

RESEARCH INTERESTS

Emergent dynamics within and among heterogeneous cell populations; multiscale, multiclass **computational models** of dynamic life systems; network inference of **cellular decision & regulation**; (machine) **learning** from biological data; **entrainment & control** of cell populations and disease states.

EDUCATION

Massachusetts Institute of Technology | Postdoctoral Researcher 2008-2011

- Biological Engineering
- Advisor: Douglas A Lauffenburger

University of California Santa Barbara | Doctoral Student 2002-2007

- Electrical & Computer Engineering with an emphasis in Control Theory
- Advisor: Francis J Doyle III (now Provost at Brown University)

University of California Santa Barbara | Undergraduate Student 1998-2002

- Electrical & Computer Engineering with Honors

EMPLOYMENT

University of Washington | 50% FTE

- Tenured Full Professor of Biology and Chemical Engineering 2025-**present**
- Tenured Associate Professor of Biology and Chemical Engineering 2020-2025
- Assistant Professor of Biology and Chemical Engineering 2019-2020

Allen Institute for Cell Science | 50% FTE

- Senior Advisor of Modeling, Dissemination, & Alliances 2019-2024

Northwestern University

- Tenured Associate Professor of Chemical & Biological Engineering 2019
- Assistant Professor of Chemical & Biological Engineering 2012-2018

ADVISORY BOARD MEMBERSHIPS

- NSF Science and Technology Center for Cellular Construction 2017-**present**
Partnership among UCSF, UC Berkeley, SF State, Stanford, and IBM
- Allen Institute for Cell Science 2018-2019
- Immuneering Corporation 2012-2018

ACADEMIC AFFILIATIONS

University of Washington

- Center for Synthetic Biology 2022-**present**
- Computational Molecular Biology Program 2019-**present**

Northwestern University

- Chemical & Biological Engineering Adjunct Professor 2019-**present**
- Center for Synthetic Biology, **founding member** 2017-**present**
- Institute of Complex Systems, **core member until 2019** 2012-**present**

• NSF-Simons Center for Quantitative Biology, founding member	2018-2019
• Feinberg School of Medicine, Pulmonary and Critical Care	2014-2019
• Chemistry of Life Processes Institute	2012-2019
• Interdisciplinary Biological Sciences Program	2012-2019
• Biotechnology Training Program	2012-2019

HONORS & AWARDS

• Senior Moulton Medal , Institution of Chemical Engineers best paper award	2020
• Distinguished Investigator , Washington Research Foundation	2019
• NSF CAREER Award , National Science Foundation Directorate for Engineering	2017
• Cornew Innovation Award , Northwestern University Chemistry of Life Processes	2014
• Searle Fellow , Northwestern University Searle Scholars Teaching Program	2013

INVITED PUBLIC LECTURES & CONFERENCE SEMINARS

35. Finding Your Inner Modeler, The Future of Mechanistic Modeling in the Age of AI (Irvine, CA)	2025
34. Winter qBIO Annual Meeting, Keynote Speaker (Oahu, HI)	2025
33. Biomedical Engineering Society (BMES) Annual Meeting (Seattle, WA)	2023
32. Cell Symposia on The Conceptual Power of Single Cell Biology (San Diego, CA)	2023
31. American Physical Society (APS) Annual March Meeting, Division of Biological Physics (Las Vegas, NV)	2023
30. Allen Institute for Immunology (Seattle, WA)	2023
29. International Federation of Automatic Control (IFAC), Plenary Speaker Symposium on Dynamics & Control of Process Systems (DYCOPS) (Busan, Korea)	2022
28. Cell and Experimental Biology Conference (Boston, MA)	2022
27. Biomedical Engineering Society (BMES) Conference on Cellular & Molecular Engineering (Indian Wells, CA)	2022
26. American Institute of Chemical Engineering (AIChE) Annual Meeting (Boston, MA)	2021
25. American Society of Cell Biology (ASCB) Annual Meeting (Washington, DC)	2019
24. Foundations of Systems Biology in Engineering (FOSBE) Triennial International Conference, Keynote Speaker (Valencia, Spain)	2019
23. Calico Labs Seminar (San Francisco, CA)	2019
22. Paul G. Allen Frontiers Symposium on Predicting Biology (Seattle, WA)	2019
21. University of Washington Mindlin Foundation Public Lecture (Seattle, WA)	2019
20. American Institute of Chemical Engineering (AIChE) International Conference on Biomolecular Engineering, Keynote Speaker (Newport, CA)	<i>Declined</i> 2019
19. Institute for Systems Biology (Seattle, WA)	2018
18. Biomedical Engineering Society (BMES) Conference on Systems Thinking in Education (Atlanta, GA)	2018
17. Accelerated Discovery Forum, Distinguished Speaker IBM Research-Almaden (San Jose, CA)	2018
16. Mathematical Biosciences Institute (MBI) Workshop on Multiscale Dynamics of Infections (Columbus, OH)	2018
15. Mathematical Biosciences Institute (MBI) Workshop on Control of Disease (Columbus, OH)	2017
14. American Institute of Chemical Engineers (AIChE) Annual Meeting (Minneapolis, MN)	2017
13. Shirley Welsh Ryan Learning for Life Public Lecture Series (Chicago, IL)	2017

12. International Conference on Molecular Systems Biology, Keynote Speaker (Raitenhaslach, Germany)	2017
11. Q-Bio Summer School & Conference (New Brunswick, NJ)	2017
10. Society for Industrial & Applied Math (SIAM) Conference on Applications of Dynamical Systems (Snowbird, UT)	2017
9. Midwest Quantitative Biology Symposium (Notre Dame, IN)	2017
8. Foundations of Systems Biology in Engineering (FOSBE) Triennial Domestic Conference (Boston, MA)	2015
7. Quantitative Cell Biology Network Workshop Modeling in Cell Biology (San Francisco, CA)	2015
6. New York University Genomics & Systems Biology Symposium (Abu Dhabi, UAE)	2014
5. Society for Integrative and Comparative Biology (SICB) Annual Meeting (Austin, TX)	2014
4. Symposium on the Systems Biology of Stem Cells (Irvine, CA)	2013
3. International Conference on Frontiers in Systems & Synthetic Biology (Atlanta, GA)	2013
2. Society for Industrial & Applied Math (SIAM) Conference on Life Sciences (San Diego, CA)	2012
1. Mathematical Biosciences Institute (MBI) Workshop on Robustness in Biological Systems (Columbus, OH)	2012

TRAINEES

Postdoctoral Researchers

3. Jason Y. Cain PhD in Chemical Engineering, University of Washington	2023-2025
2. Tyrone J. Yacoub PhD in Chemical & Biological Engineering, Northwestern University	2015-2017
1. Mark F. Ciaccio PhD in Cellular & Molecular Physiology, University of Chicago	2012-2015

Doctoral Students

17. Krista Phommatha Chemical Engineering, University of Washington B.S. in Chemical Engineering, University of Colorado Boulder	2024- present
16. Allison W. Li Biology, University of Washington B.S. in Biochemistry and Computer Science, University of Washington	2023- present
15. Madeline T. Scott Biology, University of Washington B.S. in Mathematics and Natural Science, Johns Hopkins University Co-advised with Ben Kerr	2023- present
14. Po-Hao Chiu Chemical Engineering, University of Washington B.S. in Chemical Engineering, National Taiwan University	2022- present
13. Jacob I. Evarts Biology, University of Washington B.S. in Computer & Information Science, University of Oregon NSF Graduate Research Fellow	2021- present
12. Sophia K. Jannetty Biology, University of Washington B.A. in Biology, Williams College Post Baccalaureate in Computer Science, Tufts University	2020- present
11. Jason Y. Cain Chemical Engineering, University of Washington <i>Unpacking the role of complexity in multiclass models of the tumor microenvironment</i> NU Data Science Fellow (2017) , NU Biotechnology Training Program Fellow (2018) Transferred from Chemical & Biological Engineering at Northwestern University in 2020 Postdoctoral Researcher at the University of Washington	2018-2023
10. Kate E. Dray Chemical & Biological Engineering, Northwestern University <i>A systematic workflow for model development enables rigorous exploration of synthetic biological sys-</i>	2018-2022

tems

NSF Graduate Research Fellow, NU Biotechnology Training Program Cluster Awardee (2018)

Co-advised with Joshua N. Leonard

Computational Biologist at Asimov

9. **Alexis N. Prybutok** | Chemical & Biological Engineering, Northwestern University 2017–2022
Discovering effects of tunable CAR T-cell properties and inherent tumor features on treatment outcome using ABMs NSF Graduate Research Fellow
Co-advised with Joshua N. Leonard
Assistant Teaching Professor of Chemical Engineering at the University of Washington
8. **Narasimhan Balakrishnan** | Chemical & Biological Engineering, Northwestern University 2016–2022
Modelling, analysis, and control of heterogeneous multicellular systems
NU Biotechnology Program Trainee (2017)
Senior Consultant at Guidehouse
7. **Joshua I. Levy** | Engineering Science & Applied Math, Northwestern University 2017–2021
Temperature processing and sensory navigation in Drosophila
Cabell Fellow (2016), NU Biophysics Training Program Fellow (2017–2018)
Co-advised with Bill Kath
Postdoctoral Fellow at Scripps Research
6. **Jessica S. Yu** | Chemical & Biological Engineering, Northwestern University 2016–2020
Multi-scale, multi-class agent-based models explore complexity and emergence in biological systems
NSF Graduate Research Fellow
Senior Scientist at the Allen Institute for Cell Science
5. **Joseph J. Muldoon** | Molecular Biosciences, Northwestern University 2014–2020
Heterogeneity and robustness in synthetic signaling and immune regulatory networks
NU Biotechnology Training Program Cluster Awardee (2015), NSF GRFP Honorable Mention (2015)
Co-advised with Joshua N. Leonard
Postdoctoral Fellow at UCSF (Eyquem lab and Roybal lab)
4. **Sebastian M. Bernasek** | Chemical & Biological Engineering, Northwestern University 2015–2019
Novel roles for redundant regulation during development
Co-Advised with Luis N. Amaral
Senior Machine Learning Engineer at Albert Invent
3. **Justin D. Finkle** | Molecular Biosciences, Northwestern University 2013–2019
Discovering regulatory insights from gene expression dynamics
Nicholson Fellow (2016), NU Biotechnology Training Fellow (2013), NSF GRFP Honorable Mention (2014)
Senior Bioinformatics and Computational Biology Scientist at Precede Biosciences
2. **Jia J. Wu** | Molecular Biosciences, Northwestern University 2013–2019
Data-driven strategies for optimization of human megakaryocyte culture
NSF GK-12 Fellow (2013), NU Biotechnology Training Program Cluster Awardee (2014), NIH Ruth Kirschstein NRSA award (2016)
Co-advised with William Miller
Investigator II at Novartis Institutes for Biomedical Research
1. **Albert Y. Xue** | Chemical & Biological Engineering, Northwestern University 2013–2018
Finding the needle in the haystack: applying data science to address biological questions
NU Biotechnology Training Program Cluster Awardee (2014)
Lead Data Scientist at Caterpillar Inc

Masters Students

3. **Slava S. Fazio (aka Butkovich)** | Chemical & Biological Engineering, Northwestern University 2018–2021
Cabell Fellow (2017), NU Biotechnology Training Program Cluster Awardee (2018)
Data Scientist at U.S. Department of Veterans Affairs
2. **M. Kasim Fassia** | Biomedical Engineering, Northwestern University 2014–2016
In silico analysis of network inference reveals logic gate dependencies
Interventional Radiologist at New York Presbyterian and Weill Cornell Medical Center

1. **August (aka Aaron) D. Oppenheimer** | Chemical & Biological Engineering, Northwestern Univ 2013–2015
NSF GK-12 Fellow (2013), NU Teaching Apprentice (Spring 2015)
STEM educator

Undergraduate Students

10. **Navya Jain** | Applied Mathematics and Biochemistry, University of Washington 2024-**present**
10. **Alice Fu** | Computer Science, University of Washington 2025-**present**
9. **Danielle Vahdat** | Biology, University of Washington 2024-**present**
8. **Zimo Zhu** | Biology, University of Washington 2022–2024
7. **Isabelle Chen** | Chemical & Biological Engineering, Northwestern University 2020–2023
6. **Michael Li** | Computer Science, University of Washington 2020–2023
5. **Antonio K. A. Hazboun** | Chemical & Biological Engineering, Northwestern University 2019–2021
4. **Eduardo Munoz** | Natural Sciences AA, Cerritos Community College Summer 2018
3. **Weipeng Zhang** | Chemical & Biological Engineering, Northwestern University 2018
2. **Jessica S. Yu** | Chemical & Biological Engineering, Northwestern University 2012–2014
Alumnae of Northwestern University Graduate Fellowship (2014–2015), Richter Summer Research Grant (2013), CLP Summer Scholars Fellowship (declined)
1. **Maureen Ferries** | Chemical & Biological Engineering, Northwestern University 2012–2013

High School Students

2. **Patrick Feng** | Interlake High School 2025-**present**
1. **Alexander Weiss** | Niles North High School 2013–2014

PEER-REVIEWED PUBLICATIONS

[Link to NCBI public bibliography](#)

Bagheri trainee(s) | Lead PI(s) in **bold/bold** | *Co-first authors | # bioRxiv/submitted publications

41. # Jung J, Dreyer KS, Dray KE, Muldoon JJ, George J, Shirman S, de Lourdes Cabezas M, D'Aquino AE, Verosloff M, Seki K, Rybnicky GA, Alam K, Bagheri N, Jewett M, Leonard J, Mangan N, and Lucks J. Developing, characterizing and modeling crispr-based point-of-use pathogen diagnostics. *ACS Synthetic Biology*, December 2024. doi: 10.1021/acssynbio.4c00469.
40. # Yu JS, Lyons B, Rafelsky SM, Theriot JA, Bagheri N, and Johnson GT. 4D hybrid model interrogates agent-level rules and parameters driving hips cell colony dynamics. *bioRxiv*, July 2024. doi: 10.1101/2024.08.12.607546.
39. Yu JS and Bagheri N. Model design choices impact biological insight: Unpacking the broad landscape of spatial-temporal model development decisions. *PLOS Computational Biology*, 20(3):e1011917, March 2024. doi: 10.1371/journal.pcbi.1011917.
38. Cain JY, Evarts JI, Yu JS, and Bagheri N. Incorporating temporal information during feature engineering bolsters emulation of spatio-temporal emergence. *Bioinformatics*, 40(3):btae131, March 2024. doi: 10.1093/bioinformatics/btae131.
37. Bernasek SM, Hur SSJ, Peláez-Restrepo N, Boisclair Lachance JF, Bakker R, Navarro HT, Sanchez-Luege N, Amaral LAN, Bagheri N, Rebay I, and Carthew RW. Ratiometric sensing of Pnt and Yan transcription factor levels confers ultrasensitivity to photoreceptor fate transitions in *Drosophila*. *Development*, 150(8):dev201467, April 2023. doi: 10.1242/dev.201467.
36. Cain JY, Yu JS, and Bagheri N. The in silico lab: Improving academic code using lessons from biology. *Cell Systems*, 14(1):1–6, January 2023. doi: 10.1016/j.cels.2022.11.006.
35. Prybutok AN, Yu JS, Leonard JN, and Bagheri N. Mapping CAR T-Cell Design Space Using Agent-Based Models. *Frontiers in Molecular Biosciences*, 9:849363, July 2022. doi: 10.3389/fmolb.2022.849363.

34. *Prybutok AN , *Cain JY , Leonard JN, and Bagheri N. Fighting fire with fire: deploying complexity in computational modeling to effectively characterize complex biological systems. *Current Opinions in Biotechnology*, 75:102704, June 2022. doi: 10.1016/j.copbio.2022.102704.
33. Dray KE , Muldoon JJ , Mangan NM, Bagheri N, and Leonard JN. GAMES: A Dynamic Model Development Workflow for Rigorous Characterization of Synthetic Genetic Systems. *ACS Synthetic Biology*, 11(2):1009–1029, February 2022. doi: 10.1021/acssynbio.1c00528.
32. Bagheri N, Carpenter AE, Lundberg E, Plant AL, and Horwitz, R. The new era of quantitative cell imaging-challenges and opportunities. *Molecular Cell*, 82(2):241–247, January 2022. doi: 10.1016/j.molcel.2021.12.024.
31. *Mousavikhamene Z , *Sykora DJ, Mrksich, M, and Bagheri N. Morphological features of single cells enable accurate automated classification of cancer from non-cancer cell lines. *Scientific Reports*, 11(1):24375, December 2021. doi: 10.1038/s41598-021-03813-8.
30. Yu JS and Bagheri N. Modular microenvironment components reproduce vascular dynamics de novo in a multi-scale agent-based model. *Cell Systems (Cover Story)*, 12(8):795–809.e9, August 2021. doi: 10.1016/j.cels.2021.05.007.
29. Muldoon JJ , Kandula V, Hong M, Donahue PS, Boucher JD, Bagheri N, and Leonard, JN. Model-guided design of mammalian genetic programs. *Science Advances*, 7(8):eabe9375, February 2021. doi: 10.1126/sciadv.abe9375.
28. Yu JS and Bagheri N. Agent-Based Models Predict Emergent Behavior of Heterogeneous Cell Populations in Dynamic Microenvironments. *Frontiers in Bioengineering and Biotechnology*, 8:249, 2020. doi: 10.3389/fbioe.2020.00249.
27. Bernasek SM , Peláez N, Carthew RW, Bagheri N, and Amaral, LAN. Fly-QMA: Automated analysis of mosaic imaginal discs in *Drosophila*. *PLOS Computational Biology*, 16(3):e1007406, March 2020. doi: 10.1371/journal.pcbi.1007406.
26. Muldoon JJ , Chuang Y, Bagheri N, and Leonard, JN. Macrophages employ quorum licensing to regulate collective activation. *Nature Communications*, 11(878), February 2020. doi: 10.1038/s41467-020-14547-y.
25. Donahue PS, Draut JW, Muldoon JJ , Edelstein HI, Bagheri N, and Leonard, JN. The COMET toolkit for composing customizable genetic programs in mammalian cells. *Nature Communications*, 11(779), February 2020. doi: 10.1038/s41467-019-14147-5.
24. Xue AY , Yu AM, Lucks, JB, and Bagheri N. DUETT quantitatively identifies known and novel events in nascent RNA structural dynamics from chemical probing data. *Bioinformatics*, 35(24):5103–5112, December 2019. doi: 10.1093/bioinformatics/btz449.
23. Finkle JD and Bagheri N. Hybrid analysis of gene dynamics predicts context-specific expression and offers regulatory insights. *Bioinformatics*, 35(22):4671–4678, November 2019. doi: 10.1093/bioinformatics/btz256.
22. Muldoon JJ , Yu JS , Fassia MK , and Bagheri N. Network inference performance complexity: a consequence of topological, experimental and algorithmic determinants. *Bioinformatics*, 35(18):3421–3432, September 2019. doi: 10.1093/bioinformatics/btz105.
21. Cassidy JJ, Bernasek SM , Bakker R, Giri R, Peláez N, Eder B, Bobrowska A, Bagheri N, Amaral LAN, and Carthew RW. Repressive Gene Regulation Synchronizes Development with Cellular Metabolism. *Cell*, 178(4):980–992.e17, August 2019. doi: 10.1016/j.cell.2019.06.023.
20. *Walter JM, *Ren Z, Yacoub T , Reyfman PA, Shah RD, Abdala-Valencia H, Nam K, Morgan VK, Anekalla KR, Joshi N, McQuattie-Pimentel AC, Chen CI, Chi M, Han S, Gonzalez-Gonzalez FJ, Soberanes S, Aillon RP, Watanabe S, Williams KJN, Lu Z, Paonessa J, Hountras P, Breganio M, Borkowski N, Donnelly HK, Allen JP, Amaral LA, Bharat A, Misharin AV, Bagheri N, Hauser AR, Budinger GRS, and Wunderink, RG. Multidimensional Assessment of the Host Response in Mechanically Ventilated Patients with Suspected

Pneumonia. *American Journal of Respiratory and Critical Care Medicine*, 199(10):1225–1237, May 2019. doi: 10.1164/rccm.201804-0650OC.

19. Yamankurt G, Berns EJ, Xue AY, Lee A, Bagheri N, Mrksich M, and Mirkin CA. Exploration of the nanomedicine-design space with high-throughput screening and machine learning. *Nature Biomedical Engineering*, 3(4):318–327, April 2019. doi: 10.1038/s41551-019-0351-1.
18. Bucior BJ, Scott BN, Islamoglu T, Goswami S, Gopalan A, Yildirim T, Farha OK, Bagheri N, and Snurr RQ. Energy-based descriptors to rapidly predict hydrogen storage in metal-organic frameworks. *Molecular Systems Design & Engineering*, 4:162–174, November 2019. doi: 10.1039/C8ME00050F.
17. *Finkle JD, *Wu JJ, and Bagheri N. Windowed Granger causal inference strategy improves discovery of gene regulatory networks. *Proceedings of the National Academy of Sciences*, 115(9):2252–2257, February 2018. doi: 10.1073/pnas.1710936115.
16. Hartfield RM, Schwarz KA, Muldoon JJ, Bagheri N, and Leonard JN. Multiplexing Engineered Receptors for Multiparametric Evaluation of Environmental Ligands. *ACS Synthetic Biology*, 6(11):2042–2055, November 2017. doi: 10.1021/acssynbio.6b00279.
15. Xue AY, Szymczak LC, Mrksich M, and Bagheri N. Machine Learning on Signal-to-Noise Ratios Improves Peptide Array Design in SAMDI Mass Spectrometry. *Analytical Chemistry*, 89(17):9039–9047, September 2017. doi: 10.1021/acs.analchem.7b01728.
14. Misharin AV, Morales-Nebreda L, Reyfman PA, Cuda CM, Walter JM, McQuattie-Pimentel AC, Chen CI, Anekalla KR, Joshi N, Williams KJN, Abdala-Valencia H, Yacoub TJ, Chi M, Chiu S, Gonzalez-Gonzalez FJ, Gates K, Lam AP, Nicholson TT, Homan PJ, Soberanes S, Dominguez S, Morgan VK, Saber R, Shaffer A, Hinchcliff M, Marshall SA, Bharat A, Berdnikovs S, Bhorade SM, Bartom ET, Morimoto RI, Balch WE, Sznajder JI, Chandel NS, Mutlu GM, Jain M, Gottardi CJ, Singer BD, Ridge KM, Bagheri N, Shilatifard A, Budinger GRS, and Perlman H. Monocyte-derived alveolar macrophages drive lung fibrosis and persist in the lung over the life span. *Journal of Experimental Medicine*, 214(8):2387–2404, August 2017. doi: 10.1084/jem.20162152.
13. *Stainbrook SC, *Yu JS, Reddick MP, Bagheri N, and Tyo KEJ. Modulating and evaluating receptor promiscuity through directed evolution and modeling. *Protein Engineering Design & Selection*, 30(6):455–465, June 2017. doi: 10.1093/protein/gzx018.
12. Yu JS, Xue AY, Redei EE, and Bagheri N. A support vector machine model provides an accurate transcript-level-based diagnostic for major depressive disorder. *Translational Psychiatry*, 6(10):e931, October 2016. ISSN 2158-3188. doi: 10.1038/tp.2016.198.
11. Yu JS and Bagheri N. Multi-class and multi-scale models of complex biological phenomena. *Current Opinions in Biotechnology*, 39:167–173, June 2016. doi: 10.1016/j.copbio.2016.04.002.
10. Ciaccio MF, Chen VC, Jones RB, and Bagheri N. The DIONESUS algorithm provides scalable and accurate reconstruction of dynamic phosphoproteomic networks to reveal new drug targets. *Integrative Biology (Cover Story)*, 7(7):776–791, July 2015. doi: 10.1039/c5ib00065c.
9. *Duncan MT, *Shin S, *Wu JJ, Mays Z, Weng S, Bagheri N, Miller WM, and Shea LD. Dynamic transcription factor activity profiles reveal key regulatory interactions during megakaryocytic and erythroid differentiation. *Biotechnology & Bioengineering*, 111(10):2082–2094, October 2014. doi: 10.1002/bit.25262.
8. Ciaccio MF, Finkle JD, Xue AY, and Bagheri N. A systems approach to integrative biology: an overview of statistical methods to elucidate association and architecture. *Integrative & Comparative Biology*, 54(2):296–306, July 2014. doi: 10.1093/icb/icu037.
7. *Han Q, *Bagheri N, Bradshaw EM, Hafler DA, Lauffenburger DA, and Love JC. Polyfunctional responses by human T cells result from sequential release of cytokines. *Proc Natl Acad Sci U S A*, 109(5):1607–1612, January 2012. ISSN 1091-6490. doi: 10.1073/pnas.1117194109.

6. *Bagheri N, *Shiina M, **Lauffenburger DA**, and **Korn WM**. A dynamical systems model for combinatorial cancer therapy enhances oncolytic adenovirus efficacy by MEK-inhibition. *PLOS Comput Biol*, 7(2):e1001085, February 2011. ISSN 1553-7358. doi: 10.1371/journal.pcbi.1001085.
5. Bagheri N, Lawson MJ, **Stelling J**, and **Doyle FJ**. Modeling the *Drosophila melanogaster* circadian oscillator via phase optimization. *J Biol Rhythms*, 23(6):525–537, December 2008. ISSN 0748-7304. doi: 10.1177/0748730408325041.
4. *Bagheri N, *Taylor SR, Meeker K, **Petzold LR**, and **Doyle FJ**. Synchrony and entrainment properties of robust circadian oscillators. *J R Soc Interface*, 5(Suppl 1):S17–28, August 2008. ISSN 1742-5689. doi: 10.1098/rsif.2008.0045.focus.
3. Bagheri N, **Stelling J**, and **Doyle FJ**. Circadian phase resetting via single and multiple control targets. *PLOS Comput Biol*, 4(7):e1000104, July 2008. ISSN 1553-7358. doi: 10.1371/journal.pcbi.1000104.
2. Bagheri N, , **Stelling J**, and **Doyle FJ**. Quantitative performance metrics for robustness in circadian rhythms. *Bioinformatics*, 23(3):358–364, February 2007. ISSN 1367-4811. doi: 10.1093/bioinformatics/btl627.
1. **Doyle FJ**, Gunawan R, Bagheri N, Mirsky H, and To TL. Circadian rhythm: A natural, robust, multi-scale control system. *Computers & Chemical Engineering*, 30(10):1700–1711, September 2006. ISSN 0098-1354. doi: 10.1016/j.compchemeng.2006.05.029.
41. # Jung J, Dreyer KS, Dray KE, Muldoon JJ, George J, Shirman S, de Lourdes Cabezas M, D'Aquino AE, Verosloff M, Seki K, Rybnicky GA, Alam K, Bagheri N, Jewett M, Leonard J, **Mangan N**, and **Lucks J**. Developing, characterizing and modeling crispr-based point-of-use pathogen diagnostics. *ACS Synthetic Biology*, December 2024. doi: 10.1021/acssynbio.4c00469.
40. # Yu JS, Lyons B, Rafelsky SM, Theriot JA, Bagheri N, and **Johnson GT**. 4D hybrid model interrogates agent-level rules and parameters driving hips cell colony dynamics. *bioRxiv*, July 2024. doi: 10.1101/2024.08.12.607546.
39. Yu JS and Bagheri N. Model design choices impact biological insight: Unpacking the broad landscape of spatial-temporal model development decisions. *PLOS Computational Biology*, 20(3):e1011917, March 2024. doi: 10.1371/journal.pcbi.1011917.
38. Cain JY, Evarts JL, Yu JS, and Bagheri N. Incorporating temporal information during feature engineering bolsters emulation of spatio-temporal emergence. *Bioinformatics*, 40(3):btae131, March 2024. doi: 10.1093/bioinformatics/btae131.
37. Bernasek SM, Hur SSJ, Peláez-Restrepo N, Boisclair Lachance JF, Bakker R, Navarro HT, Sanchez-Luege N, Amaral LAN, Bagheri N, **Rebay I**, and **Carthew RW**. Ratiometric sensing of Pnt and Yan transcription factor levels confers ultrasensitivity to photoreceptor fate transitions in *Drosophila*. *Development*, 150(8):dev201467, April 2023. doi: 10.1242/dev.201467.
36. Cain JY, Yu JS, and Bagheri N. The in silico lab: Improving academic code using lessons from biology. *Cell Systems*, 14(1):1–6, January 2023. doi: 10.1016/j.cels.2022.11.006.
35. Prybutok AN, Yu JS, Leonard JN, and Bagheri N. Mapping CAR T-Cell Design Space Using Agent-Based Models. *Frontiers in Molecular Biosciences*, 9:849363, July 2022. doi: 10.3389/fmolb.2022.849363.
34. *Prybutok AN, *Cain JY, Leonard JN, and Bagheri N. Fighting fire with fire: deploying complexity in computational modeling to effectively characterize complex biological systems. *Current Opinions in Biotechnology*, 75:102704, June 2022. doi: 10.1016/j.copbio.2022.102704.
33. Dray KE, Muldoon JJ, Mangan NM, Bagheri N, and Leonard JN. GAMES: A Dynamic Model Development Workflow for Rigorous Characterization of Synthetic Genetic Systems. *ACS Synthetic Biology*, 11(2):1009–1029, February 2022. doi: 10.1021/acssynbio.1c00528.

32. **Bagheri N, Carpenter AE, Lundberg E, Plant AL, and Horwitz, R.** The new era of quantitative cell imaging-challenges and opportunities. *Molecular Cell*, 82(2):241–247, January 2022. doi: 10.1016/j.molcel.2021.12.024.
31. *Mousavikhamene Z , *Sykora DJ, **Mrksich, M,** and **Bagheri N.** Morphological features of single cells enable accurate automated classification of cancer from non-cancer cell lines. *Scientific Reports*, 11(1):24375, December 2021. doi: 10.1038/s41598-021-03813-8.
30. Yu JS and **Bagheri N.** Modular microenvironment components reproduce vascular dynamics de novo in a multi-scale agent-based model. *Cell Systems (Cover Story)*, 12(8):795–809.e9, August 2021. doi: 10.1016/j.cels.2021.05.007.
29. Muldoon JJ , Kandula V, Hong M, Donahue PS, Boucher JD, **Bagheri N,** and **Leonard, JN.** Model-guided design of mammalian genetic programs. *Science Advances*, 7(8):eabe9375, February 2021. doi: 10.1126/sciadv.abe9375.
28. Yu JS and **Bagheri N.** Agent-Based Models Predict Emergent Behavior of Heterogeneous Cell Populations in Dynamic Microenvironments. *Frontiers in Bioengineering and Biotechnology*, 8:249, 2020. doi: 10.3389/fbioe.2020.00249.
27. Bernasek SM , Peláez N, Carthew RW, **Bagheri N,** and **Amaral, LAN.** Fly-QMA: Automated analysis of mosaic imaginal discs in *Drosophila*. *PLOS Computational Biology*, 16(3):e1007406, March 2020. doi: 10.1371/journal.pcbi.1007406.
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