

Alexander Michael Petersen

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Assistant professor at the IMT Institute for Advanced Studies Lucca, a member of the faculty of Economics and Institutional change, in particular, a member of the Laboratory for the analysis of complex economic systems (AxES). I research patterns of growth in social systems using a combination of data-centric analysis supported by stochastic modeling. Currently, my topics of interest are: (i) modeling competition-driven agent-based systems, (ii) longitudinal analysis of productivity, longevity, and impact at the career level, (iii) collaboration patterns at the individual and international scale, (iv) coevolution in socio-economic systems such as science, culture, innovation, and human language, and (v) quantifying the response dynamics of financial markets to exogenous shocks.

EDUCATION

- Ph.D. Physics (Boston University, March 2011). Thesis Advisor: H. E. Stanley.
- M.A. Physics (Boston University, Jan. 2008)
- B.Sc. Applied Physics (University of Utah, May 2003)
- B.Sc. Mathematics (University of Utah, May 2003)

NATIONALITY

- U.S. Citizen, Hispanic (Born: Bogota, Colombia, 03-10-1981). Languages: English (first language 5/5), Spanish (medium experience 3/5), Italian (medium experience 2/5).

EXPERIENCE

Assistant Professor, IMT Lucca Institute for Advanced Studies, Lucca Tuscany, Italy **June 2011-Present**

- Analysis of socio-economic systems using concepts and methods from complex systems and statistical physics. Teaching: Spring 2012/2013, Fall 2013, Fall 2014, “Mathematics precourse,” an introduction advanced mathematical tools including theory of complex variables, Fourier transform, Legendre transform, ordinary differential equations, partial differential equations. Contributed a lecture titled “Methods for analyzing achievement and growth in longitudinal career data” to the Fall 2013 IMT course Advanced Topics of LIME.

Research Assistant, Boston University, Boston , MA **2006-2011**

Teaching Assistant, Boston University, Boston , MA **2004-2006**

Research Assistant, Lab of Prof. Jing Shi, University of Utah, Salt Lake City, UT **2002-2003**

PUBLICATIONS

1. A. M. Petersen, D. Rotolo, L. Leydesdorff. *The interaction ‘Supply’, ‘Demand’, and ‘Technology’ in terms of Medical Subject Headings: A triple helix model of medical innovations*. Submitted to Research Policy (2015).
2. A. M. Petersen. *Quantifying the impact of weak, strong, and super ties in scientific careers*. Under review (revise & resubmit), PNAS (2015).
3. A. Morescalchi, F. Pammolli, O. Penner, A. M. Petersen, M. Riccaboni. *The evolution of networks of innovators within and accross borders: Evidence from patent data*. Research Policy 44(3), 651-668 (2015).
4. A. M. Petersen, O. Penner. *Inequality and cumulative advantage in science careers: a case study of high-impact journals*. EPJ Data Science 3, 24 (2014).

5. I. Pavlidis, A. M. Petersen, I. Semendeferi. [*Together we stand*](#). Nature Physics **10**, 700-702 (2014).
6. C. Schulz, A. Mazloumian, A. M. Petersen, O. Penner, D. Helbing. [*Exploiting citation networks for large-scale name disambiguation*](#). EPJ Data Science **3**, 11 (2014).
7. A. M. Petersen, S. Fortunato, R. K. Pan, K. Kaski, O. Penner, A. Rungi, M. Riccaboni, H. E. Stanley, F. Pammolli. [*Reputation and impact in academic careers*](#). Proceedings of the National Academy of Sciences USA **111**, 15316-15321(2014).
8. A. M. Petersen, I. Pavlidis, I. Semendeferi. [*A quantitative perspective on ethics in large team science*](#). Sci. & Eng. Ethics **20**, 923-945 (2014).
9. O. Penner, R. K. Pan, A. M. Petersen, K. Kaski, S. Fortunato. [*On the predictability of future impact in science*](#). Scientific Reports **3**, 3052 (2013).
10. A. M. Petersen, S. Succi. [*The Z-index: A geometric representation of productivity and impact which accounts for information in the entire rank-citation profile*](#). J. Informetrics **7**, 823-832 (2013).
11. O. Penner, A. M. Petersen, R. K. Pan, S. Fortunato. [*The case for caution in predicting scientists' future impact*](#). Physics Today **66**, 8 (2013).
12. A. Chessa, A. Morescalchi, F. Pammolli, O. Penner, A. M. Petersen, M. Riccaboni. [*Is Europe evolving toward an integrated research area?*](#) Science **339**, 650 (2013).
13. A. M. Petersen, J. Tenenbaum, S. Havlin, H. E. Stanley, M. Perc. [*Languages cool as they expand: Allometric scaling and the decreasing need for new words*](#). Scientific Reports **2**, 943 (2012).
14. A. M. Petersen, M. Riccaboni, H. E. Stanley, F. Pammolli. [*Persistence and Uncertainty in the Academic Career*](#). Proceedings of the National Academy of Sciences USA **109**, 5213 (2012).
15. A. M. Petersen, J. Tenenbaum, S. Havlin, H. E. Stanley. [*Statistical Laws Governing Fluctuations in Word Use from Word Birth to Word Death*](#). Scientific Reports **2**, 313 (2012).
16. A. M. Petersen, H. E. Stanley, S. Succi. [*Statistical regularities in the rank-citation profile of scientists*](#). Scientific Reports **1**, 181 (2011).
17. A. M. Petersen. [*Applications of Statistical Physics to the Social and Economic Sciences*](#). PhD Thesis, Boston University (2011). Thesis Advisor: H. Eugene Stanley.
18. A. M. Petersen, W-S. Jung, J-S. Yang, H. E. Stanley. [*Quantitative and Empirical demonstration of the Matthew Effect in a study of Career Longevity*](#). Proceedings of the National Academy of Sciences USA **108**, 18 (2011).
19. A. M. Petersen, O. Penner, H. E. Stanley. [*Methods for detrending success metrics to account for inflationary and deflationary factors*](#). Eur. Phys. J. B. **79**, 67 (2011).
Preprint title: [*Detrending career statistics in professional baseball: Accounting for the Steroids Era and beyond*](#).
20. B. Podobnik, D. Horvatic, A. M. Petersen, B. Urošević, H. E. Stanley. [*Bankruptcy Risk Model and Empirical Tests*](#). Proceedings of the National Academy of Sciences USA **107**, 18325 (2010).
21. A. M. Petersen, F. Wang, S. Havlin, H. E. Stanley. [*Market dynamics immediately before and after financial shocks: Quantifying the Omori, productivity and Bath laws*](#). Phys. Rev. E **82**, 036114 (2010).
22. B. Podobnik, D. Horvatic, A. M. Petersen, M. Njavro, H. E. Stanley. [*Common scaling behavior in finance and macroeconomics*](#). Eur. Phys. J. B **76**, 487 (2010).
23. A. M. Petersen, B. Podobnik, D. Horvatic, H. E. Stanley. [*Scale-invariant properties of public-debt growth*](#). Europhysics Letters **90**, 38006 (2010).
24. A. M. Petersen, F. Wang, H. E. Stanley. [*Methods for measuring the citations and productivity of scientists across time and discipline*](#). Physical Review E **81**, 036114 (2010).
25. A. M. Petersen, F. Wang, S. Havlin, H. E. Stanley. [*Quantitative law describing market dynamics before and after interest-rate change*](#). Physical Review E **81**, 066121 (2010).
26. B. Podobnik, D. Horvatic, A. M. Petersen, H. E. Stanley. [*Cross-Correlations between Volume Change and Price Change*](#). Proceedings of the National Academy of Sciences USA **106**, 22079 (2009).
27. B. Podobnik, D. Horvatic, A. M. Petersen, H. E. Stanley. [*Quantitative relations between risk, return and firm size*](#). Europhysics Letters **85**, 50003 (2009).

28. A. M. Petersen, W-S. Jung, H. E. Stanley. [*On the distribution of career longevity and the evolution of home run prowess in professional baseball*](#). Europhysics Letters **83**, 50010 (2008).
29. M. Mobilia, A. Petersen, S. Redner. [*On the Role of Zealotry in the Voter Model*](#). *J. Stat. Mech.* **08**, P08029 (2007).

Referee service: Science, Proceedings of the National Academy of Sciences USA, EU COST open call transdomain proposal on “big data”, Austrian Science Fund (FWF) research project grant proposal review, Europhysics Letters (named a [2011 distinguished referee](#)), Physica A (named a 2013 distinguished referee), Journal of Statistical Mechanics, PLoS 1, (Nature) Scientific Reports, Journal of the American Society for Information Science and Technology (JASIST), Royal Society Open Science, Knowledge and Information Systems, European Sociological Review, Industry & Innovation.

MEDIA COVERAGE

- [Recognition: Build a reputation](#), Nature
- [Scientific networks and success in science](#), EPJ Data Science Editorial
- [The benefits of being a big name](#), Nature
- [Researchers say academia can learn from Hollywood](#), Phys.org
- [Scientists' reputations and citation rates](#), PNAS Highlight
- [Researchers prefer citing researchers of good reputation](#), Phys.org
- [Team Science Is Tied to Growth in Grants With Multiple Recipients](#), The Chronicle of Higher Education (Sept. 30, 2014)
- [Family values](#), Chemistry World (by Philip Ball, Apr. 17, 2014)
- [Choice words: Graphing the evolution of language](#), arts&sciences Fall 2013 Magazine (Annual BU Research Highlight)
- [Divinations of academic success may be flawed](#), Nature
- [Models to predict scientists' future impact often fail](#), Phys.org
- [Europe still has a way to achieve true unity](#), Research Europe, Issue 359
- [Unione Europea, ancora non cadono le frontiere della ricerca](#), Wired (Italy)
- [F1000 evaluation of “Statistical laws governing fluctuations in word use from word birth to word death”](#), Faculty of 1000 post-publication peer review
- [When physicists do linguistics](#), Boston Globe / International Herald Tribune (Feb. 10/11, 2013)
- [Physicists explore the rise and fall of words](#), Inside Science News Service
- [Short-term contracts may hinder young scientists](#), PNAS Highlight
- [The New Science of the Birth and Death of Words](#), Wall Street Journal (Mar. 17, 2012)
- [Languages Lose Vocab to Science and Spell-Check](#), InnovationNewsDaily
- [Digital Spell-Checking May Be Killing Off Words](#), LiveScience / MSNBC / Discovery.com
- [Modern era brings death to words](#), ScienceNews
- [Study tracks births, deaths of words](#), United Press International (UPI)
- [Study reveals words' Darwinian struggle for survival](#), theGuardian
- [Bernanke Announcement Leaves Quake Like Aftershocks](#), Inside Science News Service
- [The relationship between bankruptcy and relative debt for U.S. companies](#), PNAS Highlight
- [Boston University clip](#), The Daily Free Press @ Boston University
- [New Statistical Method Ranks Sports Players From Different Eras](#), MIT Technology Review
- [A Physics Curveball](#), arts&sciences Fall 2010 Magazine (Annual BU Research Highlight)
- [Complexity Theory and the National Baseball Hall of Fame](#), the European Physical Journal (EPJ) news highlights
- [Baseball Greats Reranked](#), BU Today, April 8, 2011

INVITED TALKS

- Harvard Condensed Matter Theory KIDS Seminar, Harvard University. “ ‘One-hit Wonders’ and ‘Iron-Horses’: A model of Career Longevity in Professional Sports,” 10/28/2008.
- Departmental Seminar, Boston University Dept. of Physics. “*Quantifying the Market’s Reaction to News Using Methods from Earthquake Physics*,” 08/31/2010.
- Departmental Seminar, Sapienza University of Rome, Dept. of Physics. “*Statistical regularities in the career achievements of scientists and professional athletes*,” 10/08/2010.
- Science-Based Initiative Seminar, Harvard Business School. “*Quantifying the statistical regularities in the career achievements of scientists and professional athletes*,” 01/29/2011.
- Departmental Seminar, IMT Lucca Institute for Advanced Study, Italy. “[Quantitative laws describing market dynamics before and after interest-rate change and other financial shocks](#),” 02/02/2011.
- Barabasi Lab group seminar, Northeastern University, Dept. of Physics. “[Quantifying the statistical regularities in the career achievements of scientists and professional athletes](#),” 02/07/2011.
- Ph. D. Final Oral Examination, Boston University, Dept. of Physics. “*Applications of Statistical Physics to the Social and Economic Sciences*,” 03/08/2011.
- Physics and complexity in Society, KAIST Mini-workshop, Invited speaker, Pohang Korea. “*An atom-ic perspective on careers*,” 2/2012.
- New Trends in e-Humanities, weekly seminar, Royal Netherlands Academy of Arts & Sciences, Amsterdam Netherlands. “[Persistence and Uncertainty in the Academic Career](#),” 4/26/2012.
- COST Action MP0801 “Physics of competition and conflict” Scientometrics Meeting, Bulgarian Academy of Sciences, Sophia Bulgaria. “Dualities in Science: An Empirical analysis of cooperation-competition and persistence-uncertainty in the academic career,” 5/21/2012.
- Departmental seminar, “A microscopic perspective on academic career growth: Empirical analysis and theoretical models.” Dept. of Biomedical Engineering and Computational Science, Aalto University, Helsinki Finland. 06/13/2012.
- [Sabermetrics, Scouting, and the Science of Baseball: A weekend baseball seminar and benefit for the Jimmy Fund, 2012](#). “Beyond the asterisk *: Adjusting for performance inflation in professional sports.” Boston USA, Aug. 4-5, 2012.
- Ethics in Science Seminar, “[Identifying potential pitfalls in the quantitative appraisal system for scientific careers](#),” University of Houston. 12/03/2012.
- Helbing Lab Seminar, “Multilevel social dynamics in Science: from individual careers to Europe”, ETH Zurich. 02/01/2013.
- Lorentz Center, Workshop on Econophysics and Networks across Scales, “[Multilevel collaboration networks in science: from careers to Europe](#),” Leiden, the Netherlands, 05/31/2013.
- Harvard Institute for Quantitative Social Science, [Science of Success workshop](#), “Quantifying career success in competitive arenas: From Fenway Park to Mass. Ave.” Harvard Univ., USA, 06/17/2013.
- European Conference on Complex Systems ECCS’13, Quantifying Success satellite, “Quantitative patterns of individual achievement and growth in competitive arenas”, Barcelona Spain, 09/18/2013.
- COST Action TD1210 “Knowledge Orders and Science”, Koninklijke Bibliotheek, The Hague, Netherlands. “[Using big data to quantify the evolution of written corpora at the micro and macro scale](#)”, 10/23/2013.
- Data Science lunchtime series, “[Using big data to quantify complex social processes](#)”, University of Warwick Business School, Feb. 27 2014.
- Lorentz Center Workshop on [Simulating the social processes of Science](#), talk titled “[Quantifying the role of teamwork and reputation across scientific careers](#).” April 7-11 2014, Leiden, the Netherlands.
- Quantifying Success 2.0, “[Quantifying growth trends in science: from institutions to careers](#)”, ECCS’14 satellite workshop, Sept. 24, 2014.
- “[Quantifying Scientific Impact: Networks, Measures, Insights?](#)”, COST workshop hosted by ETH Zurich, Feb. 12-13, 2015.

- [“Measuring, modeling, and understanding career growth in science”](#). Scientific seminar, University of Lugano, May 5, 2015.

CONFERENCE TALKS

- American Physical Society (APS 2009) 2009 Annual Meeting, Pittsburgh PA, USA. “*Statistical laws for career longevity*,” 03/18/2009. ([Featured Talk/Paper](#)).
- American Physical Society (APS 2011) 2011 Annual Meeting, Dallas TX, USA. “*Statistical regularities in the rank-citation profile of scientists*,” 03/2011.
- International Conference of Econophysics (ICE 2011) 2011, Shanghai, China. “*Quantitative law describing market dynamics before and after interest-rate change*,” 06/2011.
- International Conference on Statistical Physics (Sigma Phi 2011) 2011, Larnaca, Cyprus. “*Quantifying Career Growth and Career Longevity in Academia*,” 07/2011.
- The “Unexpected” Conference on Sociophysics: Do humans behave like atoms?, ENSTA/CREA, Paris. “*An atomic perspective on careers*,” 11/2011.
- MIT Sloan Sports Analytics Conference, “[A method for the unbiased comparison of MLB and NBA career statistics across era](#),” 03/2012. (paper with O. Penner via link)
- American Physical Society (APS 2012) 2012 Annual Meeting, Boston MA, USA. “*Persistency and Uncertainty Across the Academic career*,” 2/29/12. ([Featured Talk/Paper](#)).
- American Physical Society (APS 2012) 2012 Annual Meeting, Boston MA, USA. “*The Growth Dynamics of Words: How Historical Context Shapes the Competitive Linguistic Environment*,” 2/28/12. ([Featured Talk/Paper](#), presented by coauthor J. Tenenbaum).
- The Organization, Economics and Policy of Scientific Research, “[When the Hunter becomes the Hunt-ed: the science of scientific careers](#),” Collegio Carlo Alberto, Torino IT, 5/2/2013.
- Network Science (NetSci) 2013, “Batman and Robin: understanding the role of tie-strength within superstar careers.” Copenhagen DN, 06/07/2013.
- Science of Team Science (SciTS), “Batman and Robin: understanding the role of tie-strength within superstar careers.” Northwestern University, IL USA, 06/25/2013.
- European Conference on Complex Systems ECCS’13, “Reputation and Impact in Academic Careers”, Barcelona Spain, 09/16/2013.
- History of Science Society HSS’13, “[Being Ethical in Large-Team Science: A Quantitative Historical Perspective](#)”, Boston USA, 11/2013.
- Network Science (NetSciX) 2015, “The Apostle Effect: Quantifying the impact of super ties in scientific careers.” Rio de Janeiro Brazil, 01/16/2015.

SKILLS

- Computing: C++, Python, Mathematica, STATA, TAQ database, Monte-Carlo simulations, LaTeX, Mac OSX/Unix.
- Presenting and solving equations on a blackboard in front of an audience
- Attentive to detail. Excel in learning on my own as well as with instruction
- Scientific and expository writing
- Piano (classical and improvisational), Accordion (performed at Ig Nobel Prize ceremony 2007, 2008, 2009), Score composition

ACTIVITIES, HONORS, OTHER

- Selected as Italian Managing Committee (MC) Substitute Member for COST Action TD1210, 2013-.
- Selection committee member for IMT 2012 junior faculty recruitment program for the position of Assistant Professor in Statistical Physics. Selection committee member for IMT 2012 class of incoming Economics students.

- Member of the Park St. Church Homeless Outreach Group. We meet with homeless on the Boston Commons each Thursday. Group member February 2007- April 2011. Group co-leader July 2010 - March 2011.
- Represented Boston University Physics Dept. as departmental recruiter at the *Joint Annual Conference of the National Society of Black Physicists (NSBP) and the National Society of Hispanic Physicists (NSHP)*. Spring 2008, Spring 2009.
- High Pass on Written Comprehensive Test: Boston University Dept. of Physics, Fall 2005
- Founder's Scholarship (Tulane University, 1999-2001)
- Co-Captain of High-School Baseball team, Expert skier
- Conducted the Utah Symphony in 5th grade

REFERENCES

1. Prof. Fabio Pammolli, IMT Institute for Advanced Studies, Lucca (former Director of the IMT Lucca). [Email: f.pammolli@imtlucca.it] Phone: +39 0583 432-6561. Website: http://www.imtlucca.it/faculty/current_faculty/index.php
2. Prof. H. Eugene Stanley, William Fairfield Warren Distinguished Professor, University Professor, Director of the Center for Polymer Studies, Professor of Physics, Boston University. [Email: hes@bu.edu] Phone: 617-353-2617. Website: <http://argento.bu.edu/hes/>
3. Prof. Santo Fortunato, Dept. of Biomedical Engineering and Computational Science (BECS), Aalto University, Aalto Finland. [Email: santo.fortunato@aalto.fi] Phone: +358 50 460 5511. Website: http://becs.aalto.fi/en/personnel/staff/fortunato_santo.html
4. Prof. Shlomo Havlin, Professor of Physics, Bar-Ilan University. [Email: havlin@ophir.ph.biu.ac.il] Phone: 972-3-531-8436. Website: <http://havlin.biu.ac.il/>
5. Dr. Andrea Scharnhorst, Head of Research at DANS and member of the e-humanities group at the Royal Netherlands Academy of Arts and Sciences, Chair of COST Action TD1210 "KnowEscape". [Email: andrea.scharnhorst@dans.knaw.nl] Phone: +31 6 236 332 93. Website: <http://www.dans.knaw.nl/en/content/contact/staff-members/andrea-scharnhorst>