Self-Statement for Merit Action (promotion to Professor, Step 6), Effective 7/1/22
Mason A. Porter, 9/29/21

This document covers scholarship, service, and other aspects of my academic career, but it emphasizes things since 2014, when I was promoted to Professor of Nonlinear and Complex Systems at University of Oxford. The document covers teaching since Fall 2016.

In addition to the Department of Mathematics, I am also affiliated with UCLA's Bhaumik Institute for Theoretical Physics, Institute of Transportation Studies, Center for Social Statistics, and Computational and Systems Biology. In the University of California system, I am also part of the UC Health — CDPH COVID Modeling Consortium. In August 2021, I was named an External Professor of the Santa Fe Institute, which is devoted to the study of complex systems.

Scholarship

I study network analysis, data science, complex systems, and nonlinear systems — including theory, algorithms, data analysis, and applications. A defining feature of my work is its interdisciplinary nature, including publications in mathematics, physics, biology, social science, and multidisciplinary journals. Internationally, I am best known for my work in network analysis.

I earned my PhD in 2002. I have coauthored more than 200 scientific papers. I have more than 21,000 citations on Google Scholar, including more than 15,000 since 2016 and about 3000 in 2020. My h-index is 65, and my h-index since 2016 is 54. I have about 50 articles with at least 100 citations, including 10 with at least 400 citations. Five of my papers have been cited more than 1000 times, led by a 2014 review article on multilayer networks than has more than 2500 citations and has helped drive the subfield of multilayer networks, which is one of the most prominent areas of network science.

I have studied a large variety of of topics. In network analysis, these include network clustering, multilayer networks, temporal networks, centrality, network epidemiology, social dynamics on networks, coupled oscillators on networks, and "higher-order" structure in networks (such as through topological data analysis). Applications of these tools that I have studied include political science, sociology, granular materials, neuroscience, fungal science, protein biology, urban transportation, human mobility and migration, animal behavior, social psychology, and many others. In my "other life" as a researcher in dynamical systems and nonlinear waves, I have worked on topics such as granular crystals, nonlinear optics, Bose–Einstein condensation, and plankton dynamics.

I am continuing to build on these research paths, with several exciting research directions in both mathematics and its applications, and also to go in new directions. I currently have active grants on opinion models on networks, COVID-19 dynamics on multilayer networks (joint with Andrea Bertozzi of UCLA's Mathematics department), and how real-world networks shape and are shaped by neural processing (joint with Carolyn Parkinson of UCLA's Psychology department). In opinion dynamics, I am developing models — especially "bounded-confidence" models, in which opinions take continuous values in some metric space — to study how their dynamics (e.g., phase transition between consensus, polarization, and opinion fragmentation) are affected by network structures with multiple channels of communication and with dialog on multiple social topics, polyadic interactions (by placing opinion models on hypergraphs and simplicial complexes), and coupling between network structure and opinion states (through the study of adaptive networks). The effects of network structure on dynamics is

also important for my research on COVID-19 dynamics. A parallel thread in my COVID-19 studies uses topological data analysis (TDA), where I am now generalizing spatially-informed methods for computing persistent homology (PH) that my collaborators and I developed to spatiotemporal data. As an initial paper, we have applied these new methods to COVID-19 case rates in California. With my research in TDA, I also hope to explore increasingly mathematical directions in collaboration with algebraic topologists. To give one example of an upcoming new research direction, NSF has recently funded me to study multilayer networks and microbiome assembly and function (joint with biologists from Michigan State University). This will leverage my knowledge of multilayer networks and nonlinear dynamics, but I have never studied microbiome applications before. As another example, which builds on my interest in spatial systems, I am now collaborating with geographers (e.g., Clio Andris of Georgia Tech) to study human mobility and "natural boundaries" for epidemic-containment policies.

The study of networks and network dynamics is increasingly crucial throughout the sciences (including the social sciences), and I look forward to continue expanding my research in new directions. As a new External Professor at Sante Fe Institute (this affiliation just started in August 2021), I especially look forward to expanding my collaboration network with social and political scientists.

Papers:

Before I highlight 5 papers, I'll give some context for a subset of my major contributions. Two topics in which I have made particularly well-known contributions are clustering in networks and multilayer networks.

In a 2010 paper in *Science* [A65, cited more than 1700 times], my collaborators and I developed the first systematic method for studying community structure in multilayer networks. We generalized the popularity "modularity" objective function to multilayer networks — including both time-dependent networks and multiplex networks as special cases — by generalizing the relationship between this objective function and random walks on networks through the incorporation of heterogeneous types of connections in networks and keeping track of different transition probabilities for different types of connections. Our application-oriented follow-up 2011 paper in *PNAS* [A79, cited more than 1300 times] applied these tools to functional brain networks in neuroscience and help usher in "chronnectomics", whose purpose is to study neuronal connectivity in a way that is both data-driven and time-resolved. Our paper helped pave the way for the application of multilayer modularity maximization (and multilayer community detection more generally) in functional neuroscience and many other applications. My work on such applications includes not only problems in neuroscience [A89, A106, A110, A116], but also in finance [A135] and epidemiology [A131]. Recent methodological highlights include deriving a relationship between multilayer modularity maximization and stochastic block models [A188], generalizing centrality analysis to multilayer networks [A149, A194, A216], analysis of edge correlations in multilayer networks [A208], developing new generative models for random multilayer networks with flexible correlation structures [A199], and developing new multilayer stochastic blocks models, with an application to urban bicycle-sharing networks [C51]. I have also considered other types of clustering on networks, including core–periphery structure [A115, A117, A147, A160] and very recently used "dictionary learning" to study other low-rank mesoscale structures [C83].

My work has helped lead to the development of multilayer networks as one of the most prominent subfields of network science. My collaborators and I developed a tensorial formalism for the adjacency structure of multilayer networks in a 2013 paper in *Physical Review X* [A114, cited over 900 times] and extended it in my 2014 review article [A121, cited over 2500 times] on

multilayer networks.

Another major theme of my research is dynamical processes on networks, such models of opinions and social influence on networks. Recent work includes generalizing social-contagion models to include synergistic effects [A178], timers [A169], and hipsters [A185]; analysis of bounded-confidence models [A175], which have continuous opinions, and using them to study the influence of media on opinions [A200] and generalizing them to hypergraphs [C82]; a dynamical-systems model for forecasting elections [A207] that performed just as well as those of experts such as FiveThirtyEight.com; voter models that coevolve with network structure [A201]; and a multilayer network model with competing opinions (e.g., pro-physical-distancing versus anti-physical distancing) that coevolve with the spread of an infectious disease [C86].

In the past few years, I gave become increasingly interested in topological data analysis (TDA), with a focus on extending methods for analyzing persistent homology (PH) to spatial, temporal, and social systems. My papers have analyzed situations that are embedded in space, including two-dimensional percolation with disks [A176], contagions on spatially-embedded networks [A131], and developing and applying new methods for PH to spatial data [A205, A214, C77]. Jointly with my PhD student Abby Hickok and my colleague Deanna Needell, I recently generalized PH to spatiotemporal data, with a case study on COVID-19 case rates and vaccination rates [C88].

I have also written several influential reviews and surveys, in addition to the aforementioned 2014 review on multilayer networks. My 2009 survey on community structure [A54] has been cited more than 1300 times. My 2016 tutorial book on dynamical processes on networks [A134], my 2017 review article on random walks on networks [A162], my 2017 "roadmap" article on the computation of PH in TDA [A161], and my 2017 review article on multilayer networks in ecology [A156] have all been cited about 300 times. I also have coauthored recent review articles on granular and particulate networks [A173], multilayer networks in animal behavior [A187], and social network analysis for social neuroscientists [A204].

Five example papers (since becoming a full professor in 2014):

(1) Kivelä et al. [A121], which was published in 2014 in *Journal of Complex Networks*, is a review article on multilayer networks. It has been cited more than 2500 times and established the predominant approach and mathematical formalism for the study of multilayer networks, which has become one of the most prominent areas of network science. This review article unified prior work that was scattered over numerous disciplines — with enormous confusion in terminology, notation, and fact versus fiction — and it set the agenda for the field. Our approach to multilayer networks is discussed briefly as the main introduction to the topic in the 2nd edition (2018, by Mark Newman) of the standard undergraduate textbook on network analysis.

(2) Jeub et al. [A129], which was published in 2015 in *Physical Review E* and has been cited more than 100 times, developed new methods for local community detection using ideas from spectral graph theory. By calculating network community profiles (NCPs), which reveal the most "community-like" sets (as quantified by discrete versions of the ratio of surface area to volume) of networks for subgraphs of each size, this paper illustrated the unrealistic nature of the standard benchmark models for community detection, providing an important warning for conclusions that are based on analyzing those examples. It also illustrated a 'typography' of the different shapes of NCPs that can occur, especially for social networks.

(3) Bazzi et al. [A135], which was published in 2016 in the *Multiscale Modeling &*

Simulation journal of the Society for Industrial and Applied Mathematics and has been cited more than 150 times, concerns community detection in time-dependent networks using a multilayer formalism. It revisits and mathematically firms up the underpinnings of the methods that my collaborators and I developed in previous papers and then applies them to networks of financial correlations as a case study. One of its results is that it proves that the limit of 0 interlayer coupling is a singular limit, so 0 interlayer coupling and very small interlayer coupling do not differ merely because of choices in numerical calculations but are in fact mathematically different for arbitrarily small positive coupling. Unusually for a paper in a SIAM journal, this paper has been cited by many neuroscientists, who have adopted our tools in their analysis of systems such as functional brain networks.

(4) Meng et al. [A175], which was published in 2018 *Physical Review E* and has been cited about 30 times, is a systematic study of bounded-confidence models on several types of networks to examine how the dynamics of such models depend on the structure of a social network. We demonstrated numerically that both network structure and opinion-update parameters have important effects on whether there is convergence to a consensus opinion state, as well as how long such convergence takes when it exists. We also studied transitions between qualitatively different types of behavior. This paper was foundational for my current research on bounded-confidence models and was the starting point for my recent NSF grant to study these models further and extend them to multilayer networks, hypergraphs, and adaptive networks.

(5) Feng and Porter [A214], which was published in 2021 in *SIAM Review* and has been cited 17 times thus far, generalized computation of PH to spatial systems by developing new constructions of filtered simplicial complexes that respect the spatial structure of a data set. In addition to developing these tools, we apply them to data from the 2016 presidential election in California. For such spatial data, the standard distance-based constructions of filtered simplicial complexes give problematic results because they are unduly influenced by features such as the physical sizes of precincts. My coauthor Michelle Feng (who got their PhD degree from the UCLA mathematics department in 2020) won a 2021 SIAM Student Paper Prize in recognition of this paper.

Editorial activities: In my career, I have been on the editorial boards of 11 journals, including 9 active ones. They encompass top international journals in applied mathematics, physics, and network science. For several of these journals, I was named to the inaugural editorial board. Current editorial boards include *Physical Review E* (APS), *SIAM Journal on Mathematics of Data Science* (inaugural editorial board), *Network Neuroscience* (MIT Press; inaugural editorial board), *Transactions of Mathematics and its Applications: A Journal of the IMA* (Oxford University Press; inaugural editorial board), *SIAM Review*, *IEEE Transactions on Network Science and Engineering* (Institute of Electrical and Electronic Engineers; inaugural editorial board), and *European Journal of Applied Mathematics* (Cambridge University Press). I have also co-edited special issues for *European Journal of Applied Mathematics* and *Journal of Nonlinear Science*.

Invited lectures: I have been invited to give about 200 lectures — nationally and internationally — at universities, conferences, and other venues. A few highlights include MultiNet Webinar, Indiana University Network Institute [February 2021], Santa Fe Institute, Colloquium [December 2020], Mathematical Biosciences Institute (MBI) National Colloquium [March 2020], Centro de Investigación en Matemática Pura y Aplicada, Universidad de Costa Rica [January 2019], University of Sydney, Department of Mathematics [September 2018], Keynote ("Springer Complexity Lecture"), NetSci2018, Paris, France [June 2018], First Latin

American Conference on Complex Networks (LANET '17), Puebla, Mexico [September 2017], Dynamics Days 2017, Silver Springs, MD [January 2017], Michigan State University, Department of Physics and Astronomy, "Science at the Edge" Interdisciplinary Seminar [January 2017], University of Cambridge, Applied and Computational Analysis Seminar [June 2016], University of Pennsylvania, Warren Center for Network and Data Sciences, Distinguished Lecture Series [November 2015], Arizona State University, Brauer–Mickens Distinguished Seminar Series, School of Mathematical & Statistical Sciences [November 2014], Conference on Brain Networks, Yeosu, Korea [November 2011]

I have also been an invited participant in several long-term academic programs, such as the Mathematical Biosciences Institute (MBI) Emphasis Semester on Dynamics of Biologically Inspired Networks, Columbus, OH, USA [Spring 2016] and the Institute for Computational and Experimental Research in Mathematics (ICERM) Semester Program on Network Science and Graph Algorithms [Spring 2014].

Organization of conferences, workshops, and summer schools:

I have been a very active organizer of conferences, workshops, and other scholarly activities. Some of these activities, such as a 2021 Short Course and a 2014 Mathematics Research Community through the American Mathematical Society, have been for the key purpose of mentoring and teaching other scholars (especially junior scholars).

Examples include DSOFT/GSNP Short Course, "Introduction to Topological Data Analysis", 2021 American Physical Society (APS) March Meeting (cosponsored by Group on Statistical and Nonlinear Physics [GSNP] and Division on Soft Matter [DSOFT]) [March 2021], American Mathematical Society (AMS) Short Course on "Mathematical and Computational Methods for Complex Social Systems" (with H. Z. Brooks, M. Feng, and A. Volkening), 2021 Joint Mathematics Meetings [January 2021], Institute for Pure and Applied Mathematics (IPAM) Workshop on Mathematical Models in Understanding COVID-19 (with A. L. Bertozzi, J. C. Miller, and D. Schriger) [August 2020], Workshop on Granular and Particulate Networks [PARNET19] (with D. S. Bassett and K. E. Daniels), Max Planck Institute for the Physics of Complex Systems, Dresden, Germany [July 2019], SIAM Conference on Applications of Dynamical Systems 2019 [DS19] (with E. Spiller), Snowbird, UT, USA (May 2019), SIAM Workshop on Network Science 2017 [NS17] (with M. Girvan), Pittsburgh, PA, USA [July 2017], Ada Lovelace Bicentenary: Celebrating Women in Computer Science, Somerville College, Oxford [October 2015], and Workshop on Mathematics and Physics of Multilayer Complex Networks [MAPCOM15] (with A. Arenas), Max Planck Institute for the Physics of Complex Systems, Dresden, Germany [July 15]. Additionally, I have been a co-lead organizer of NetSciEd, an annual workshop on network science and education, every year since 2015. I am also on the Board of Experts of the Lake Como School on Complex Networks (with summer schools from 2014–2019 and to resume after the pandemic).

Hosting visiting scholars: I have had hosted several visiting scholars—both short-term and long-term, and both domestic and international—at UCLA and before that at University of Oxford. One example is Paul C. Bressloff (Professor of Mathematics, University of Utah, Sept–Dec 2018). During the pandemic, I hosted Christopher Curtis (Associate Professor, San Diego State University) in a virtual visit for his one-semester sabbatical. It was planned to be in person, but the pandemic forced us to modify the "visit".

Teaching (since fall 2016)

Design of new Data Theory major and new courses: I have been very active in curriculum design, including developing 3 new courses for UCLA's mathematics department. I was also part of the committee to design our new Data Theory major, including designing and teaching (Spring 2019, Spring 2020) our new capstone lower-division course in it: Math 42: Introduction to Data-Driven Mathematical Modeling: Life, The Universe, and Everything. I also designed the upper-division course Math 168: Introduction to Networks and the graduate course Math 276: Topics in Network Science.

Courses taught:

Since I moved to UCLA in 2016, I have taught the following courses: Math 285J (Winter 17, Spring 21), Math 191 (Spring 17; became the regular course Math 168 for subsequent years), Math 168 (Spring 18, Fall 20), Math 266a (Fall 17, 18, 19), Math 276 (Winter 18, 19), Math 42 (Spring 19, 20). Math 238B (Winter 20), and Math 266B (Winter 21).

My course evaluation scores and feedback have been strong. One highlight is Math 168 in Spring 2018. In it, my teaching effectiveness had a mean of 7.92 and a median of 8, my availability and helpfulness had a mean of 8.75 and a median of 9, and the rating of the course had a mean of 8.33 and a median of 9. Another highlight is Math 42 in spring 2020, which was my first online course because of the COVID-19 pandemic. My teaching effectiveness had a mean of 7.6 and a median of 8, my helpfulness had a mean of 8.54 and a median of 9, and the rating of the course had a mean of 7.87 and a median of 8. Even in courses where my teaching effectiveness wasn't evaluated as highly as the above two, I was still praised very often for my helpfulness in particular.

A few quotes from student evaluations from my various courses convey my students' experiences:

"I want to thank Professor Porter for what he had done for us throughout the quarter. He has been kind and helpful. He is both funny and so knowledgeable. His T-shirt is really cool, by the way. This class literally made me want to apply for a graduate school in the area of network science."

"This class was challenging, but the professor was extremely helpful both inside and outside the classroom (during office hours). He was very patient and accommodating and made the class enjoyable."

"This professor is such a kind-hearted man. He always knows how to enjoy himself when he teaches class, always throwing in subtle jokes or references in the middle of lecture. He goes by the textbook a lot of the time, but he will give comments on what he thinks and elaborates on what the textbook did not show. He also was always open to just talking to people, regardless of whether or not it was subject related."

"Professor Porter makes his class challenging yet also intriguing. He has been very helpful during office hours and he'd always be willing to discuss topics outside the scope of our class. Looking back, I have learned so much from this class and much of the knowledge is applicable to many other areas of my study."

"Professor Porter is very knowledgeable and cares about his students. He is always very helpful during his office hours. The topics that we discussed are difficult but also very interesting. The homework assignments sometimes require a lot of work, but I get to learn a lot during the process. Overall I really enjoyed this class."

Student and Postdoc Supervision:

I am currently supervising four PhD students from the UCLA Mathematics department and one PhD student (Mina Shahi) from Bioengineering. The four students from the Mathematics department are Abby Hickok, Grace Li, Jerry Luo, and Kaiyan Peng (she is jointly supervised with Andrea Bertozzi). Abby and Kaiyan have passed their ATC exams, and Grace and Jerry are slated to take their ATC exams around February 2022. I have been on the dissertation committees of many students in the Mathematics, Statistics, and other departments. I am contacted frequently by PhD students who are interested in my work, and I plan to continue to grow my research group.

I am mentoring two current postdocs: Phil Chodrow from Mathematics and Elisa Baek (jointly mentored with Carolyn Parkinson) from Psychology. I previously supervised postdoctoral scholars Heather Zinn Brooks (now on the faculty at Harvey Mudd College) and Nina Otter (now on the faculty at Queen Mary University of London).

I supervised four previous students who completed their PhD degrees in the UCLA Mathematics department: Michelle Feng, Yacoub Kureh, Charlie Marshak, and Will Oakley. Marshak (who I supervised jointly with Andrea Bertozzi), who graduated in 2017, has a job at the Jet Propulsion Laboratory.. Feng, Kureh, and Oakley all earned their PhD degrees in 2020. Kureh and Oakley now work in industry, and Feng is a postdoctoral scholar at Caltech. Feng has been particularly successful and has won several prestigious UCLA, national, and international awards, including a Girsky Prize, a Pacific Journal Mathematics Dissertation Award, a James S. McDonell postdoctoral fellowship in complex systems, an AWM Dissertation Prize, and a SIAM Student Paper Prize. A number of my University of Oxford doctoral students have also earned their degrees since I joined UCLA in 2016. In total, 24 students have completed their dissertations under my mentorship.

I have also mentored some Master's students and numerous undergraduate researchers (including more than 30 UCLA students) since I moved to UCLA in 2016. I have coauthored several research papers with our undergraduate students. During my career, I have mentored more than 100 undergraduate students and more than 35 Master's students on research projects.

A notable feature of my UCLA research group is its gender ratio, which differs drastically from the norm in mathematics. 10 of the 24 students who have earned their PhD degrees under my mentorship are female or nonbinary. The current mentees in my research group consist of 3 men and 9 people who are women or nonbinary. By contrast, roughly 15% of the PhD students in UCLA's mathematics department are women or nonbinary.

Major Awards and Recognition

I have been recognized nationally and internationally for my contributions to research and mentorship.

I am a Fellow of the American Physical Society [2016], the American Mathematical Society [2018], and the Society for Industrial and Applied Mathematics [2019].

My other major national and international awards include the Erdös–Rényi Prize from the Network Science Society [2014], a Whitehead Prize from the London Mathematical Society (LMS) [2015], the Young Scientist Award for Socio- and Econophysics, German Physical Society (DPG) [2016], and the Council on Undergraduate Research (CUR) Faculty Mentoring Award

(Advanced Career Category; Mathematics and Computer Science Division) [2017].

Most recently, I was named a Highly Cited Researcher by Clarivate Web of Science [2020] in the Cross-Field category.

As I discussed previously (see "Invited lectures"), I have given more than 200 invited lecturers at universities, conferences, and other venues. This includes several keynote lectures at international conferences.

In August 2021, I was named an External Professor at the Santa Fe Institute.

Service

I will discuss my UCLA service since I joined the faculty in 2016. I will also indicate some national and international service from earlier years, but I won't discuss my service at University of Oxford.

UCLA: I have been active in departmental service in Mathematics; I will discuss some highlights. I was also on a promotion evaluation committee for another UCLA department.

I have been a member of several hiring committees, including both the standard mathematics departmental staff-search committee (2018–19, 2020–21) and several ad hoc hiring committees. The ad hoc hiring committees on which I served are ones for a CFM postdoc (2016–17, 2017–18), a Data Theory faculty member (2019–20), and a Social Justice Data Science Assistant Adjunct Professor (2020–21). The Social Justice postdoctoral position is one that I helped formulate.

Another highlight is that I helped design the new Data Theory major as a member of the working group to establish the major (2017–2020). I was very active in this working group, and I designed the major's capstone lower-division course: Math 42: Introduction to Data-Driven Mathematical Modeling: Life, The Universe, and Everything. I continue to help oversee the major as a member of its Management Committee (2020–present).

In 2019–20, I was Chair of the Colloquium Committee and was one of two members of the Putnam Exam and Mathematical Contest in Modeling (MCM) Committee. My role in the latter was to bring back the MCM competition to UCLA students, as the department had not been organizing or guiding any MCM teams for about 7 years. My other departmental committee assignments include the Distinguished Lecture Series (DLS) committee (2016–17, 2017–18, 2018–19, 2019–20), the Undergraduate Studies Committee (2016–17), Graduate Admissions Committee (2017–18), and Teaching Committee (2020–21). I have also been on the committee for the Applied Differential Equations (ADE) qualifying exam on numerous occasions and have done various other departmental duties (e.g., course coordinator).

National and international: In addition to the previously mentioned (in other parts of this document) organizational and scientific committee work with conferences and summer schools (and membership of journal editorial boards), I have held several other service positions, especially with the Society for Industrial and Applied Mathematics. Examples include the Subcommittee on Mathematics Across the Disciplines, Committee on the Undergraduate Program in Mathematics, Mathematical Association of America [2 terms; 2009–15]; Education Committee, Society for Industrial and Applied Mathematics [3 terms; 2013–21]; Secretary (and DSWeb Co-Editor-in-Chief), SIAM Activity Group on Dynamical Systems [2016–17]; Program Director, SIAM Activity Group on Dynamical Systems [1/1/18–12/31/19]; Selection Committee, J.D. Crawford Prize for recent work in dynamical systems, Society for Industrial

and Applied Mathematics (SIAM) [2021 prize]; Fellows Selection Committee, Society for Industrial and Applied Mathematics (SIAM) [2020–22]; Scientific Advisory Committee, Wallenberg Initiative in Networks and Quantum Information (WINQ), Nordic Institute for Theoretical Physics (NORDITA) [2021–present]; and Directorate Advisory Committee (DAC), Physical and Computational Sciences Directorate, Pacific Northwest National Laboratory (PNNL) [2021–present]. I have also been an External Evaluator for several promotion cases (for mid-term review, tenure, and full professorship), including in mathematics, computer science, information science, mechanical engineering, and physics departments.

Research Grants

I have been awarded several large grants, with particular success in the last few years. My major grants are:

1. Co-Principal Investigator, "Collaborative Research: MIM: Using Multilayer Interaction Networks to Predict Microbiome Assembly and Function", National Science Foundation [No. 2124903], URoL-Understanding the Rules of Life: Predicting Phenotype (PI: Elena Litchman; also joint with Christopher A. Klausmeier and Shannon D. Manning) $260,535 subawarded to MAP from the overall award [10/01/21–9/30/24]

2. Co-Principal Investigator, "RAPID: Analysis of Multiscale Network Models for the Spread of COVID-19", National Science Foundation [No. DMS-2027438], Mathematical Biology (PI: Andrea L. Bertozzi), $200,000 [4/15/20–3/31/22]

3. Co-Principal Investigator, "NCS-FO: How Real-World Interaction Networks Shape and are Shaped by Neural Information Processing", National Science Foundation, Integrative Strategies for Understanding Neural and Cognitive Systems (NSF-NCS) (PI: Carolyn Parkinson), $976,747 [4/1/19–3/31/23]

4. Principal Investigator, "Dynamic Optimization and Network Analysis for Bus Transportation for the Los Angeles Unified School District", funded as a 2018 UCLA Institute of Transportation Studies (IST) research proposal (co-PI: Mario Gerla), $101,447 [10/01/18–03/31/20]

5a. Principal Investigator (sole PI), "ATD: Models of Spreading Dynamics in Multilayer Networks", National Science Foundation, ATD-Algorithms for Threat Detection (NSF 19-504), Division of Mathematical Sciences, $500,000 [10/01/19–09/30/23].

5b. Supplement (to Grant 3a) of $15,999 to work on Challenge Problems awarded on 7/31/19

6. Principal Investigator, "PLEXMATH: Mathematical Framework for Multiplex Networks", European Commission FET-Proactive Project [No. 317614], FP7-ICT-2011-8, Dynamics of Multi-Level Complex Systems (joint with A. Arenas, M. Barthelemy, J. P. Gleeson, and Y. Moreno), €1,520,540 (including €287,069 to University of Oxford) [11/12–10/15]

7. Principal Investigator, "Community Structure in Multislice Networks", EPSRC grant [No. EP/J001759/1], £211,051 [6/12–5/14]

8. Principal Investigator, "Coevolution, Interconnections, and Communities of Social and Political Networks in the United States Congress" James S. McDonnell Foundation [No. JSMF#220020177, Studying Complex Systems Research Award], 21st Century Science Initiative (joint with J. H. Fowler), $418,038 [2/09–1/14]