

Benjamin Kuznets-Speck

Biophysics graduate group, University of California, Berkeley

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Education

University of California, Berkeley, Sep. 2018— present. Ph.D candidate, Biophysics graduate group, David Limmer group, Carlos Bustamante lab.

Case Western Reserve University, Cleveland, OH, 2014-2018 Bachelor of Science (summa cum laude, honors, 3.98 GPA), Math and Physics, Michael Hinczewski group.

Awards & Scholarships

- **Kavli Energy NanoScience Institute Philomathia Fellow**, 2022-2023.
- **Hertz Fellowship Finalist**, one of forty nation-wide, 2019
- **Barry Goldwater Scholar**, 2017-18
- **Donald A. Glaser Award**: outstanding math and physics student CWRU, 2018.
- **Albert A. Michelson Prize**: superior performance in Jr. year of physics, CWRU, 2017.
- **Michelson-Morley STEM Scholarship**, CWRU
- **Jr & Sr Scholarship**, CWRU Alumni Association
- **Deans list high honors** (all terms at CWRU)

Research

Carlos Bustamante lab, U.C. Berkeley, 2022-present. Experimental tests speed limits on single molecule transitions; experiments, simulations and data analysis of single molecule force spectroscopy experiments to study protein folding.

David Limmer group, U.C. Berkeley, 2018-present. Speed limits on accelerating collective phenomena and the energetic cost to do so; design and control of complex random systems with reinforcement learning, model-free transition rate inference.

Michael Hinczewski group, CWRU Physics, 2015-18. Using non-equilibrium statistical mechanics to: 1) map trade-offs in speed, cost and information transfer in living cells; 2) steering evolution in heterogeneous clonal populations. 3) control biophysical networks.

Teaching, Mentoring and Outreach

- **Mentor to two graduate students** (David Limmer and Ahmet Yildiz labs)
- **Graduate student instructor**, Physical Chemistry CHEM120B, 2022.
- **Admissions committee member**, Biophysics graduate group, UC Berkeley. 2022-23

- **Compass mentor to 3 undergraduates**, UC Berkeley Physics, Spring 2021-present.
- **Research facilitator: *Physical Biology of the Cell*** summer course, Marine Biological Laboratory, Woods Hole MA, Summer 2019.
- **Undergraduate mentor to 2 underclassmen**: CWRU Phys./Astro. club, 2017-18.
- **Teaching assistant**: Introduction to Biological Physics, CWRU, 2017

Publications (see my webpage/google scholar; * indicates equal contribution)

- [7] **B. Kuznets-Speck** & D. T. Limmer, 'Inferring equilibrium transition rates from nonequilibrium protocols,' *arXiv*, 2022.
- [6] A. Das*, **B. Kuznets-Speck*** & D. T. Limmer, 'Direct evaluation of rare events in active matter from variational path sampling,' *Phys. Rev. Lett.*, 2022.
- [5] E. Ilker **et al.**, 'Shortcuts in Stochastic Systems and Control of Biophysical Processes' *Phys. Rev. X*, 2022.
- [4] **B. Kuznets-Speck** & D. T. Limmer, 'Dissipation bounds the amplification of transition rates far from equilibrium' *Proc. Natl. Acad. Sci.*, 2021.
- [3] T. Wang, **B. Kuznets-Speck**, J. Broderick & M. Hinczewski, 'The price of a bit: energetic costs and the evolution of cellular signaling,' *bioRxiv*. 2020
- [2] S. Iram **et al.**, 'Controlling the speed and trajectory of evolution with counterdiabatic driving,' *Nature Physics*, 2020.
- [1] A.W. Eckford, **B. Kuznets-Speck**, M. Hinczewski & P.J. Thomas, 'Thermodynamic properties of molecular communication' *IEEE*, 2018.

Conferences and public speaking

- American Physical Society Annual Meeting, 2022.
- Berkeley Statistical mechanics meeting, 2022.
- Compass Physics Lecture, UC Berkeley, Fall 2021.
- American Physical Society Annual Meeting, 2021.
- Second Workshop On Stochastic-thermodynamics (WOSTII), Santa Fe Institute, 2021.
- Berkeley Statistical mechanics meeting, 2020.
- Biophysics graduate group retreat, Berkeley, CA, 2019.
- Biophysical Society Annual Meeting, San Francisco, CA, 2018.

Additional References

In addition to primary research advisors (David Limmer, Carlos Bustamante and Michael Hinczewski), the following will act as references.

Hernan Garcia: Asst. Professor, Physics and Molecular/Cell Biology, UC Berkeley.

Rob Phillips: Professor, Applied Physics, Caltech.