Kirill S. Korolev

Associate Professor in Physics and Bioinformatics, Boston University
590 Commonwealth Avenue, Boston, MA 02215; Metcalf Science Building, Rm. 255
www.kirillkorolev.com

EDUCATION

Harvard University, Cambridge, MA
- **Ph.D. in theoretical condensed matter physics** — May 2010
  Thesis: Statistical physics of topological emulsions and expanding populations
  Advisor: David R. Nelson

Moscow Institute of Physics and Technology (MIPT), Dolgoprudny, Russia
- **B.S. *with highest honors* in applied physics and applied mathematics** — July 2005
  Undergraduate thesis: Magnetization relaxation in monocrystals of YBaCuO
  Advisor: Lyudmila S. Uspenskaya

APPOINTMENTS

- Associate Professor (with tenure), *Boston University* — 2020–present
  Joint appointment between the Department of Physics and the Graduate Program in Bioinformatics
- Assistant Professor, *Boston University* — 2013–2020
  Joint appointment between the Department of Physics and the Graduate Program in Bioinformatics
- Pappalardo Postdoctoral Fellow, *MIT* — 2010–2013
  Advisors: Leonid A. Mirny and Jeff Gore
- Postdoctoral Fellow, *Harvard University* — 2010
  Advisor: David R. Nelson

HONORS AND AWARDS

- Cottrell Scholar, *Research Corporation for Science Advancement (RCSA)* — 2017
- Simons Investigator in the Mathematical Modeling of Living Systems, *Simons Foundation* — 2016
- Junior Faculty Fellow, *Hariri Institute for Computing* — 2015
- Scialog Fellow, *Research Corporation for Science Advancement* — 2014–2016
- Pappalardo Postdoctoral Fellow, *MIT* — 2010–2013
- Certificate of Distinction in Teaching, *Harvard University* — 2009
- Goldhaber Prize to an outstanding PhD candidate, *Harvard University* — 2008
- Purcell Fellowship to incoming PhD students, *Harvard University* — 2005–2006
- Scholarship for academic excellence, *MIPT* — 2002–2005
- Potanin Fellowship, *MIPT* — 2002–2005
- Gold medal International Physics Olympiad (IPhO) XXXII, Turkey — 2001

FUNDING

Current
- Title: Relationship between genealogies and biophysical processes during spatial growth
  Role: Principal Investigator
  Sponsor: NIH/NIGMS
  Award Number: 1R01GM138530-01 (PI: KOROLEV)
  Dates: 09/11/2020-06/30/2026

Total Costs to Korolev lab: $1,424,380

- Title: Spatio-temporal mechanistic modeling of whole-cell tumor metabolism
  Role: Investigator
  Sponsor: NIH/NCI
  Award Number: 1R21CA279630-01 (PI: SEGRE)
  Dates: 05/01/2023-04/30/2025
  Total Costs: $424,257

Completed

- Title: Modeling the Emergence of MRSA Strains
  Role: Sub-Award PI
  Sponsor: NIH/NCI
  Award Number: SP14274-SB1 (PI: Robinson)
  Dates: 08/19/2021-07/31/2023
  Direct Costs: $3,588

- Title: Simons Investigator in the Mathematical Modeling of Living Systems
  Role: Principal Investigator
  Sponsor: Simons Foundation
  Award Number: 409704 (PI: KOROLEV)
  Dates: 08/01/2016 - 07/31/2021
  Total Costs to Korolev lab: $660,000

- Title: Chiral pattern formation and the benefits of chirality
  Role: Principal Investigator
  Sponsor: Research Corporation for Science Advancement
  Award Number: 24010 (PI: KOROLEV)
  Dates: 07/01/2017 - 06/30/2020
  Direct Costs to Korolev lab: $100,000

- Title: The evolutionary dynamics of temporal division of labor
  Role: Principal Investigator
  Sponsor: Research Corporation for Science Advancement
  Award Number: 26119 (PIs: KOROLEV & KIM)
  Dates: 10/01/2018 - 09/31/2019
  Total Costs to Korolev lab: $55,000

- Title: What is fitness in expanding populations?
  Role: co-Principal Investigator
  Sponsor: Gordon and Betty Moore Foundation
  Award Number: 6790.08 (PIs: KOROLEV & KIM)
  Dates: 07/26/2017 - 07/25/2018
  Total Costs to Korolev lab: $56,250

- Title: Social Networks at Microscale
  Role: co-Principal Investigator
  Sponsor: Hariri Institute for Computing and Computational Science & Engineering
  Award Number: 2016-10-005 (PIs: KOROLEV & SEGRE)
  Dates: 01/01/2017 - 12/31/2017

Direct Costs to Korolev lab: $10,000

- Title: Hariri Junior Faculty Fellow
  Role: Principal Investigator
  Sponsor: Hariri Institute for Computing and Computational Science & Engineering
  Direct Costs to Korolev lab: $5,000

TEACHING EXPERIENCE

Boston University

- Introduction to Computational Physics — Spring 2025-2026
- Statistical Mechanics I — Fall 2023-2025
- General Physics I — Spring 2023-2024
- Foundations of Programming, Data Analytics, and Machine Learning in Python — Fall 2019-2020
- Computational Physics — Fall 2019-2020
- Computational and Quantitative Reasoning for Bioinformatics and Systems Biology — Fall 2018
- Mathematical Physics — Fall 2013–2018
- Dynamics and Evolution of Biological Networks — Spring 2014–2017
- Bioinformatics Graduate Seminar — Spring 2014–2017

Harvard University

- Departmental Teaching Fellow; Physics Department — 2009–2010
  Ran a training program in pedagogy for new Teaching Fellows
- Physical Sciences 2; Head Teaching Fellow — Fall 2008
- Advanced Electromagnetism; Teaching Fellow — Fall 2007
- Physical Sciences 3; Teaching Fellow — Spring 2007
- Physical Sciences 2; Teaching Fellow — Fall 2006
- Physics 1a; Teaching Fellow — Summer 2006

ADVISING

Postdoctoral scholars

- Louis Brezin (2020–present); PhD from Institut Curie & College de France
  with Jean-Francois Joanny and Thomas Risler
- Robert Marsland (2017–2020); PhD from MIT with Jeremy England,
  jointly advised with Pankaj Mehta and Daniel Segrè
  Pubilcations: [32]
- Alexander Golden (2018–2022); PhD from University of Michigan with David Lubensky,
  jointly advised with Pankaj Mehta and Daniel Segrè
- Feng Wang (2014–2016); PhD from Hong Kong University of Science and Technology with Yilong Han
  Pubilcations: [20], [23]
  he went on to do a second postdoc at HUST and then started a faculty position at Tianjin University

Graduate students

- Dileep Kishore (2016–2022)
  co-advised with Daniel Segrè on a project to create a database of microbial interactions
  Publications: [39], [40], [43]
- Ashish George (2015–2020)
  Thesis: Evolutionary effects of broken symmetries and nonlinearities in range expansions
  Publications: [30], [33], [42]
- Gabriel Birzu (2014–2019)
  Thesis: Stochastic reaction-diffusion fronts: Applications to ecology and evolution

Publications: [31], [35], [37], [39], [40]
- Rajita Menon (2014–2018)
  Thesis: Network topology and community function in spatial microbial communities
  Publications: [18], [23], [27], [28], [29]
  upon graduation, she started on a research team at Vedanta Biosciences in Cambridge, MA
- Michael Chernicoff (2014-2015)
  graduated with a Master's degree in Physics and then in Education;
  started teaching in Cambridge Latin High School.

Undergraduate students
- Will Stride (2025-2026)
  used KPZ and FKPP equations to model mutualism and antagonism in growing colonies
  recepient of UROP funding for Summer 2025
- Kyle J. Shaffer (2026)
  studied the effects of nutrient-dependent motility on colony growth
  REU student from Gettysburg College
- Pranai Basani (2019-2021)
  investigated evolution of mechanical properties of cancer cells
  recepient of UROP funding for Summer 2019
- Ryan Cornellius (2018-2019)
  investigated growth of large microtubule complexes with cooperative nucleation
- Sakib Matin (2017-2018)
  carried out independent research on mode locking and diversity loss during invasions
  Publications: [33], [35]
  started PhD in Physics at BU
- Daniel Varoli (2016-2018)
  co-advised with Rama Bansil; senior thesis on patter formation in *Helicobacter pylori* colonies
  he went for a Master Degree in France, will start PhD in Biomedical Engineering at BU.
- Daniel Collins (2017-2018)
  co-advised with Shyamsunder Erramilli on the tradeoff between complexity and stability of proteins
- Michelle Patino (2018-2018)
  REU student in Bioinformatics from the University of Texas at El Paso;
  compared methods to carry out microbiome-wide association studies
  Publications: there is a potential for a future publication based on her work
- Brianna Richardson (2017-2017)
  REU student in Bioinformatics from the University of Maryland Baltimore County;
  carried out a microbiome-wide association study on collagenous gastritis
- Vivek Ramanan (2016-2016)
  REU student in Bioinformatics from Swarthmore College;
  developed new methods to separate direct from spurious associations in microbiome studies
  Publications: [29]
- Xiangxi Gao (2015-2015)
  REU student in Bioinformatics from Emory University;
  compared microbial interaction networks in controls and patients with Crohn's disease
- Peter Freese (2010-2012)
  senior thesis at Harvard University jointly advised with Irene Chen; went to graduate school at MIT.
  Thesis: Modeling and simulation of bacterial conjugation in spatially structured populations and its inhibition by bacteriophage infection
  Publications: [14].

Visiting graduate students
- Keisuke Ishihara (2014-2016)
  PhD student from Tim Mitchison's lab at Harvard Medical School;
  now ELBE fellow, Max Planck Institute, Center for Systems Biology Dresden

I advised him on mathematical modeling of the growth of large microtubule complexes
Publications: [22], [38]
- Kohaku So (2015-2015)
Physics PhD student from the University of Tokyo;
studied the effect of density-dependent growth on the evolution of dispersal
Publications: there is a potential for a future publication based on his work
- Quentin Hoarau(2014-2014)
Physics Master student from Ecole Normale Superieure of Cachan;
studied the effects of phenotypic heterogeneity on evolutionary dynamics

High school students
- Kaitlyn Hoxha (2018)
6 week intern through BU RISE;
studied the effects of different nucleation mechanisms on the growth of microtubule complexes
Publications: there is a potential for a future publication based on her work
- Raghav Jain (2017)
6 week intern through BU RISE;
studied how phenotypic switching between growth and dispersal phenotypes affects tumor growth
- Sanjena Venkatesh (2016)
6 week intern through BU RISE;
studied how natural selection shapes the genetic architecture of tumor suppression in different tissues
- Adarsh Ramchandran (2015)
6 week intern through BU RISE;
studied predictability of microbiome time series data
- Luanna Ferreeira (2015)
6 week intern through MIT RSI;
studied predictability of microbiome time series data
- Andrew Li (2015)
local high school student;
studied predictability of microbiome time series data
- Alexander Smirnov(2015)
6 week intern through BU RISE;
studied the effect of recombination on fitness valley crossing in spatially structured populations
- You Jin Reo (2015)
6 week intern through MIT RSI;
studied nutrient distribution around growing microbial colonies

Other mentees
- Daniel W. Swartz (2022-2025)
graduate student in the group of Mehran Kardar at MIT
- Hyunseok Lee (2019-2022)
graduate student in Jeff Gore lab at MIT
Publications: [40]
- Saurabh Gandhi (2015-2019)
graduate student in Jeff Gore lab at MIT
Thesis: Population and evolutionary dynamics during microbial range expansions
Publications: [21], [36]
- Cristopher McFarland (2010-2014)
graduate student in Leonid Mirny lab at MIT; now postdoc at Stanford University
Thesis: The role of deleterious passengers in cancer.
Publications: [10], [16]
- Lei Dai (2011-2015)
graduate student in Jeff Gore lab at MIT; postdoc at UCLA;
now on faculty at Chinese Academy of Sciences in Shenzhen

Thesis: Spatio-Temporal Dynamics Before Population Collapse (APS DBIO Thesis Prize)
Publications: [8], [12], [17]

PROFESSIONAL ACTIVITIES

Editorial work and peer review

- Serve on the editorial board of JSAT (Journal of Statistical Mechanics: Theory and Experiment).
- Review grant applications for Simons Foundation, Research Corporation for Science Advancement, Department of Defense, National Science Foundation
- Referee for Physical Review Letters, PNAS, eLife, Cell, Current Biology, Nature Communications, PLoS Biology, PLoS Computational Biology, Evolution, Proceedings of the Royal Society B, Europhysics Letters, Reviews of Modern Physics, Oikos, Trends in Cancer, Genetics, Physical Biology, Physical Review E, PLoS ONE, JSTAT, Nonlinearity Journal of the Royal Society Interface, Bulletin of Mathematical Biology, Journal of Mathematical Biology, Scientific Reports, ISME Journal, Cell Systems, Proceedings of the Royal Society Interface, New Journal of Physics, Physica D

Conferences, meeting, and outreach

- Co-organized BU Theory of Living Systems Conference 2019
- Co-organized BU Theory in Biology Conference 2018
- Organized BU biophysics seminar 2017–2018
- Co-organized invited session at APS March meeting titled "Complex microbial communities" 2016
- Outreach lecture to 30 Boston area high school science teachers on the synergies between research in physics and biology 2014
- Organized Harvard Condensed Matter Theory Kid's Seminar 2008–2010
- Helped organize Biannual Teaching Conference, Harvard University 2009
- Helped organize High School Physics Olympiads, Russia 2001–2004

INVITED TALKS

- Soft Condensed Matter Seminar, *Harvard University* 2025
  Phenomenological models of growth and competition in microbial colonies
- 128$^{\text{th}}$ Statistical Mechanics Conference, *Rutgers University* 2025
  KPZ and Fisher equations describe competition in microbial colonies
- Fall Meeting of the APS New England Section, *Northeastern University* 2024
  KPZ and Fisher equations describe competition in microbial colonies
- Applied Mathematics Seminar, *Stanford University* 2023
  KPZ and Fisher equations describe competition in microbial colonies
- Center for Mathematical Biology Seminar, *University of Pennsylvania* 2022
  Universality classes in traveling waves modeled by stochastic reaction-diffusion equations
- Greater Boston Area Statistical Mechanics Meeting, *UMass Amherst* 2022
  Universality classes in traveling waves modeled by stochastic reaction-diffusion equations
- Applied Mathematics Seminar, *University of Toronto* 2022
  Universality classes in traveling waves modeled by stochastic reaction-diffusion equations
- Department Seminar, *University of Mississippi Medical Center* 2022
  Evolution in growing populations
- Biological Design Center Symposium, *Boston University* 2021
  Evolutionary and ecological surprises of spatial growth
- Dynamical Systems Seminars, *Boston University* 2021
  Universality classes in the evolutionary dynamics of expanding populations
- Materials Research Science and Engineering seminar series, *Brandeis University, Waltham MA* 2019
  Universality classes in the evolutionary dynamics of expanding populations
- Theory & Biology conference, *Simons Foundation, NYC* 2019

Universality classes in the evolutionary dynamics of expanding populations
- Physics Colloquium, *University of Michigan* 2019
  Universality classes in the evolutionary dynamics of expanding populations
- Frontiers in Quantitative and Systems Biology seminar series, *UCLA* 2019
  The role of space in population dynamics
- Mathematical Modeling and Basic Biology groups, *Fred Hutch Cancer Center, Seattle* 2019
  The role of space in population dynamics
- Physicists working on cancer, *Weizemann Institute of Science, Israel* 2018
  Population genetics and ecology of spatially growing populations
- American Society for Microbiology Microbe Meeting, *Atlanta, GA* 2018
  Effects of cellular chirality on competition and cooperation in microbial colonies
- Microbiome: Applications & Future, *Synthetic Biology Center, MIT* 2018
  Theory & Microbiome
- American Physical Society March Meeting, *Los Angeles, CA* 2018
  Neither pulled nor pushed: A new class of reaction diffusion waves
- Condensed Matter Kid's Seminar, *Harvard University* 2018
  Neither pulled nor pushed: A new class of reaction diffusion waves
- Fundamental problems in active matter, *Aspen Institute of Physics* 2018
  Effects of Cellular Chirality on Competition and Cooperation in Microbial Colonies
- Biomathematics Seminar, *Harvard University* 2017
  Evolution during range expansions of cooperatively growing populations
- Workshop on Systems Biology and Molecular Economy of Microbial Communities, 2017
  International Center for Theoretical Physics (ICTP), Trieste, Italy
  The role of spatial structure in microbial interactions
- BU Microbiome Day, *Boston University* 2017
  Statistical physics of microbial communities
- Bioinformatics and Computational Biology Seminar, *Worcester Polytechnic Institute* 2017
  Mutations that slow down cancer
- Physics Department Colloquium, *University of Massachusetts, Boston* 2016
  To grow or not to grow: From microtubules to cancer
- Center for Theoretical Biological Physics Seminar, *Rice University* 2016
  Beyond the Standard Model of Growth: From Chiral Cells to Polymer Networks
- Widely Applied Mathematics *Harvard University* 2016
  Survival of the chiral: Chiral microbes succeed by altering spatial structure
- Squishy Physics, *Harvard University* 2016
  Assembly and control of large microtubule complexes
- XXIII Summer School Nicolás Cabrera, *Madrid, Spain* 2016
  Phase transitions in populations dynamics of microbes and cancer
- Channing Network Science Seminar, *Harvard Medical School* 2016
  Ecology and evolution of cancer tumors
- First MIT Meeting on Quantitative Ecology, *Massachusetts Institute of Technology* 2016
  The games microbes play
- Populations, Evolution, and Physics, *Aspen Institute of Physics* 2016
  Evolution during cooperative growth
- Center for Genomics and Computational Biology Seminar Series, *Duke University* 2015
  The tug-of-war between deleterious and beneficial mutations in cancer
- Hariri Institute for Computing and Computational Science & Engineering, *Boston, MA* 2015
  Why cancer is so rare?
- American Physical Society March Meeting, *San Antonio, TX* 2015
  Diffusion-limited mutualism
- Digestive Disease Week, *Chicago* 2014
  Community structure of bacteria in the human microbiome
- Biology Department Seminar Series, *Boston University* 2014
  Evolutionary dynamics in cancer

- Physics Department Colloquium, *Emory University* 2013
  Ecology and evolution of cancer tumors and expanding populations
- Biophysics Seminar Series, *Massachusetts Institute of Technology* 2013
  Ecology and evolution of cancer tumors and expanding populations
- Laufer Center Seminar, *University of Stony Brook* 2013
  Ecology and evolution of cancer tumors and expanding populations
- Biophysics Theory Seminar, *Purdue University* 2013
  Ecology and evolution of cancer tumors and expanding populations
- Complex Systems Seminar, *University of Michigan* 2013
  Ecology and evolution of cancer tumors and expanding populations
- Evolution Seminar, *University of Pennsylvania* 2013
  Ecology and evolution of cancer tumors and expanding populations
- Systems Biology Seminar, *Boston University* 2013
  Ecology and evolution of cancer tumors and expanding populations
- 15th Annual Greater Boston Area Statistical Mechanics Meeting, *Brandeis University* 2013
  Dynamics of evolutionary innovations in cancer
- Workshop on Selection in Population Genetics, *Radcliffe Institute* 2012
  Dangerous passengers: A closer look at deleterious mutations in evolutionary models of cancer
- Condensed Matter Seminar, *UMass Amherst* 2012
  Statistical mechanics of genes in expanding microbial colonies
- Condensed Matter Theory Kid's Seminar, *Harvard University* 2012
  Dangerous passengers: A closer look at deleterious mutations in evolutionary models of cancer
- Towards Unifying Concepts in the Physics of Aperiodic Systems, *Princeton University* 2011
  Space, evolution, and the Petri dish: Statistical mechanics of stochastic demixing and deterministic mixing in microbial colonies
- Condensed Matter Seminar, *Virginia Tech* 2011
  Space, evolution, and the Petri dish
- Pappalardo Symposium; and Faculty lunch, *MIT* 2011
  Genetic demixing in bacterial colonies
- Mini Stat Mech Meeting, *UC Berkeley* 2011
  Genetic mixing and demixing in bacterial colonies
- Cells, Circuits, and Computation, *Harvard University* 2010
  Spatial assays for microbial evolution
- Center for the Physics of Living Cells, *UIUC* 2010
  Population genetics in a Petri dish
- Widely Applied Mathematics seminar, *Harvard University* 2009
  Genetic demixing and Fisher waves

PUBLICATIONS AND CITATIONS

Up-to-date bibliometric information is available through my Google Scholar profile:
`https://scholar.google.com/citations?user=-2jHQakAAAAJ`

PREPRINTS

50. Louis Brezin* and Kirill S. Korolev, *Mechanically-driven growth and competition in a Voronoi model of tissues*, arXiv:2405.07899 (2024)

PUBLICATIONS

2026

49. Louis Brezin*, Kyle J. Shaffer*, and Kirill S. Korolev, *Transition from traveling fronts to diffusion-*

limited growth in expanding populations, **Physical Review E**, accepted (2026)

48. Daniel W. Swartz*, Hyunseok Lee*, Mehran Kardar, and Kirill S. Korolev, *New sector morphologies emerge from anisotropic colony growth*, **Physical Review E**, accepted (2026)

2025

47. Ilija Dukovski, Lauren Golden*, Jing Zhang, Melisa Osborne, Daniel Segrè, and Kirill S. Korolev, *Biophysical metabolic modeling of complex bacterial colony morphology*, **Cell Systems** 16(8), 101352 (2025)

46. Goel, Nikunj, Andrew M. Liebhold, Cleo Bertelsmeier, Mevin B. Hooten, Kirill S. Korolev, and Timothy H. Keitt, *A mechanistic statistical approach to infer invasion characteristics of human-dispersed species with complex life cycle*, **Ecological Monographs** 95(1), e70003 (2025)

2023

45. Daniel W. Swartz*, Hyunseok Lee*, Mehran Kardar, Kirill S. Korolev, *Interplay between morphology and competition in two-dimensional colony expansion*, **Physical Review E** 108, L032301 (2023)

44. Dileep Kishore*, Gabriel Birzu*, Zhenjun Hu, Charles DeLisi, Kirill S. Korolev, and Daniel Segrè, *Inferring microbial co-occurrence networks from amplicon data: a systematic evaluation*, **mSystems** 8:e00961-22 (2023)

43. Ashish B. George* and Kirill S. Korolev, *Ecological landscapes guide the assembly of optimal microbial communities*, **PLoS Computational Biology** 19(1), e1010570 (2023)

2022

42. Alexander Golden*, Ilija Dukovski, Daniel Segrè, and Kirill S. Korolev, *Growth instabilities shape morphology and genetic diversity of cellular aggregates*, **Physical Biology** 19, 056005 (2022)

41. Hyunseok Lee *, Jeff Gore, and Kirill S. Korolev, *Slow expanders invade by forming dented fronts in microbial colonies*, **PNAS** 119(1), e2108653119 (2022)

40. Zhenjun Hu, Dileep Kishore, Yan Wang, Gabriel Birzu*, Charles DeLisi, Kirill S. Korolev, and Daniel Segrè, *A resource for the comparison and integration of heterogeneous microbiome networks*, bioRxiv (2022)

2021

39. Gabriel Birzu*, Oskar Hallatschek, and Kirill S. Korolev, *Genealogical structure changes as range expansions transition from pushed to pulled*, **PNAS** 118(34) e2026746118 (2021)

38. Ilija Dukovski, Djordje Bajić, Jeremy M. Chacón, Michael Quintin, Jean C.C. Vila, Snorre Sulheim, Alan R. Pacheco, David B. Bernstein, William J. Rieh, Kirill S. Korolev, Alvaro Sanchez, William R. Harcombe, Daniel Segrè, *Computation Of Microbial Ecosystems in Time and Space (COMETS)*, **Nature Protocols** 16, 5030-5082 (2021)

2020

37. Keisuke Ishihara* and Kirill S. Korolev, *Traveling fronts in self-replicating persistent random walks with multiple internal states*, **New Journal of Physics** 22(8) 083034 (2020)

2019

36. Saurabh R. Gandhi, Kirill S. Korolev and Jeff Gore, *Cooperation mitigates diversity loss in a spatially expanding microbial population*, **PNAS** 116(47), 23582-23587 (2019)

- *Highlighted in a commentary by Mark Lewis: Feasting yeast and the sweetness of diversity in PNAS.*

35. Gabriel Birzu[*], Sakib Matin[†], Oskar Hallatschek, and Kirill S. Korolev, *Genetic drift in range expansions is very sensitive to density feedback in dispersal and growth*, **Ecology Letters** 22, 1817-1827 (2019)

34. Maxime Deforet, Carlos Carmona Fontaine, Kirill S. Korolev, and Joao B. Xavier, *Contribution of growth and dispersal to the evolution of expanding populations*, **American Naturalist** 194(3), 291-350 (2019)

33. Ching-Hao Wang[*], Sakib Matin[†], Ashish George[*], and Kirill S. Korolev, *Pinned, locked, pushed, and pulled traveling waves in structured environments*, **Theoretical Population Biology** 127, 102-119 (2019)

32. Robert Marsland III[*], Wenping Cui, Joshua Goldford, Alvaro Sanchez, Kirill S. Korolev, and Pankaj Mehta, *Available energy fluxes drive a phase transition in the diversity, stability, and functional structure of microbial communities*, **PLoS Computational Biology** 15(2), e1006793 (2019)

• *Included in PLoS Microbiome Channel*

2018

31. Gabriel Birzu[*], Oskar Hallatschek, and Kirill S. Korolev, *Fluctuations uncover a distinct class of traveling waves*, **PNAS** 115, E3645-E3654 (2018)

30. Ashish George[*] and Kirill S. Korolev, *Chirality provides a direct fitness advantage and facilitates intermixing in cellular aggregates*, **PLoS Computational Biology** 14(12), e1006645 (2018)

29. Rajita Menon[*], Vivek Ramanan[†], and Kirill S. Korolev, *Interactions between species introduce spurious associations in microbiome studies*, **PLoS Computational Biology** 14(1), e1005939 (2018)

28. Mohammad I. El Mouzan, Harland S. Winter, Assad A. Assiri, Kirill S. Korolev, Ahmad A. Al Sarkhy, Scot E. Dowd, Mohammad A. Al Mofarreh, and Rajita Menon[*], *Microbiota profile in new-onset pediatric Crohn's disease: data from a non-Western population*, **BMC Gut Pathogens** 10, 49 (2018)

27. Mohammad I El Mouzan, Kirill S. Korolev, Mohammad A. Al Mofarreh, Rajita Menon[*], Harland S. Winter, Ahmad A. Al Sarkhy, Scot E Dowd, Ahmad M. Al Barrag, and Asaad A Assiri, *Fungal dysbiosis predicts the diagnosis of pediatric Crohn's disease*, **World Journal of Gastroenterology** 24(39): 4510-4516 (2018)

26. Mina Nazari, Xiaoqing Li, Mohammad Amin Alibakhshi, Haojie Yang, Kathleen Souza, Christopher Gillespie, Suryaram Gummuluru, Björn M. Reinhard, Kirill S. Korolev, Lawrence D. Ziegler, Qing Zhao, Meni Wanunu, Shyamsunder Erramilli, *Femtosecond Photonic Viral Inactivation Probed Using Solid-State Nanopores*, **Nano Futures** 2, 045005 (2018)

2017

25. Ana B. Pavel[*] and Kirill S. Korolev, *Genetic load makes cancer cells more sensitive to common drugs: evidence from Cancer Cell Line Encyclopedia*, **Scientific Reports** 7, 1938 (2017)

24. Liselotte Jauffred, Rebecca Munk-Vejborg, Kirill S. Korolev, Stanley Brown, and Lene B. Oddershede, *Chirality in microbial biofilms is mediated by close interactions between the cell surface and the substratum*, **ISME Journal** 11, 1688-1701 (2017)

23. Mohammad El Mouzan, Feng Wang[*], Mohammad Al Mofarreh, Rajita Menon[*], Ahmad Al Barrag, Kirill S. Korolev, Ahmad Al Sarkhy, Mona Al Asmi, Yassin Hamed, Anjum Saeed, Scot Dowd, Asaad Assiri, and Harland Winter, *Fungal microbiota profile in newly-diagnosed treatment-naive children with Crohn disease*, **Journal of Crohn's and Colitis** 11, 586-592 (2017)

2016

22. Keisuke Ishihara[*], Kirill S. Korolev, Timothy J. Mitchison, *Physical basis of large microtubule aster growth*, **eLife** e19145 (2016)

21. Saurabh R. Gandhi, Eugene A. Yurtsev, Kirill S. Korolev and Jeff Gore, *Range expansions transition from pulled to pushed waves as growth becomes more cooperative in an experimental microbial population*, **PNAS** 113, 6923 (2016)

• *Highlighted in a PNAS Commentary by Mark Lewis: Finding the sweet spot for invasion theory.*

20. Feng Wang*, Jess L. Kaplan, Benjamin D. Gold, Manoj K. Bhasin, Naomi L. Ward, Richard Kellermayer, Barbara S. Kirschner, Melvin B. Heyman, Scot E. Dowd, Stephen B. Cox, Haluk Dogan, Blaire Steven, George D. Ferry, Stanley A. Cohen, Robert N. Baldassano, Christopher J. Moran, Elizabeth A. Garnett, Lauren Drake, Hasan H. Otu, Leonid A. Mirny, Towia A. Libermann, Harland S. Winter, and Kirill S. Korolev, *Detecting microbial dysbiosis associated with pediatric Crohn disease despite the high variability of the gut microbiota*, **Cell Reports** 14, 945 (2016)

2015

19. Kirill S. Korolev, *Evolution arrests invasions of cooperative populations*, **Physical Review Letters** 115, 208104 (2015)

• *Highlighted in APS Physics, Focus: Evolution sometimes slows things down.*

18. Rajita Menon* and Kirill S. Korolev, *Public good diffusion limits microbial mutualism*, **Physical Review Letters** 114, 168102 (2015)

• *Highlighted in APS Physics, Synopsis: Microbes share, but not too much.*

17. Lei Dai, Kirill S. Korolev, and Jeff Gore, *Relation between stability and resilience determines the performance of early warning signals under different environmental drivers*, **PNAS** 112, 10056 (2015)

2014

16. Christopher D. McFarland*, Leonid A. Mirny, and Kirill S. Korolev, *Tug-of-war between driver and passenger mutations in cancer and other adaptive processes*, **PNAS** 111, 15138 (2014)

• *Highlighted in Editor's Choice in Science.*

15. Kirill S. Korolev, Joao B. Xavier, and Jeff Gore, *Turning ecology and evolution against cancer*, **Nature Reviews Cancer** 14, 371 (2014)

• *Highlighted in MIT News.*

14. Peter D. Freese†, Kirill S. Korolev, Jose I. Jimenez, and Irene A. Chen, *Genetic drift suppresses bacterial conjugation in spatially structured populations*, **Biophysical Journal** 106, 944 (2014)

2013

13. Manoshi S. Datta*, Kirill S. Korolev, Ivana Cvijovic†, Carmel Dudley†, and Jeff Gore, *Range expansion promotes cooperation in an experimental microbial metapopulation*, **PNAS** 110, 7354 (2013)

• *Highlighted in Quanta Magazine and Wired.com.*

12. Lei Dai, Kirill S. Korolev, and Jeff Gore, *Slower recovery in space before collapse of connected populations*, **Nature** 496, 355 (2013)

• *Highlighted in Nature News and Views, Science News, and MIT News.*

11. Kirill S. Korolev, *The fate of cooperation during range expansions*, **PLoS Computational Biology** 9, e1002994 (2013)

10. Christopher D. McFarland, Kirill S. Korolev, Gregory V. Kryukov, Shamil Sunyaev, and Leonid A. Mirny, *The impact of deleterious passenger mutations on cancer progression*, **PNAS** 110, 2910 (2013)

• *Highlighted in Nature Reviews Cancer and MIT News.*

9. Maxim O. Lavrentovich, Kirill S. Korolev, and David R. Nelson, *Radial Domany-Kinzel models with mutation and selection*, **Physical Review E** 87, 012103 (2013)

2012

8. Lei Dai, Daan Vorselen, Kirill S. Korolev, Jeff Gore, *Generic indicators for loss of resilience before tipping point leading to population collapse*, **Science** 336, 1175 (2012)

• *Highlighted on yeastgenome.org: Yeast on the Brink and in Condensed Matter Journal Club.*

7. Kirill S. Korolev, Melanie J.I. Müller, Nilay Karahan, Andrew W. Murray, Oskar Hallatschek, and David R. Nelson, *Selective sweeps in growing microbial colonies*, **Physical Biology** 9, 026008 (2012)

2011

6. Kirill S. Korolev, Joao B. Xavier, David R. Nelson, and Kevin R. Foster, *A quantitative test of population genetics using spatiogenetic patterns in bacterial colonies*, **The American Naturalist** 178, 538 (2011)

5. Kirill S. Korolev and David R. Nelson, *Competition and cooperation in one-dimensional stepping-stone models*, **Physical Review Letters** 107, 088103 (2011)

2005 - 2010

4. Kirill S. Korolev, Mikkel Avlund, Oskar Hallatschek, and David R. Nelson, *Genetic demixing and evolution in linear stepping stone models*, **Reviews of Modern Physics** 82, 1691 (2010)

• *Highlighted in Nature Physics: Dimensional Analysis.*

3. Oskar Hallatschek and Kirill S. Korolev, *Fisher waves in the strong noise limit*, **Physical Review Letters** 103, 108103 (2009)

2. Kirill S. Korolev and David R. Nelson, *Defect-mediated emulsification in two dimensions*, **Physical Review E** 77, 051702 (2008)

1. L.S. Uspenskaya, Kirill S. Korolev, and P.N. Yarykin, *Peculiarity of magnetization relaxation in finite size superconductors*, **Physica C** 423, 181 (2005)

NOTES
* denotes graduate students and postdoctoral scholars whose work for a given publication was supervised by me.
† denotes undergraduate students whose work for a given publication was supervised by me.
PLoS stands for Public Library of Science; a family of open access journals.
PNAS stands for Proceedings of the National Academy of Sciences, USA; a peer reviewed journal covering all natural and social sciences.
ISME stands for International Society of Microbial Ecology, which publishes ISME journal.
BMC stands for BioMed Central; a family of open access journals.