physics* 151, 720-734 (2013).
85. Distributed Generation and Resilience in Power Grids, A. Scala, M. Mureddu, G. Caldarelli, A. Chessa, A. Damiano, *Lecture Notes in Computer Sciences* 7722, 71 (2013)
86. Reconstructing a Credit Network G. Caldarelli, A. Chessa, A. Gabrielli, F. Pammolli, M. Puliga *Nature Physics* 9 125 (2013).
87. Complex Derivatives S. Battiston, G. Caldarelli, C-P Georg, R. May, J. Stiglitz *Nature Physics* 9, 123 (2013).
88. Complex Weighted Networks as Randomly Reinforced Urn Process G. Caldarelli, A. Chessa, I. Crimaldi, F. Pammolli *Physical Review E* 87, 020106(R) (2013).
89. An economic and financial exploratory S. Cincotti, D. Sornette, P. Treleaven, S. Battiston, G. Caldarelli, C. Hommes, and A. Kirman *Eur. Phys. J. Special Topics* 214, 361–400 (2012).
90. A network analysis of countries' export flows: firm grounds for the building blocks of the economy G. Caldarelli, M. Cristelli, A. Gabrielli, L. Pietronero, A. Scala, A. Tacchella *PLOS One* 7, e47278 (2012).
91. A New Metrics for Countries' Fitness and Products' Complexity A. Tacchella, M. Cristelli, G. Caldarelli, A. Gabrielli, L. Pietronero, *Scientific Reports* 2, 723 (2012)
92. Using Networks to Understand Medical Data: The Case of Class III Malocclusions. A. Scala, P. Auconi, M. Scazzocchio, G. Caldarelli, JA McNamara, L. Franchi *PLOS One* 7, e44521 (2012).
93. Competitors' communities and taxonomy of products according to export fluxes M. Cristelli, A. Tacchella, A. Gabrielli, L. Pietronero, A. Scala, G. Caldarelli, *European Physical Journal Special Topics* 212, 115-120 (2012).
94. Progress in the Physics of Complex Networks G. Caldarelli, G. Kanadiakis, A. Scarfone *European Physical Journal B* 212, 1-3 (2012).
95. Viewpoint: The Longevity of Rankings G. Caldarelli *Physics* 5, 105, (2012).
96. DebtRank: Too Central to Fail? Financial Networks, the FED and Systemic Risk S. Battiston, M. Puliga, R. Kaushik, P. Tasca, G. Caldarelli, *Scientific Reports* 2, 541 (2012).
97. Web search queries can predict stock market volumes I. Bordino, S. Battiston, G. Caldarelli, M. Cristelli, A. Ukkonen and I. Weber *PLOS One* 7, e40014 (2012).
98. Robustness and assortativity for Diffusion-like Processes in Scale-Free Networks G. D'Agostino, A. Scala, V. Zlatić, G. Caldarelli, *EPL* 97, 68006 (2012).
99. Networks with arbitrary edges multiplicities V. Zlatić, D. Garlaschelli, G. Caldarelli, *EPL* 97, 28005 (2012).
100. A network approach to orthodontic diagnosis P. Auconi, G. Caldarelli, A. Scala, G. Ierardo, A. Polimeni *Orthodontics and Craniofacial Research* 14, 189-197 (2011).

101. Population Dynamics On Complex Food Webs G. Palamara, V. Zlatić, A. Scala, G. Caldarelli, *Advances in Complex Systems* 14, 635-647 (2011).
102. Topologically biased random walk and community finding in networks, V. Zlatić, A. Gabrielli, G. Caldarelli, *Physical Review E* 82, 066109 (2010).
103. A pagerank-based preferential attachment model for the evolution of the world wide web, P. Giammatteo, D. Donato, V. Zlatić, G. Caldarelli, *EPL* 91, 18004 (2010).
104. A Networked World, M. Buchanan, G. Caldarelli, *Physics World* 23, 22-24 (2010).
105. PageRank equation and localization in the WWW, N. Perra, V. Zlatić, A. Chessa, C. Conti, D. Donato, G. Caldarelli, *EPL* 88, 11111 (2009).
106. Hypergraph Topological quantities for tagged social networks, V. Zlatić, G. Ghoshal, G. Caldarelli, *Physical Review E* 80, 036118 (2009).
107. Random Hypergraphs and their applications, G. Ghoshal, V. Zlatić, G. Caldarelli, M.E.J. Newman, *Physical Review E* 79, 066118 (2009).
108. Invasion percolation on a tree and queuing models, A. Gabrielli, G. Caldarelli, *Physical Review E* 79, 041133 (2009).
109. On the rich-club effect in dense and weighted networks, V. Zlatić, G. Bianconi, A. Diaz-Guilera, D. Garlaschelli, F. Rao, G. Caldarelli, *European Physical Journal B* 67, 271-275 (2009).
110. Invasion percolation and the time scaling behaviour of a queuing model of human dynamics, A. Gabrielli, G. Caldarelli, *JStat* P02046 (2009).
111. A Self-organized model for Network Evolution, G. Caldarelli, A. Capocci, D. Garlaschelli, *European Journal of Physics B* 64, 585-591 (2008).
112. Folksonomy and clustering in the collaborative system CiteUlike, A. Capocci, G. Caldarelli, *Journal of Physics A* 41, 224016 (2008).
113. Quantifying the universal taxonomic diversity in real species assemblage, Caretta Cartozo, D. Garlaschelli, C. Ricotta, M. Barthélémy and G. Caldarelli, *Journal of Physics A* 41, 224012 (2008).
114. Applying Weighted Network measures to microarray distance matrices, S. Ahnert, D. Garlaschelli, T.M.A. Fink and G. Caldarelli, *Journal of Physics A* 41, 224011 (2008).
115. Complex Networks: from Biology to information technology – Preface, Barrat, S. Boccaletti, G. Caldarelli, A. Chessa, V. Latora, *Journal of Physics A* 41, 220301 (2008).
116. Taxonomy and clustering in collaborative systems: the case of the on-line encyclopedia Wikipedia, A. Capocci, F. Rao, G. Caldarelli, *EPL* 81, 28006 (2008).
117. A network analysis of the Italian Overnight Money Market, G. Iori, G. De Masi, O. Precup, G. Gabbi, G. Caldarelli, *Journal of Economic Dynamics and Control* 32, 259-278 (2007).
118. Self-organized network evolution coupled to extremal dynamics, D. Garlaschelli, A. Capocci, G. Caldarelli, *Nature Physics* 3, 813-817 (2007). (supp.info)
119. Uncovering the topology of configuration space networks, D. Gfeller, P. De Los Rios, D. Morton de Lachapelle, G. Caldarelli, F. Rao, *Physical Review E* 76, 026113 (2007).
120. Spectral methods cluster words of the same class in a syntactic dependency network, R. Ferrer i Cancho, A. Capocci, G. Caldarelli, *International Journal of Bifurcation and Chaos* 17, 2453-2463 (2007).
121. Ensemble approach to the Analysis of Weighted Networks, S.E. Ahnert, D. Garlaschelli, T.M. Fink, G. Caldarelli, *Physical Review E* 76, 016101 (2007).
122. Invasion Percolation and Critical Transient in the Barabási Model of Human Dynamics, A. Gabrielli, G. Caldarelli, *Physical Review Letters* 98, 208701 (2007).
123. Interplay between topology and dynamics in the World Trade Web, D. Garlaschelli, T. Di Matteo, T. Aste, G. Caldarelli, M.I. Loffredo, *Eur. Physical Journal B* 57, 159-164 (2007).

124. Trading strategies in the Italian interbank market, G. Iori, R. Renò, G. De Masi, G. Caldarelli, *Physica A* 376, 467-479 (2007).
125. The Italian interbank network: statistical properties and a simple model, G. De Masi, G. Iori, G. Caldarelli, *SPIE Proceedings* 6601, U210-U223 (2007).
126. Fitness model for the Italian interbank money market, G. De Masi, G. Iori, G. Caldarelli, *Physical Review E* 74, 066112 (2006).
127. Preferential attachment in the growth of social networks: the Internet encyclopedia Wikipedia, A. Capocci, V.D.P. Servedio, F. Colaiori, L.S. Buriol, D. Donato, S. Leonardi, G. Caldarelli, *Physical Review E* 74, 036116 (2006).
128. The Scale-free Topology of Market Investments, D. Garlaschelli, S. Battiston, M. Castri, V.D.P. Servedio, G. Caldarelli, *Physica A* 350, 491-499 (2005).
129. Food Web Topology, D. Garlaschelli, G. Caldarelli, L. Pietronero, *Nature* 435, E4 (2005).
130. The topology of shareholding networks, S. Battiston, D. Garlaschelli and G. Caldarelli, *Lecture Notes in Economics and Mathematical Systems* 550, 189-199 (2005).
131. Loop Structure of the Internet at the Autonomous System Level, G. Bianconi, G. Caldarelli, A. Capocci, *Physical Review E* 71, 066116 (2005).
132. Detecting communities in large networks, A. Capocci, V.D.P. Servedio, G. Caldarelli, F. Colaiori, *Physica A* 352, 669-676 (2005).
133. Vertex Intrinsic Fitness: how to produce arbitrary scale-free networks, V.D.P. Servedio, G. Caldarelli, P. Buttà, *Physical Review E* 70, 056126 (2004).
134. Assortative model for social networks, M. Catanzaro, G. Caldarelli, L. Pietronero, *Physical Review E* 70, 037101 (2004).
135. Preferential Exchange: Strengthening Connections in Complex Networks, G. Caldarelli, F. Coccetti and P. De Los Rios, *Physical Review E* 70, 027102 (2004).
136. The Corporate Boards Networks, G. Caldarelli, M. Catanzaro, *Physica A* 338, 98-106 (2004).
137. Social Networks growth with assortative mixing, M. Catanzaro, G. Caldarelli, L. Pietronero, *Physica A* 338, 119-124 (2004).
138. Virtual Round Table on ten leading questions for network research, L.A.N. Amaral, A. Barrat, A.-L. Barabasi, G. Caldarelli, P. De Los Rios, A. Erzan, B. Kahng, R. Mantegna, J.F.F. Mendes, R. Pastor-Satorras, A. Vespignani, *European Physical Journal B* 38, 143-145 (2004).
139. Preface on Application of Networks, G. Caldarelli, A. Erzan, A. Vespignani, *European Physical Journal B* 38, 141 (2004).
140. Structure of cycles and local ordering in complex networks, G. Caldarelli, R. Pastor-Satorras, A. Vespignani, *European Physical Journal B* 38, 183-186 (2004).
141. Networks of equities in financial markets, G. Bonanno, G. Caldarelli, F. Lillo, S. Miccichè, N. Vandewalle, R. N. Mantegna, *European Physical Journal B* 38, 363-372 (2004).
142. Emergence of Complexity in Financial Networks, G. Caldarelli, S. Battiston, D. Garlaschelli, M. Catanzaro *Lecture Notes in Physics* 650, 399-423 (2004).
143. The Mathematics of Networks: the structure of Biological and Social Systems, G. Caldarelli, *SIAM News* 37, 3 (2004).
144. The Statistical features of Drainage Basins in Mars Channel Networks can one guess from the landscape the past presence of water?, G. Caldarelli, P. De Los Rios, M. Montuori, V.D.P. Servedio, *European Physical Journal B* 38, 387-391 (2004).

145. Widespread Occurrence of the Inverse Square Distribution in Social Sciences and Taxonomy, G. Caldarelli, C. Caretta-Cartozo, P. De Los Rios and V.D.P. Servedio, *Physical Review E* **69**, 035101(R) (2004).
146. Community Detection in large networks, A. Capocci, V.D.P. Servedio, G. Caldarelli, F. Colaiori, *Lecture Notes in Computer Science* **3243**, 181-187 (2004).
147. Dynamic Fracture Model for Acoustic Emission, M. Minozzi, G. Caldarelli, L. Pietronero, S. Zapperi, *European Physical Journal B* **36**, 203 (2003).
148. Topology of correlation based minimal spanning trees in real and model markets, G. Bonanno, G. Caldarelli F. Lillo, R. Mantegna, *Physical Review E* **68**, 046130 (2003).
149. Quantitative description and modeling of real networks A. Capocci, G. Caldarelli, P. De Los Rios, *Physical Review E* **68**, 047101 (2003).
150. Universal Scaling Relations in Food Webs D. Garlaschelli, G. Caldarelli, L. Pietronero, *Nature* **423**, 165 (2003).
151. Food Web Structure and the evolution of complex networks, G. Caldarelli, D. Garlaschelli, L. Pietronero, *Lecture Notes in Physics* **625**, 148-166 (2003).
152. A Multi-Layer Model for the Web Graph L. Laura, S. Leonardi, G. Caldarelli, P. De Los Rios, 2nd International Workshop on Web Dynamics, Honolulu (2002).
153. Scale-free networks from varying vertex intrinsic fitness, G. Caldarelli, A. Capocci, P. De Los Rios, M.A. Muñoz, *Physical Review Letters* **89**, 258702 (2002).
154. Local Rigidity in Sandpile Models S. Ciliberti, G. Caldarelli, V. Loreto, L. Pietronero, *Physical Review E* **66**, 016133, (2002).
155. Reply to the comment on Percolation in Real Wildfires G. Caldarelli, R. Frondoni, A. Gabrielli, M. Montuori, R. Retzlaff, C. Ricotta, *Europhysics Letters* **59**, 157 (2002).
156. Probabilistic approach to the Bak Sneppen Model G. Caldarelli, M. Felici, A. Gabrielli, L. Pietronero, *Physical Review E* **65**, 046101 (2002).
157. Percolation in Real Wildfires G. Caldarelli, R. Frondoni, A. Gabrielli, M. Montuori, R. Retzlaff, C. Ricotta, *Europhysics Letters* **56**, 510 (2001).
158. Beauty and Distance in the Stable Marriage Problem, G. Caldarelli, A. Capocci, *Physica A* **300**, 325 (2001).
159. Sex-oriented stable matchings of the marriage problem with correlated and incomplete information, G. Caldarelli, A. Capocci P. Laureti, *Physica A* **299**, 268 (2001).
160. Growing Dynamics of Internet Providers, A. Capocci, G. Caldarelli, R. Marchetti, L. Pietronero, *Physical Review E* **64**, 35105 (2001).
161. Fractal growth from Local Instabilities R. Cafiero, G. Caldarelli, *Europhysics Letters* **54**, 187 (2001).
162. Cold and Warm Swelling of Hydrophobic Polymers P. De Los Rios, G. Caldarelli, *Physical Review E* **63**, 31802 (2001).
163. Perturbative approach to the Bak and Sneppen Model, M. Felici, G. Caldarelli, A. Gabrielli, L. Pietronero, *Physical Review Letters* **86**, 1896 (2001).
164. Cellular Models for River Networks G. Caldarelli, *Physical Review E* **63**, 21118 (2001).
165. Cold and Warm Denaturation of Proteins G. Caldarelli, P. De Los Rios, *Journal of Biological Physics* **27**, 229 (2001).
166. Angular structure of Lacunarity and Renormalization Group, R.C. Ball, G. Caldarelli, A. Flammini, *Physical Review Letters* **85**, 5134 (2000).
167. Discretized Diffusion Processes, S. Ciliberti, G. Caldarelli, P. De Los Rios, L. Pietronero Y.-C. Zhang, *Physical Review Letters* **85**, 4848-4851 (2000).
168. Invasion Percolation with Temperature and the Nature of SOC in Real Systems, A. Gabrielli, G. Caldarelli, L. Pietronero, *Physical Review E*, **62**, 7638 (2000).

169. Putting Proteins back into Water P. De Los Rios, G. Caldarelli, *Physical Review E* 62, 8449 (2000).
170. Damage and Cracks in Thin Mud Layers R. Cafiero, G. Caldarelli, A. Gabrielli, *Journals of Physics A* 45, 8013 (2000).
171. Roughness of fracture surfaces, A. Parisi, G. Caldarelli, L. Pietronero, *Europhysics Letters* 52, 304, (2000).
172. The Fractals Properties of Internet, G. Caldarelli, R. Marchetti, L. Pietronero, *Europhysics Letters* 52, 386 (2000).
173. Using Stochastic Dynamics to Model Multispecies Communities, G. Caldarelli, B. Drossel, P. Higgs, A. McKane, *AIP* 502, 226-231 (2000)
174. Self-affine properties of fractures in brittle materials, A. Parisi, G. Caldarelli, *Physica A* 280, 161-165 (2000).
175. Critical behaviour in the fracture of disordered media, G. Caldarelli, C. Castellano, A. Petri, *Philosophical Magazine B* 79, 1939-1944 (1999).
176. Comment on First Order Transition in the Breakdown of Disordered Media, G. Caldarelli, A. Petri, *Physical Review Letters* 83, 1483 (1999).
177. Criticality in Model for Fractures in Disordered Media, G. Caldarelli, C. Castellano, A. Petri, *Physica A* 270, 15 (1999).
178. Statistical Properties of Fractures in Damaged Materials, A. Gabrielli, R. Cafiero, G. Caldarelli, *Europhysics Letters* 45, 13 (1999).
179. Theory of Boundary Effects in Invasion Percolation A. Gabrielli, R. Cafiero, G. Caldarelli, *Journal of Physics A* 31, 7429 (1998).
180. Modelling Coevolution in Multispecies Communities, G. Caldarelli, P. Higgs, A. McKane, *Journal of Theoretical Biology* 193, 345-358 (1998).
181. Stationary Self-Organized Fractal Structures in an Open, Dissipative Electrical System M. Marani, J. R. Banavar, G. Caldarelli A. Maritan, A. Rinaldo, *Journal of Physics A* 31, L337-L343 (1998).
182. Mean Field Theory for Ordinary and Hot Sandpiles, G. Caldarelli, *Physica A* 252, 295-307 (1998).
183. Dynamics of Fractures in Quenched Disordered Media, G. Caldarelli, R. Cafiero, A. Gabrielli, *Physical Review E* 57, 3878-3885 (1998).
184. A Prototype Model of Stock Exchange, G. Caldarelli, M. Marsili, Y.-C. Zhang, *Europhysics Letters* 40, 479-484 (1997).
185. Scaling in Currency Exchange, S. Galluccio, G. Caldarelli, M. Marsili, Y.-C. Zhang, *Physica A* 245, 423 (1997).
186. Surface Effects on Invasion Percolation, R. Cafiero, G. Caldarelli, A. Gabrielli, *Physical Review E* 56, R1291-R1293 (1997).
187. Randomly Pinned Landscape Evolution, G. Caldarelli, A. Giacometti, A. Maritan, I. Rodriguez-Iturbe, A. Rinaldo, *Physical Review E* 55, R4865-R4868 (1997).
188. Hot Sandpiles, G. Caldarelli, A. Maritan, M. Vendruscolo, *Europhysics Letters* 35, 481-485 (1996).
189. Self Organization and Annealed Disorder in Fracturing Processes, G. Caldarelli, F. Di Tolla, A. Petri, *Physical Review Letters* 77, 2503-2508 (1996).
190. Branching Processes and Evolution at the Ends of a Food Chain, G. Caldarelli, C. Tebaldi and A. L. Stella, *Physical Review Letters* 76, 4983-4986 (1996).
191. Optimal path and Directed Percolation, P. De Los Rios, G. Caldarelli, A. Maritan and F. Seno *Physical Review E* 53, R2029-R2032 (1996).

192. Quenched Disorder, Memory and Self Organization M. Marsili, G. Caldarelli and M. Vendruscolo, *Physical Review E* 53, R13-R16 (1996).
193. Self Organized Critical Scaling at Surfaces, A. Stella, C. Tebaldi and G. Caldarelli, *Physical Review E* 52, 72 (1995).
194. Fixed Scale Transformation Approach for Born Model of Fractures G. Caldarelli and A. Vespignani, *Fractals* 3, 829 (1995).
195. Fixed Scale Transformation for Fracture Growth Processes Governed by Vectorial Fields, G. Caldarelli, A. Vespignani and L. Pietronero, *Physica A* 215, 223 (1995).
196. Fractal and Topological Properties of Directed Fractures G. Caldarelli, C. Castellano and A. Vespignani, *Physical Review E* 49, 2673 (1994).

PROCEEDINGS

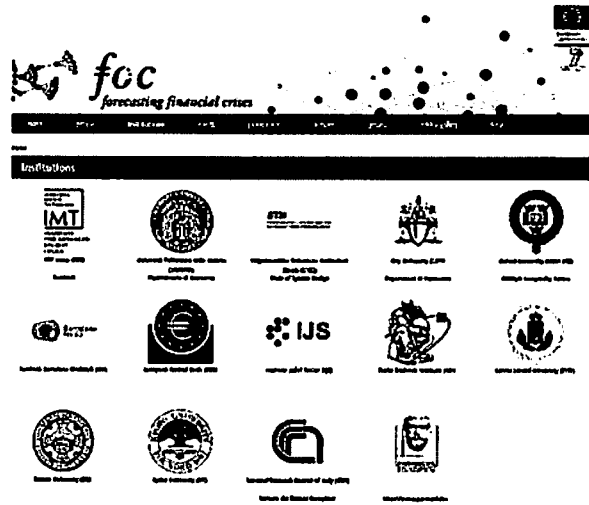
1. G. De Masi, G. Iori, G. Caldarelli "The Italian interbank network: statistical properties and a simple model", *SPIE Proceedings* 6601, U210-U223 (2007).
2. C. Caretta Cartozo, D. Garlaschelli, G. Caldarelli, "Graph Theory and Food Webs" "*Ecological Networks*" *Santa Fe Proceeding series* 93-117 (2006).
3. G. Caldarelli, The Structure of Social and Biological Systems, *SIAM Bulletin*, June 2004.
4. G. Caldarelli, "Introduction to complex networks", Proceedings of the VII Granada Seminar on Computational Physics. (2003)
5. L. Laura, S. Leonardi, G. Caldarelli, P. De Los Rios, "A Multi-Layer Model for the Web Graph" *2nd International Workshop on Web Dynamics*, Honolulu (2002).
6. G. Caldarelli, "Food Web Structure and the Evolution of Complex Networks", Proceedings of the XVIII Sitges Conference on Statistical Physics (2002).
7. G. Caldarelli, M. Piccioni, E. Sciubba "A Numerical Study on the Evolution of Portfolio Rules",
Contribution accepted to CEF2000
8. R. Marchetti, G. Caldarelli, L. Pietronero, "Statistical properties of Internet", Proceedings of the VI Granada Seminar on Computational Physics. (2000)

BOOKS OF PROCEEDINGS EDITED/ NEWSPAPERS

- S. Battiston, F. De Pellegrini, G. Caldarelli, E. Merelli, Proceedings of ECCS14, Springer (2016).
- G. Caldarelli G. Kanadiakis, A. Scarfone, *European Physical Journal B* 212 (2012)
- A. Barrat, S. Boccaletti, G. Caldarelli, A. Chessa and V. Latora *Journal of Physics A* 41 (2008)
- G. Caldarelli and A. Vespignani *European Physical Journal B* 38 (2004)
- G. Caldarelli "Sei regioni in bilico analisi di Thyco Big Data" *La Stampa* p.6 18/02/2013

DESCRIPTION OF FOC PROJECT

Contract nr. 255987
Total Funds 2,894,484€
Participants 14
Site <http://www.focproject.eu>



FOC is a scientific project funded by the Future and Emerging Technology (FET) Open Scheme in the field of Information Technology & Communication of European Commission.

The research topic is the understanding and possibly prediction of systemic risk and global financial instability. We want to provide a new approach to this problem based on complex network theory. On one hand, we want to improve the theoretical framework for the understanding of systemic risk in the global financial market. On the other hand, we wanted to produce widgets and software for policy makers. These instruments will allow to monitor the systemic fragility of the financial systems and the spread of the crisis between the institutions and markets around the world. With such approach we want to help policy regulators to evaluate quantitatively the deterioration of the financial situation and to run models to interactively visualize the possible future scenarios.

Our scientific and social approach looks at the global financial system as an example of a complex techno-social system. In fact, the recent development of an integrated and fast reacting global financial system is the result of the transformations caused by the information technology revolution. Decision-makers in modern financial systems operate within a system of pervasive information, also formed by market analysts, press agencies, data providers, blogs and forums. Also (in the spirit of Web 2.0) themselves act as producers of information. As a result, market regulators are incorporated in a gigantic information network formed by more technological networks. In our view, the inadequacy of existing structures in the face of systemic risk can be overcome only on the basis of advances in the use and design of new instruments for the sciences of complexity. In particular, we need to develop more proactive and predictive model-based simulations and through the collection and processing of data networks.

The results of this project are

- A new algorithm to compute the centrality of financial institutions (DebtRank) published in [DebtRank: Too Central to Fail? Financial Networks, the FED and Systemic Risk](#) S. Battiston, M. Puliga, R. Kaushik, P. Tasca, G. Caldarelli, *Scientific Reports* 2 541 (2012).

This publication has had an excellent response by regulators and the media. It is currently used by the research division of the European Central Bank (Ivan Alves), Bank of England (Peter Zimmerman), the Bank of Italy (Giovanni di Iasio), as well as in the media

<http://www.bloomberg.com/news/2012-08-06/how-google-might-help-us-avert-a-financial-crisis.html>

- We have created a series of widgets, some available on the project website <http://ethz.focproject.net/viewer/home> and others made for various financial institutions. The purpose of these widgets is to provide a quantitative basis (based on graph theory) for the analysis of systemic risk in financial institutions.
- A special focus in the journal Nature Physics, which is a kind of manifesto of the scientific interdisciplinary approach used within the project

The screenshot displays the Nature Physics journal website interface. At the top, the journal title "nature physics" is prominent, along with a search bar and navigation links for "Login" and "Cart". A banner below the header promotes a survey by the Nature Publishing Group. The main content area is titled "Table of contents" and features a thumbnail of the journal cover for March 2013, Volume 9, No 3, pages 119-197. A list of contents includes Editorial, Commentaries, Thesis, Research Highlights, News and Views, Letters, and Articles. A "Subscribe to Nature Physics" button is visible on the right. Below the main table of contents, a section titled "Complex networks in finance" highlights a focus issue, describing the 2008 financial crisis and the application of network science to finance. On the far right, "open innovation challenges" are listed, including one about exposing data relationships through visualization and another about male/female differences in Alzheimer's disease.

Journal content

- Journal home
- Advance online publication
- Current issue
- **Archive**
- Supplements
- Insights
- Focuses
- Press releases

Journal information

- Guide to authors
- Online submission
- For referees
- Pricing
- Free online issue
- Contact the journal
- Subscribe
- Help
- About this site

NPG services

Table of contents

March 2013, Volume 9 No 3 pp119-197

- Editorial
- Commentaries
- Thesis
- Research Highlights
- News and Views
- Letters
- Articles
- About the cover

ISSUE

◀ Previous | Next ▶

Complex networks in finance

Focus issue: March 2013 Volume 9, No 3 pp119-197

▶ **Table of contents**

The 2008 financial crisis has highlighted major limitations in the modelling of financial and economic systems. However, an emerging field of research at the frontiers of both physics and economics aims to provide a more fundamental understanding of economic networks, as well as practical insights for policymakers. In this *Nature Physics* Focus, physicists and economists consider the state-of-the-art in the application of network science to finance.

Subscribe to Nature Physics

Journal services

- ☐ Sign up for e-alerts
- ☑ Recommend to your library
- ☑ Live newsfeeds
- ☑ View table of contents PDF
- ☑ View masthead PDF

open innovation challenges

Expose Data Relationships Through Visualization of Thomson Reuters Web of Science Content

Deadline: Jul 25 2013
Reward: Varies

This challenge provides an opportunity for Solvers to build a web-based or mobile "app" to explore ...

Male/Female Differences in the Pathogenesis and Presentation of Alzheimer's Disease in Pre-symptomatic, Early Symptomatic and Late Stages

DESCRIPTION OF THE MULTIPLEX PROJECT

Contract nr. 317532

Total Funds 6,000,000€

Participants 22

Site <http://www.multiplexproject.eu>

•Multiplex proposal is the result of a bottom-up process involving scientists from many EU countries and institutions.

•Each consortium node represents a large community of researchers and institutions coherently addressing this Proactive Initiative

The Science of Complex Systems is regarded as a success story among the emerging fields of science. However, further progress in the ICT domain is hampered by the lack of deeper knowledge about how multi-level complex systems function. Preliminary findings indicate that interactions in a multi-level system cannot be treated as interactions in a single-level system. For example, multi-level dependencies may amplify cascade failures

or make more sudden the collapse of the entire system, as indeed was observed in recent large-scale blackouts resulting from cascades in the power-grid coupled to the control communication system. A better understanding of multi-level systems is essential for future ICT's and for improving life quality and security in an increasingly interconnected and interdependent world. In this respect, complex networks science is particularly suitable for the many challenges that we face today, from critical infrastructures and communication systems, to techno-social and socio-economic networks. MULTIPLEX proposes a substantial paradigm shift for the development of a mathematical, computational and algorithmic framework for multi-level complex networks. Firstly, this will lead to a significant progress in the understanding and the prediction of complex multi-level systems. Secondly, it will enable a better control, and optimization of their dynamics. By combining mathematical analyses, modelling approaches and the use of massive heterogeneous data sets, we shall address several prominent aspects of multi-level complex networks, i.e. their topology, dynamical organization and evolution. On the empirical side, the theories, models and algorithms developed by MULTIPLEX will be tested and validated in relevant economic, technological and societal contexts. The long-term objective of the project is to bring the newly developed formalisms to other areas of complexity and to supply new conceptual tools for EU policy makers, stakeholders and citizens.



A sample of participants:

A. Arenas, P. Argyrakis, A.-L. Barabási, A. Barrat, S. Battiston, M. Boguñá, B. Bollobas, G. Caldarelli, C. Cattuto, J. Diaz, A. Diaz-Guilera, S. Dorogotsev, S. Fortunato, S. Havlin, M. Henzinger, K. Kaski, S. Leonardi, V. Latora, J. Mendes, F. Meyer auf der Heide, Y. Moreno, F. Pammolli, A. Panconesi, P. Sankowski, R. Pastor-Satorras, L. Pietronero, C. Rozenblat, F. Schweitzer, M.A. Serrano, P. Spirakis, S. Thurner, B. Vedral, A. Vespignani

In addition, another dozen senior participants in individual teams.

DESCRIPTION OF COSIN PROJECT

Contract nr. 33555

Total Funds 1,256,000€

Participants 7

Site <http://www.cosinproject.eu>

This project acted as an incubator of most of the scientific community in the field of Complex Networks. (If you see the picture below taken from a paper of Mark Newman (based on collaboration network of scientists publishing on the archive) we see that most of the people working in COSIN are rather central in this collaboration network). The aim of this project is to develop a unified set of Complex Systems theoretical methodologies for the characterization of Complex Networks, helping addressing fundamental question about stability, efficiency and functionality of these networks. We concentrated the research activity on the structures originated by the interplay of different agents in information society as the Internet network, the World Wide Web structure and the social and economic networks. In particular we defined a set of new tools for the analysis and the simulation of very large networks; devise efficient algorithms for measuring the relevant characteristics of such networks and for visualizing their evolution at different scales. We shall also show that such tools can help in addressing the real-world problems faced in ITS technology as well as in the social studies.

Complexity in Networks
Home Page of the European Project COSIN
COEvolution and Self-Organization In dynamical Networks

Node 1 INFN
Node 2 Rome "La Sapienza"
Node 3 Universitat Autònoma de Barcelona
Node 4 EPFL, Lausanne
Node 5 DSI, Paris
Node 6 Universitat Karlsruhe
Node 7 Universitat de Paris Sud

About COSIN
People
Publications
Software
Visualization
Network data
Complexity: What is Complexity?
Complex networks
What are Complex Networks?

The COSIN project is a FET OPEN Project
It is funded by EU commission in the priority area of: Information Society Technologies

The Cosin Project
The Cosin Project is a research project aiming to develop statistical models to describe Networks growths and evolution. These models will be based on agents interactions and inspired by the theory of self-organisation and fractal growth. At the same time, we are thinking to collect data mainly for the Internet and the World Wide Web. These data will be collected in order to validate our models. We also want to devise visualization tools in order to analyze large data sets both from numerical simulations and real world data. Applications to economic networks will be also considered.

Special Issue on COSIN Conference
The most beautiful book on technological networks

