Curriculum Vitae

Dmitri Krioukov

Associate Professor Departments of Physics, Mathematics, and E&C Engineering Network Science Institute, Northeastern University 360 Huntington Avenue, Boston, MA 02115, USA	Phone: (617) 373-2934 Fax: (617) 373-2943 Email: dima@northeastern.edu http://www.dk-lab.net/

INTERESTS

Networks: geometry, entropy, dynamics, statistical inference, navigation, routing, random graphs, hypergraphs, simplicial complexes

EDUCATION

- **Ph.D. in Physics (1994-1998)**
  Old Dominion University, Norfolk, Virginia, USA
  Dissertation Title: "Construction of Effective Electromagnetic Currents for Two-Body Quasipotential Equations."
  Advisor: J. W. Van Orden

- **Diploma with Honors in Theoretical Physics (1987-1993)**
  St. Petersburg State University, St. Petersburg, Russia
  Thesis Title: "Non-Standard Differential Calculi on the Quantum Group $SL_q(2)$."
  Advisor: V. D. Lyakhovsky

POSITIONS HELD

- **Associate Professor (2014-Present)**
  Departments of Physics, Mathematics, and Electrical & Computer Engineering
  Network Science Institute, Northeastern University, Boston, Massachusetts

- **Sr. Research Scientist (2004-2014)**
  Cooperative Association for Internet Data Analysis (CAIDA)
  San Diego Supercomputer Center (SDSC)
  University of California San Diego (UCSD), San Diego, California

- **Research Scientist (2000–2002)**
  Nortel Networks, Herndon, Virginia

- **Network Architect (1998-2000)**
  Dimension Enterprises, Herndon, Virginia

- **Network Engineer (1993-1994)**
  The Central R&D Institute for Robotics and Cybernetics, St. Petersburg, Russia

SERVICE TO THE PROFESSIONAL COMMUNITY

- **Conference organizer**
  - Chair of the organizing committee, *Critical and collective effects in graphs and networks*
    Saint Barnabas's Church, Falmouth, MA, June 2022
  - Chair of the organizing committee, *Foundations of Quantum Mechanics*
    Northeastern University, Boston, MA, May 2022
  - Organizing committee, *Critical and collective effects in graphs and networks*
    Satellite of the International Congress of Mathematicians (ICM 2022), cancelled,
    Euler Mathematical Institute, St. Petersburg, Russia, May 2022
  - Organizing committee, *Critical and collective effects in graphs and networks*
    École de Physique des Houches, Les Houches, France, May 2019
  - Local Chair, *ACM Conference on Information Centric Networking*
    Northeastern University, Boston, MA, September 2018
  - Chair of the organizing committee, *Critical and collective effects in graphs and networks*
    Eurandom, TU Eindhoven, Eindhoven, Netherlands, June 2018
  - Advisory committee, *Mathematical Physics Workshop on Discrete Geometry and Statistics*
    Chulalongkorn University, Bangkok, Thailand, January 2018
  - Organizing committee, *Critical and collective effects in graphs and networks*
    Independent University of Moscow, Moscow, Russia, May 2017
  - Organizing committee, *GeoTopoNets2016: Network Geometry and Topology Workshop*
    NetSci Satellite, Seoul, Korea, May 2016
  - Organizing committee, *Critical and collective effects in graphs and networks*
    Moscow Institute of Physics and Technology, Moscow, Russia, April 2016
  - Chair of the organizing committee, *Random graphs, simplicial complexes, and their applications*, Northeastern University, Boston, Massachusetts, May 2015
  - Chair of the organizing committee, *Network Geometry Workshop*
    University of California San Diego, San Diego, California, July 2013
  - Co-organizer, *Workshop on Geometry of Large Networks*
    American Institute of Mathematics, Palo Alto, California, November 2011
  - Chair, *Workshop on Network Geometry*
    University of Cyprus, Limassol, Cyprus, January 2011
  - Program co-chair, *Workshop on Information Theory and Applications (ITA)*
    University of California San Diego, San Diego, California, February 2010
  - Chair of the organizing committee, *Workshop on Networks and Navigation*
    Santa Fe Institute, Santa Fe, New Mexico, August 2008
  - Chair of the organizing committee, *Workshop on the Internet Topology (WIT)*
    University of California San Diego, San Diego, California, May 2006
- **Prize/award committees**
  - Network Science Fellow Nomination Committee, 2023
  - Erdős–Rényi Prize Committees, 2014, 2015
- **Funding agency grant reviewer and panelist**
  - National Science Foundation (NSF)
  - Binational Science Foundation (BSF)
  - Army Research Office (ARO)
- **Book reviewer**
  - Cambridge University Press

- **Advisory boards**
  - International Advisory Committee on Discrete Geometry and Statistics, 2017-
  - DeepAML Advisory Board, 2017-
- **Journal editor**
  - Nature Scientific Reports (2015-)
  - Computer Communication Review (2007-2010)
- **Journal reviewer**
  - NPG Journals (Nature, Nature Physics, Nature Communications, Scientific Reports)
  - Proceedings of the National Academy of Sciences (PNAS)
  - PLOS ONE, PLOS Biology
  - Physical Review Letters (PRL)
  - Physical Review X (PRX)
  - Physical Review Research (PRR)
  - Physical Review E (PRE)
  - Physical Review D (PRD)
  - Journal of High Energy Physics (JHEP)
  - Journal of Statistical Physics (JSP)
  - Journal of Physics A: Mathematical and Theoretical
  - Europhysics Letters (EPL)
  - Physica A
  - Network Science
  - EPJ Data Science
  - F1000Research
  - Internet Mathematics
  - Central European Journal of Mathematics (CEJM)
  - Stochastic Models
  - Transactions on Networking (ToN)
  - Journal on Selected Areas in Communications (JSAC)
  - Computer Communication Review (CCR)
  - Computer Networks (ComNet)
  - Computer Communications (ComCom)
  - IEEE Communications Letters
  - IET Communications
  - Operations Research
- **Conference technical program committee**
  - International School and Conference on Network Science (NetSci), 2014-2018
  - Conference on Complex Systems, 2017
  - Workshop on Topology & Networks (TopoNets), 2015
  - Conf. of the ACM Special Interest Group on Data Communication (SIGCOMM), 2009
  - Workshop on Simplifying Complex Networks for Practitioners (SIMPLEX), 2009
  - Workshop on Network Science for Communication Networks (NetSciCom), 2009
  - Conf. of the ACM Special Interest Group on Data Communication (SIGCOMM), 2007
  - Conf. on Emerging Networking Experiments and Technologies (CoNEXT), 2006
- **Conference reviewer**
  - Conf. on Computing, Communications, and Control Technologies (CCCT), 2010
  - Conf. on Performance Evaluation Methodologies and Tools (ValueTools), 2009
  - Passive and Active Measurement Conf. (PAM), 2008
  - Internet Measurement Conf. (IMC), 2006
  - USENIX Annual Technical Conf. (USENIX), 2006
  - Conf. of the ACM Special Interest Group on Data Communication (SIGCOMM), 2005

- Conf. on Computer Communications (INFOCOM), 2005
- Passive and Active Measurement Conf. (PAM), 2005
- Conf. on High Performance Switching and Routing (HPSR), 2005
- Internet Measurement Conf. (IMC), 2004

TEACHING

- ***Network Science 2***, Northeastern University, Spring 2024
- ***Introduction to Network Science***, Northeastern University, Fall 2023
- ***Network Science 2***, Northeastern University, Spring 2023
- ***Introduction to Network Science***, Northeastern University, Fall 2022
- ***Network Science 2***, Northeastern University, Spring 2022
- ***Introduction to Network Science***, Northeastern University, Fall 2021
- ***Network Science 2***, Northeastern University, Spring 2021
- ***Quantum Mechanics***, Northeastern University, Fall 2020
- ***Quantum Mechanics***, Northeastern University, Spring 2020
- ***Quantum Mechanics***, Northeastern University, Fall 2019
- ***Thermodynamic and Statistical Mechanics***, Northeastern University, Spring 2019
- ***Statistical Physics of Complex Networks***, Northeastern University, Fall 2018
- ***Thermodynamic and Statistical Mechanics***, Northeastern University, Spring 2018
- ***Statistical Physics of Complex Networks***, Northeastern University, Fall 2017
- ***Thermodynamic and Statistical Mechanics***, Northeastern University, Spring 2017
- ***Physics 1***, Northeastern University, Fall 2015
- ***Intro to Physics Research***, Northeastern University, Fall 2015
- ***Geometric Exponential Random Graphs and Network Geometry Inference***, Brown University, Summer 2015
- ***Thermodynamic and Statistical Mechanics***, Northeastern University, Spring 2015
- ***Intro to Physics Research***, Northeastern University, Spring 2015
- ***Physics 1***, Northeastern University, Fall 2014
- ***Intro to Physics Research***, Northeastern University, Fall 2014

ADVISING

- Postgraduate research associates
  - **Maksim Kitsak**
    Ph.D. in Physics, Boston University
    Advisors: Eugene Stanley and Shlomo Havlin
    Went to: TU Delft (Assistant Professor, ECE)
  - **Pim van der Hoorn**
    Ph.D. in Mathematics, University of Twente
    Advisors: Nelly Litvak
    Went to: TU Eindhoven (Assistant Professor, Math)

- **Rodrigo Aldecoa**
  Ph.D. in Computer Science, Instituto de Biomedicina de Valencia
  Advisor: Ignacio Marín
  Went to: BlipIQ
- **Konstantine Zuev**
  Ph.D. in Mathematics, Moscow State University
  Advisor: Alexey Bolsinov and Anatoly Fomenko
  Went to: Caltech (Assistant Teaching Professor, Math)
- **Michel Buck**
  Ph.D. in Physics, Imperial College London
  Advisor: Fay Dowker
  Went to: G-Research
- **Chiara Orsini**
  Ph.D. in Information Engineering, University of Pisa
  Advisor: Luciano Lenzini
  Went to: Amazon
- **Massimo Ostilli**
  Ph.D. in Physics, University of Rome "La Sapienza"
  Advisor: Carlo Presilla
  Went to: Universidade Federal de Santa Caterina (Postdoc)
- **Fragkiskos Papadoupolos**
  Ph.D. in Electrical and Computer Engineering, University of Southern California
  Advisor: Konstantinos Psounis
  Went to: Cyprus University of Technology (Assistant Professor, ECE)

- Graduate students and interns
  - **Jasper van der Kolk**
    University of Barcelona
  - **Narayan Sabhahit**
    Northeastern University
  - **Moritz Laber**
    Northeastern University
  - **Harrison Hartle**
    Northeastern University
    Went to: Santa Fe Institute (Omidyar Postdoctoral Fellow)
  - **Cory Glover**
    Northeastern University
    Went to: Northeastern University
  - **Ivan Voitalov**
    Northeastern University
    Went to: Scipher Medicine Corporation
  - **Will Cunningham**
    Northeastern University
    Went to: Perimeter Institute (Postdoc)
  - **Maksim Piskunov**
    Northeastern University
    Went to: Northeastern University
  - **Pol Colomer de Simon**
    University of Barcelona
    Went to: Data Research in Business Intelligence Analytics

- **Chiara Orsini**
  University of Pisa
  Went to: University of California San Diego
- **Fragkiskos Papadoupolos**
  University of Southern California
  Went to: University of California San Diego
- **Xuemei Ding**
  University of California San Diego
  Went to: Google
- **Srinivas Shakkottai**
  University of Illinois at Urbana-Champaign
  Went to: Texas A&M University
- **Xenofontas Dimitropoulos**
  Georgia Institute of Technology
  Went to: ETH Zürich
- **Priya Mahadevan**
  University of California San Diego
  Went to: Palo Alto Research Center
- **Almerima Jamakovic**
  Delft University of Technology
  Went to: TNO Information and Communication Technology
- **Benoit Donnet**
  Université Pierre et Marie Curie
  Went to: Université catholique de Louvain
- **Yihua He**
  University of California Riverside
  Went to: Yahoo Research
- **Jasmine Lie Zan**
  University of California Irvine
  Went to: Rockwell Collins
- **Raymond Liu**
  University of California Los Angeles
  Went to: Scalable Network Technologies

- Undergraduate students
  - **Tyler Krasnigor**
    Northeastern University
  - **Huck Stepanyants**
    Northeastern University
  - **Jeremy Paton**
    Northeastern University
    Went to: DraftKings
  - **Or Eisenberg**
    Northeastern University
    Went to: Harvard University
- Middle school interns
  - **Luca Pieleanu**
    Sharon Middle School

OTHER COLLABORATORS

- Northeastern University, Boston, Massachusetts
  - **Gabor Lippner** (Mathematics)
  - **Jim Halverson** (Physics)
  - **Brent Nelson** (Physics)
  - **Jonathan Carifio** (Physics)
  - **Cody Long** (Physics)
- University of Cambridge, Cambridge, United Kingdom
  - **Alan Frank Beardon** (Mathematics)
- University of Barcelona, Barcelona, Spain
  - **Marian Boguñá** (Physics)
  - **Mariángeles Serrano** (Physics)
  - **Pedro Almagro** (Physics)
- Tallinn University, Tallinn, Estonia
  - **Misha Tamm** (Physics)
- Technion – Israel Institute of Technology, Haifa, Israel
  - **Omer Bobrowski** (Mathematics)
- Bar-Ilan University, Ramat Gan, Israel
  - **Shlomo Havlin** (Physics)
  - **Ivan Bonamassa** (Physics)
- Center for Information Technology, Fondazione Bruno Kessler, Povo – Trento, Italy
  - **Manlio De Domenico** (Physics)
- Eindhoven University of Technology, Eindhoven, Netherlands
  - **Remco van der Hofstad** (Mathematics)
- Indiana University, Bloomington, Indiana
  - **Filippo Radicchi** (Physics)
- Queen Mary University of London, London, United Kingdom
  - **Ginestra Bianconi** (Mathematics)
  - **Alexander Kartun-Giles** (Mathematics)
- Boston University, Boston, Massachusetts
  - **Paul Krapivsky** (Physics)
- University of Limerick, Limerick, Ireland
  - **James Gleeson** (Mathematics)
- University of Zaragoza, Zaragoza, Spain
  - **Yamir Moreno** (Physics)
- Swiss Scientific, Genève, Switzerland
  - **Carlo Trugenberger** (Physics)
- University of Virginia, Charlottesville, Virginia
  - **Alexander Ganin** (Systems and Information Engineering)
- Arizona State University, Tempe, Arizona
  - **Daniel Eisenberg** (Civil Engineering)
- Naval Postgraduate School, Monterey, California
  - **David Alderson** (Operations Research)
- U.S. Army Engineer Research and Development Center, Concord, Massachusetts
  - **Igor Linkov** (Civil Engineering)
- University of California Los Angeles, Los Angeles, California
  - **Lixia Zhang** (Computer Science)

- University of Memphis, Memphis, Tennessee
    - **Lan Wang, Vince Lehman, Ashlesh Gawande** (Computer Science)
- University of Arizona, Tucson, Arizon
    - **Beichuan Zhang** (Computer Science)
- Simula Research, Oslo, Norway
    - **Ahmed Elmokashfi** (Computer Science)
- Aalto University, Helsinki, Finland
    - **Santo Fortunato** (Computer Science)
    - **Marija Dankulov** (Biomedical Engineering and Computational Science)
- IMT Alti Studi, Lucca, Italy
    - **Guido Caldarelli** (Physics)
- University of Notre Dame, Notre Dame, Indiana
    - **Zoltán Toroczkai** (Physics)
- University of Houston, Houston, Texas
    - **Kevin Bassler** (Physics)
- Budapest University of Technology and Economics, Budapest, Hungary
    - **András Gulyás** (Electrical Engineering and Informatics)
    - **József Bíró** (Electrical Engineering and Informatics)
    - **Attila Kőrösi** (Electrical Engineering and Informatics)
    - **Gábor Rétvári** (Electrical Engineering and Informatics)
- Italian National Research Council, Pisa, Italy
    - **Enrico Gregory** (Institute of Informatics and Telematics)
- University of Pisa, Pisa, Italy
    - **Luciano Lenzini** (Information Engineering)
- Bank of Canada, Ottawa, Ontario, Canada
    - **Kartik Anand** (Physics)
- University of California San Diego, San Diego, California
    - Cooperative Association for Internet Data Analysis
        - **kc claffy**
        - **Marina Fomenkov**
        - **Ryan Koga**
        - **Young Hyun**
        - **Ken Keys**
        - **Bradley Huffaker**
    - Mathematics
        - **David Rideout**
        - **David Meyer**
        - **Fan Chung**
    - Neurosciences Institute
        - **Ralph Greenspan**
    - Computer Science and Engineering
        - **Amin Vahdat**
        - **Charles Elkan**
    - San Diego Supercomputer Center
        - **Robert Sinkovits**
- Cyprus University of Technology, Limassol, Cyprus
    - **Constantinos Psomas** (Electrical and Computer Engineering)
- Georgia Institute of Technology, Atlanta, Georgia
    - **George Riley** (Electrical and Computer Engineering)

- Intel Research, Berkeley, California
  - **Kevin Fall** (Computer Science)
- Tufts University, Boston, Massachusetts
  - **Arthur Brady** (Computer Science)
- Northeastern University, Boston, Massachusetts
  - **Alessandro Vespignani** (Physics)
- AT&T Research, Florham Park, New Jersey
  - **Walter Willinger** (Computer Science)
- Duke University, Durham, North Carolina
  - **Xiaowei Yang** (Computer Science)

PUBLICATIONS ('♯' marks >100 citations according to Google Scholar)

- **Refereed articles**
  - I. A. Kasyanov, P. van der Hoorn, D. Krioukov, and M.V. Tamm,
    Nearest-Neighbor Directed Random Hyperbolic Graphs,
    Physical Review E, v.108, 054310, 2023 (DOI, arXiv),
    One-sentence abstract: A directed version of random hyperbolic graphs.
  - P. van der Hoorn, G. Lippner, C. Trugenberger, and D. Krioukov,
    Ollivier Curvature of Random Geometric Graphs Converges to Ricci Curvature of their Riemannian Manifolds,
    Discrete & Computational Geometry, v.70(3), p.671-712, 2023 (DOI, arXiv),
    One-sentence abstract: The proofs of the results announced here.
  - J. Paton, H. Hartle, H. Stepanyants, P. van der Hoorn, and D. Krioukov,
    Entropy of Labeled versus Unlabeled Networks,
    Physical Review E, v.106, 054308, 2022 (DOI, arXiv),
    One-sentence abstract: In sparse labeled networks, the noise of meaningless labeling can overpower the network-structural signal, as demonstrated by the comparison of the entropies of labeled and unlabeled random geometric graphs.
  - H. Hartle, F. Papadopoulos, and D. Krioukov,
    Dynamic Hidden-Variable Network Models,
    Physical Review E, v.103, 052307, 2021 (DOI, arXiv),
    One-sentence abstract: A generalization of network models with hidden variables to dynamic hidden variables and dynamic links.
  - P. van der Hoorn, W. Cunningham, G. Lippner, C. Trugenberger, and D. Krioukov,
    Ollivier-Ricci Curvature Convergence in Random Geometric Graphs,
    Physical Review Research, v.3, 013211, 2021 (DOI, arXiv, software),
    One-sentence abstract: Ollivier curvature of random geometric graphs in any Riemannian manifold converges to Ricci curvature of the manifold in the continuum limit.
  - M. Boguna, I. Bonamassa, M. De Domenico, S. Havlin, D. Krioukov, M. Angeles Serrano,
    ♯ **Network Geometry**,
    Nature Reviews Physics, v.3, 114-135, 2021 (DOI, arXiv),
    One-sentence abstract: Network geometry review.
  - I. Voitalov, P. van der Hoorn, M. Kitsak, F. Papadopoulos, and D. Krioukov,
    Weighted Hypersoft Configuration Model,
    Physical Review Research, v.2, 043157, 2020 (DOI, arXiv, software),
    One-sentence abstract: The maximum entropy model of weighted networks with a given joint distribution of degrees and strengths.

- M. Kitsak, I. Voitalov, and D. Krioukov,
  Link Prediction with Hyperbolic Geometry,
  Physical Review Research, v.2, 043113, 2020 (DOI, arXiv, software),
  One-sentence abstract: The harder a link to predict, the better off the hyperbolic geometry is at predicting it.
- F. Radicchi, D. Krioukov, H. Hartle, and G. Bianconi,
  Classical Information Theory of Networks,
  Journal of Physics: Complexity, v.1, 025001, 2020 (DOI, arXiv),
  One-sentence abstract: Heterogeneity emerges from the maximum entropy principle.
- M. Boguna, D. Krioukov, P. Almagro, and M. Angeles Serrano,
  Small Worlds and Clustering in Spatial Networks,
  Physical Review Research, v.2, 023040, 2020 (DOI, arXiv),
  One-sentence abstract: Necessary and sufficient conditions for small worldness and nonvanishing clustering in homogeneous and heterogeneous soft random geometric graphs.
- I. Voitalov, P. van der Hoorn, R. van der Hofstad, and D. Krioukov,
  ♯ **Scale-Free Networks Well Done**,
  Physical Review Research, v.1, 033034, 2019 (DOI, arXiv, software and data),
  Press: TU/e,
  One-sentence abstract: A proper way to deal with power laws in network science.
- J. Carifio, W. Cunningham, J. Halverson, D. Krioukov, C. Long, and B. Nelson,
  Vacuum Selection from Cosmology on Networks of String Geometries,
  Physical Review Letters, v.121, 101602, 2018 (DOI, arXiv),
  One-sentence abstract: String theory landscape networks of string geometries provide new tools to study the vacuum selection problem in cosmology in the context of eternal inflation.
- W. Cunningham and D. Krioukov,
  Causal Set Generator and Action Computer,
  Computer Physics Communications, v.233, p.123-133, 2018 (DOI, arXiv, software),
  One-sentence abstract: An optimized software package to generate causal sets sprinkled over Lorentzian manifolds, and to compute their Benincasa-Dowker action.
- A. Kartun-Giles, D. Krioukov, J.P. Gleeson, Y. Moreno, and G. Bianconi,
  Sparse Power-Law Network Model for Reliable Statistical Predictions Based on Sampled Data,
  Entropy, v.20, n.4, p.257, 2018 (DOI, arXiv),
  One-sentence abstract: A projective but not exchangeable formulation of the hypersoft configuration model.
- M. Kitsak, A. Ganin, D. Eisenberg, P. Krapivsky, D. Krioukov, D. Alderson, and I. Linkov,
  Stability of a Giant Connected Component in a Complex Network,
  Physical Review E, v.97, 012309, 2018 (DOI, arXiv),
  One-sentence abstract: The higher the node degree, the higher the probability that it belongs to the giant connected component in bond percolation.
- W. Cunningham, D. Rideout, J. Halverson, and D. Krioukov,
  Exact Geodesic Distances in FLRW Spacetimes,
  Physical Review D, v.96, 103538, 2017 (DOI, arXiv),
  One-sentence abstract: An exact formula for the geodesic distance between a pair of points in any spatially flat FLRW spacetime.

- P. van der Hoorn, G. Lippner, and D. Krioukov,
  Sparse Maximum-Entropy Random Graphs with a Given Power-Law Degree Distribution,
  Journal of Statistical Physics, 2017 (DOI, arXiv),
  One-sentence abstract: The hypersoft configuration model maximizes graph entropy under the power-law degree distribution constraint in the large-graph limit.
- J. Carifio, J. Halverson, D. Krioukov, and B. Nelson,
  ♯ **Machine Learning in the String Landscape**,
  Journal of High Energy Physics (JHEP), v.2017, p.157, 2017 (DOI, arXiv),
  Press: Science Trends
  One-sentence abstract: Machine learning can be used for numeric predictions and for suggesting new rigorous results in string landscapes.
- I. Voitalov, R. Aldecoa, L. Wang, and D. Krioukov,
  Geohyperbolic Routing and Addressing Schemes,
  ACM SIGCOMM Computer Communication Review (CCR), v.47, n.3, p.11-18, 2017 (DOI, arXiv, software and data),
  One-sentence abstract: Geohyperbolic addressing and network design schemes, combining geographic and centrality addressing into hyperbolic addressing, allow for maximally scalable, efficient and robust routing in dynamic networks.
- W. Cunningham, K. Zuev, and D. Krioukov,
  Navigability of Random Geometric Graphs in the Universe and Other Spacetimes,
  Nature Scientific Reports, v.7, p.8699, 2017 (DOI, arXiv),
  One-sentence abstract: A universe is navigable only if contains dark energy.
- M. Kitsak, F. Papadopoulos, and D. Krioukov,
  Latent Geometry of Bipartite Networks,
  Physical Review E, v.95, 032309, 2017 (DOI, arXiv),
  One-sentence abstract: Strong bipartite clustering and power-law distributions of the number of common neighbors are signature of latent geometry in bipartite networks, which can be inferred using the common neighbor statistics.
- V. Lehman, A. Gawande, R. Aldecoa, D. Krioukov, L. Wang, B. Zhang, and L. Zhang,
  ♯ **An Experimental Investigation of Hyperbolic Routing with a Smart Forwarding Plane in NDN,**
  IEEE/ACM International Symposium on Quality of Service (IWQoS), 2016 (DOI, arXiv),
  One-sentence abstract: Hyperbolic routing performance at the packet level in Named Data Networking is orders of magnitude more efficient than traditional routing protocols.
- D. Krioukov,
  Clustering Implies Geometry in Networks,
  Physical Review Letters, v.116, 208302, 2016 (DOI, arXiv),
  One-sentence abstract: Networks with strong homogeneous clustering are geometric.
- K. Zuev, F. Papadopoulos, and D. Krioukov,
  Hamiltonian Dynamics of Preferential Attachment,
  Journal of Physics A: Mathematical and Theoretical, v.49, n.10, p.105001, 2016 (DOI, arXiv),
  One-sentence abstract: Soft preferential attachment and soft configuration model are the same ensembles of random graphs with the same Hamiltonian appearing in Hamilton's equations describing preferential attachment dynamics of networks.

- M. Kitsak, A. Elmokashfi, S. Havlin, and D. Krioukov,
  Long-Range Correlations and Memory in the Dynamics of Internet Interdomain Routing,
  PLOS ONE 10(11): e0141481, 2015 (DOI, arXiv, data),
  One-sentence abstract: Time series of BGP updates are characterized by power laws, long-range correlations, and memory effects.
- K. Zuev, O. Eisenberg, and D. Krioukov,
  Exponential Random Simplicial Complexes,
  Journal of Physics A: Mathematical and Theoretical, v.48, n.46, p.465002, 2015 (journal cover featured article, IOPselect) (DOI, arXiv),
  One-sentence abstract: Generalization of edge-independent exponential random graph models to simplicial complexes.
- C. Orsini, M. Mitrovic Dankulov, P. Colomer-de-Simon, A. Jamakovic, P. Mahadevan, A. Vahdat, K. Bassler, Z. Toroczkai, M. Boguna, G. Caldarelli, S. Fortunato, and D. Krioukov,
  ♯ **Quantifying Randomness in Real Networks**,
  Nature Communications, v.6, p.8627, 2015 (DOI, arXiv, software),
  One-sentence abstract: Many real networks are 2.5k-random, where 2.5k = degrees + correlations + clustering.
- R. Aldecoa, C. Orsini, and D. Krioukov,
  Hyperbolic Graph Generator,
  Computer Physics Communications, v.196, p.492-296, 2015 (DOI, arXiv, software),
  One-sentence abstract: A description of the software package to generate hyperbolic and other random graphs.
- F. Papadopoulos, R. Aldecoa, and D. Krioukov,
  ♯ **Network Geometry Inference using Common Neighbors**,
  Physical Review E, v.92, 022807, 2015 (DOI, arXiv, software),
  One-sentence abstract: The common neighbor similarity statistics allows to infer hyperbolic geometry from network structure even more accurately.
- A. Gulyas, J. Biro, A. Korosi, G. Retvari, and D. Krioukov,
  Navigable Networks as Nash Equilibria of Navigation Games,
  Nature Communications, v.6, p.7651, 2015 (DOI, arXiv),
  Press: NU, NU2, U.S. News & World Report, International Business Times, R&D Magazine, redOrbit, PhysOrg, Scicasts, BPoD, index, Tendencias21, Espectador, ...
  One-sentence abstract: Nash equilibrium networks that have the smallest possible number of links required to maintain 100% navigability, form skeletons of real networks and share with them their basic structural properties.
- K. Zuev, M. Boguna, G. Bianconi, and D. Krioukov,
  ♯ **Emergence of Soft Communities from Geometric Preferential Attachment**,
  Nature Scientific Reports, v.5, p.9421, 2015 (DOI, arXiv),
  One-sentence abstract: Scale-free degree distributions, strong clustering, and soft community structure emerge from geometric preferential attachment, similar to inflation models in cosmology.
- F. Papadopoulos, C. Psomas, and D. Krioukov,
  ♯ **Network Mapping by Replaying Hyperbolic Growth**,
  IEEE/ACM Transactions on Networking, v.23, n.1, p.198-211, 2015 (DOI, arXiv, software),
  One-sentence abstract: A simple and accurate method to map complex networks to their hyperbolic spaces.

- C. Orsini, E. Gregori, L. Lenzini, and D. Krioukov,
  Evolution of the Internet *k*-dense structure,
  IEEE/ACM Transactions on Networking, v.22, n.6, p.1769-1780, 2014 (DOI, arXiv),
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  One-sentence abstract: A review of canonical models of random simplicial complexes and their most exciting features.

- M. Mitrovic Dankulov, G. Caldarelli, S. Fortunato, and D. Krioukov,
  Classifying Networks with *dk*-series,
  In *Multiplex and Multilevel Networks (S. Battiston, G. Caldarelli, and A. Garas (edt.))*,
  Oxford University Press, Oxford, UK, 2019 (DOI, Amazon),
  One-sentence abstract: A generalization of *dk*-series to multiplex and multilayer networks.
- D. Krioukov,
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Patents

- D. Krioukov and I. Voitalov,
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Technical reports and arXiv'es

- P. van der Hoorn, I. Voitalov, R. van der Hofstad, and D. Krioukov,
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  One-sentence abstract: Some comments about that scale-free networks are rare.
- A. Jamakovic, P. Mahadevan, A. Vahdat, M. Boguna, and D. Krioukov,
  How Small Are Building Blocks of Complex Networks (arXiv, 2015),
  One-sentence abstract: The global structure of complex networks is statistically determined by the probability of the presence of links between node triples, once this probability accounts for the degree of the individual nodes.
- P. Mahadevan, D. Krioukov, M. Fomenkov, B. Huffaker, X. Dimitropoulos, kc claffy, and A. Vahdat,
  ♯ **Lessons from Three Views of the Internet Topology**,
  CAIDA technical report CAIDA-TR-2005-02, 2005 (CAIDA, arXiv),
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- D. Krioukov, K. Fall, and X. Yang,
  Compact Routing on Internet-Like Graphs,
  Intel Research technical report IRB-TR-03-10 (arXiv),
  One-sentence abstract: Compact routing on scale-free networks yields essentially the best possible trade-off between the average stretch (optimality of paths) and size of routing tables (memory requirements per node).

Internet Research Task Force (IRTF) publications

- E. Davies, A. Doria, H. Berkowitz, D. Krioukov, M. Carlzon, A. Bergsten, O. Pers, Y. Jiang, L. Carr-Motyckova, P. Fransson, O. Schelen, and T. Madsen,
  Analysis of Inter-Domain Routing Requirements and History,
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- E. Davies, A. Doria, H. Berkowitz, D. Krioukov, M. Carlzon, A. Bergsten, O. Pers, Y. Jiang, L. Carr-Motyckova, P. Fransson, O. Schelen, and T. Madsen,
  Future Domain Routing Requirements,
  Routing Research Working Group ID, 2001 (pdf, txt).

- H. Berkowitz and D. Krioukov,
  To Be Multihomed: Requirements and Definitions,
  Network Working Group ID, 2001 (pdf, txt).

- **White papers**
  - **Video Codecs: Comparative Analysis and Performance Evaluation**
    Nortel Networks, 2001
  - **MPLS Layer 2 VPNs**
    Nortel Networks, 2001
  - **Virtual Block Injection (VBI): the Specification of a New Content Routing Algorithm**
    Nortel Networks, 2001

INVITED TALKS

- *Workshop on Discrete Random Structures*
  EPFL, Lausanne, Switzerland, August 2023
  Entropy of sparse unlabeled random graphs

- *Random Graphs: Combinatorics, Complex Networks and Disordered Systems*
  Oberwolfach Research Institute for Mathematics, Oberwolfach, Germany, March 2023
  Entropy of sparse unlabeled random graphs

- Department of Mathematics, University of Massachusetts, Boston, Massachusetts, March 2023
  Network Geometry

- *Physics and Astronomy Complex Systems Seminar*
  Northwestern University, Evanston, Illinois (online), October 2020
  Ollivier-Ricci curvature convergence in random geometric graphs

- *Multiscale & Integrative compleXNetworks: EXperiments & Theories (MIX-NEXT), NetSci*
  Rome, Italy (online), September 2020
  Ollivier-Ricci curvature convergence in random geometric graphs

- *Heavy Tails Workshop*
  Einhoven University of Technology, Eindhoven, Netherlands, December 2019
  Power Loss with Power Laws

- *Complex Simplex: Topological and Network Data Science Workshop*
  Politecnico di Torino, ISI Foundation, Torino, Italy, October 2019
  Keynote: Power Loss with Power Laws

- *International Workshop on Theoretical Perspectives in Network Science*
  APTCP, Seoul National University, Seoul, South Korea, December 2018
  Network science extremes: From power laws to probabilistic symmetries

- BBN Technologies, Cambridge, Massachusetts, July 2018
  Geohyperbolic routing and addressing schemes

- Department of Statistics, University of California Davis, Davis, California, May 2018
  Exchangeability and projectivity in sparse random graphs

- *Macfang Workshop*
  Barcelona, Spain, November 2017
  Keynote: Random geometric graphs as models of complex networks

- *Workshop on Random Geometric Graphs*
  The Fields Institute, Toronto, ON, Canada, June 2017
  Random geometric graphs as models of complex networks
- *NETWORKS Scientific Conference*
  Amsterdam, Netherlands, June 2017
  The maximum-entropy principle in modeling complex networks
- Higher School of Economics, Moscow, Russia, May 2017
  Navigable networks as Nash equilibria of navigation games
- *Applied and Computational Algebraic Topology Conference*
  Hausdorff Research Institute for Mathematics, Bonn, Germany, May 2017
  Exponential random simplicial complexes
- *Mathematical Physics Workshop on Discrete Geometry and Statistics*
  Chulalongkorn University, Bangkok, Thailand, January 2017
  Clustering implies latent geometry in random graphs
- *Applied and Interdisciplinary Mathematics Seminar*
  Northeastern University, Boston, Massachusetts, January 2017
  Clustering implies geometry in networks
- *Random Geometric Graphs and Their Applications to Complex Networks*
  Banff International Research Station, Banff, Alberta, Canada, November 2016
  Clustering implies geometry in networks
- *Quantitative Network Science Workshop on*
  Building Bridges between Computational, Mathematical and Statistical Networks Analysis
  Ludwig-Maximilian University, Center for Advanced Studies,
  Munich, Germany, October 2016
  Configuration model and preferential attachment are equivalent
- *Conference on Complex Systems*
  Amsterdam, Netherlands, September 2016
  Clustering implies geometry in networks
- *Generalized Network Structures & Dynamics*
  Ohio State University, Columbus, Ohio, March 2016
  Exponential Random Simplicial Complexes
- *APS March Meeting: Inference in Complex Networks*
  Baltimore, Maryland, March 2016
  Clustering means geometry in networks
- *Workshop on Big Graphs: Theory and Practice*
  University of California San Diego, La Jolla, California, January 2016
  Clustering means geometry in large sparse graphs
- Department of Computer Science, Worcester Polytechnic Institute,
  Worcester, Massachusetts, September 2015
  First principles behind network structure, function, and dynamics
- *Network Geometry Workshop*
  Queen Mary University of London, London, United Kingdom, July 2015
  Emergence of Geometry from Discrete Random Structures

- *Conference on Socio-physics and Socio-engineering*
  Moscow State University, Moscow, Russia, June 2015
  First principles behind network structure, function, and dynamics

- *International School and Conference on Network Science*
  NetSci, Zaragoza, Spain, June 2015
  First principles behind network structure, function, and dynamics

- *Advances in Discrete Networks*
  Department of Mathematics, University of Pittsburgh,
  Pittsburgh, Pennsylvania, December 2014
  Lorentz-invariant edge-independent maximum-entropy ensembles of random graphs and simplicial complexes

- *Topology and Geometry of Networks and Discrete Metric Spaces*
  Institute for Mathematics and its Applications, University of Minnesota,
  Minneapolis, Minnesota, April 2014
  Lorentzian geometry of complex networks

- Department of Physics, California State University Long Beach,
  Long Beach, California, April 2014
  Large graphs in physics:
  From statistical mechanics of networks to quantum cosmology

- Department of Mathematics, Northeastern University,
  Boston, Massachusetts, February 2014
  Random geometric graphs, Apollonian packings, number networks, and the Riemann hypothesis

- Center for Complex Network Research, Northeastern University,
  Boston, Massachusetts, February 2014
  Complex networks in quantum gravity and cosmology

- *Bell Labs-NIST Workshop on Large-Scale Networks*
  Bell Labs, Murray Hill, New Jersey, October 2013
  Duality between static and dynamic networks

- *IQC workshop on quantum computation and complex networks*
  Institute for Quantum Computing, University of Waterloo,
  Waterloo, Ontario, Canada, May 2013
  Complex Networks in Quantum Gravity

- *Structure, Statistical Inference and Dynamics in Networks: From Graphs to Rich Data*
  Santa Fe Institute, Santa Fe, New Mexico, May 2013
  Inferring Latent Geometries of Real Networks

- *SIAM Conference on Computational Science & Engineering (CSE)*
  SIAM, Boston, Massachusetts, March 2013
  Popularity versus Similarity in Growing Networks

- Northeastern University, Boston, Massachusetts, February 2013
  Physics and Geometry of Networks

- University of Southern California, Information Sciences Institute,
  Los Angeles, California, November 2012
  Popularity versus Similarity in Growing Networks

- University of Houston, Houston, Texas, November 2012
  Large graphs in physics:
  From statistical mechanics of networks to quantum cosmology
- *DARPA GRAPHS Kickoff*
  DARPA, Chicago, Illinois, July 2012
  The Universal Laws of Structural Dynamics in Large Graphs
- *DARPA Mathematics Summit*
  DARPA, Lake Tahoe, Nevada, February 2012
  Hyperbolic Geometry of Large Networks
- California Institute of Technology, Pasadena, California, February 2012
  Popularity versus Similarity in Growing Networks
- University of Maryland, College Park, Maryland, November 2011
  Popularity versus Similarity in Growing Networks
- *Geometry of Large Networks*
  American Institute of Mathematics, Palo Alto, California, October 2011
  Geometry of Large Networks
- *Large Graphs: Modeling, Algorithms, and Applications*
  Institute for Mathematics and Its Applications, Minneapolis, Minnesota, October 2011
  Popularity versus Similarity in Growing Networks
- *Geometry of Networks*
  Bell Labs, Murray Hill, New Jersey, April 2011
  Hyperbolic Geometry of Complex Networks
- *Decision Making: Bridging Psychophysics and Neurophysiology*
  University of North Texas, Denton, Texas, March 2011
  Percolation in Self-Similar Networks
- *Different Angles on Network Complexity, Engineering, and Science*
  University of California San Diego, San Diego, California, December 2010
  Complex Network Geometry and Navigation
- Bielefeld University, Bielefeld, Germany, November 2010
  Hyperbolic Geometry of Complex Networks
- *Robustness of Complex Networks*
  Delft University of Technology, Delft, Netherlands, November 2010
  Robustness of Targeted Transport in Complex Networks
- University Pierre & Marie Curie, Paris, France, July 2010
  Optimal Routing in a Hyperbolically Mapped Internet
- *Toward Evolutive Routing Algorithms for Scale-Free/Internet-Like Networks*
  Laboratoire Bordelais de Recherche en Informatique, Bordeaux, France, July 2010
  Optimal Routing in a Hyperbolically Mapped Internet
- *Algorithms for Modern Massive Data Sets*
  Stanford University, Palo Alto, California, June 2010
  Hyperbolic Mapping of Complex Networks

- *Shared Organizing Principles in the Computing and Biological Sciences*
  National Science Foundation, Arlington, Virginia, May 2010
  Navigability of Networks
- *Decision Making: A Psychophysics Application of Network Science*
  University of North Texas, Denton, Texas, January 2010
  Navigability of Complex Networks
- *Center for Applied Mathematical Sciences*
  University of Southern California, Los Angeles, California, October 2009
  Hyperbolic Geometry of Complex Networks
- *Southern California Symposium on Network Economics and Game Theory*
  University of Southern California, Los Angeles, California, October 2009
  Evolution of the Internet Ecosystem
- Telefonica Research, Barcelona, Spain, June 2009
  ***dK*-series and Hidden Hyperbolic Metric Spaces**
- *Future Internet Design Meeting*
  National Science Foundation, Arlington, Virginia, April 2009
  Hidden Metric Spaces and Navigability of Complex Networks
- *BCNet Workshop*
  University of Barcelona, Barcelona, Spain, December 2008
  Keynote: Hyperbolic Geometry and Scale-Free Topology of Complex Networks
- IBM Research, Zürich, Switzerland, June 2008
  Routing in the Internet and Navigability of Scale-Free Networks
- ETH, Zürich, Switzerland, June 2008
  Routing in the Internet and Navigability of Scale-Free Networks
- University of Barcelona, Barcelona, Spain, June 2008
  Routing in the Internet and Navigability of Scale-Free Networks
- *Institute for Cross-Disciplinary Physics and Complex Systems*
  University of Balearic Islands, Palma de Mallorca, Spain, June 2008
  Routing in the Internet and Navigability of Scale-Free Networks
- University of Aveiro, Aveiro, Portugal, May 2008
  What We Know and What We Do Not Know about the Internet
- *Center for Networked Systems*
  University of California San Diego, San Diego, California, July 2007
  Generating Realistic Network Traffic and Topologies
- *DoD GIG Routing and Addressing Workshop*
  SRI International, Arlington, Virginia, February 2007
  Topology and Routing
- University Paris Diderot, Paris, France, June 2006
  ***dK*-series: Systematic Topology Analysis and Generation Using Degree Correlations**
- University Pierre & Marie Curie, Paris, France, June 2006
  Something We Always Wanted to Know about ASs: Relationships and Taxonomy

- University of California Berkeley, Berkeley, California, April 2006
  Flat Routing on Curved Spaces
- Microsoft Research, Redmond, Washington, September 2003
  Compact Routing on Internet-Like Graphs
- Intel Research, Berkeley, California, September 2003
  Compact Routing on Internet-Like Graphs
- International Computer Science Institute, Berkeley, California, September 2003
  Compact Routing on Internet-Like Graphs
- *Midnight Sun Routing Workshop*
  Luleå University of Technology, Luleå, Sweden, June 2002
  Project for a ®Evolution in Data Network Routing:
  the Kleinrock Universe and Beyond