

Curriculum vitae

Jaron Kent-Dobias

Assegno di ricerca
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A physicist studying the statistical mechanics of critical, nonequilibrium, and disordered systems.



Employment



Postdoctoral researcher Nov 2022 – Present
DYNsYSMATH, Istituto Nazionale di Fisica Nucleare, Sezione di Roma I

Postdoctoral researcher Oct 2020 – Oct 2022
Centre National de la Recherche Scientifique, Laboratoire de Physique de l'ENS, Paris

Education



Doctor of Philosophy, Physics June 2020
Cornell University, Ithaca, NY

Thesis: [Novel critical phenomena](#) (PDF, Poster PDF, Presentation PDF)

Master of Science, Physics Feb 2017
Cornell University, Ithaca, NY

Bachelor of Science, Physics May 2014
Harvey Mudd College, Claremont, CA

Thesis: [Energy driven pattern formation in planar dipole-dipole systems](#) (PDF)

High School Diploma May 2010
Skyline High School, Sammamish, WA

Preprints



Origin of symmetry breaking in the grasshopper model, David Llamas, JK-D, Kun Chen, Adrian Kent & Olga Goulko, [arXiv:2311.05023](#) (2023)

Log-correlated color in Monet's paintings, JK-D, [arXiv:2209.01989](#) (2022)

Smooth and global Ising universal scaling functions, JK-D & James P Sethna, [arXiv:1707.03791](#) (2021)

Publications



Normal forms, universal scaling functions, and extending the validity of the RG, James P Sethna, David Hathcock, JK-D & Archishman Raju, in *50 years of the Renormalization Group: Dedicated to the memory of Michael E Fisher*, edited by Amnon Aharony, Ora Entin-Wohlman, David A Huse & Leo Radzihovsky (June 2024) [[arXiv:2304.00105](#)]

Arrangement of nearby minima and saddles in the mixed spherical energy landscapes, JK-D, *SciPost Physics* **16**, 001 (2024) [PDF | [arXiv:2306.12779](#)]

When is the average number of saddle points typical?, JK-D, *Europhysics Letters* **143**, 61003 (2023) [PDF | [arXiv:2306.12752](#)]

How to count in hierarchical landscapes: a full solution to mean-field complexity, JK-D & Jorge Kurchan, *Physical Review E* **107**, 064111 (2023) [PDF | [arXiv:2207.06161](#)]

Analytic continuation over complex landscapes, JK-D & Jorge Kurchan, *Journal of Physics A: Mathematical and Theoretical* **55**, 434006 (2022) [PDF | [arXiv:2204.06072](#)]

Glass phenomenology in the hard matrix model, Junkai Dong, Veit Elser, Gaurav Gyawali, Kai Yen Jee, JK-D, Avinash Mandaiya, Megan Renz & Yubo Su, *Journal of Statistical Mechanics: Theory and Experiment* **2021**, 093302 (2021) [[arXiv:1912.07558](#)]

Complex complex landscapes, JK-D & Jorge Kurchan, *Physical Review Research* **3**, 023064 (2021)..... [[PDF](#) | [arXiv:2012.06299](#)]

Elastic properties of hidden order in URu₂Si₂ are reproduced by a staggered nematic, JK-D, Michael Matty & BJ Ramshaw, *Physical Review B* **102**, 075129 (2020) [[PDF](#) | [arXiv:1910.01669](#)]

Visualizing probabilistic models in Minkowski space with intensive symmetrized Kullback-Leibler embedding, Han Kheng Teoh, Katherine N Quinn, JK-D, Colin B Clement, Qingyang Xu & James P Sethna, *Physical Review Research* **2**, 033221 (2020) [[PDF](#) | [arXiv:1912.06039](#)]

Normal form for renormalization groups, Archishman Raju, Colin B Clement, Lorien X Hayden, JK-D, Danilo B Liarte, D Zeb Rocklin & James P Sethna, *Physical Review X* **9**, 021014 (2019) [[PDF](#) | [arXiv:1706.00137](#)]

Cluster representations and the Wolff algorithm in arbitrary external fields, JK-D & James P Sethna, *Physical Review E* **98**, 063306 (2018) [[PDF](#) | [arXiv:1805.04019](#)]

Deformation of crystals: connections with statistical physics, James P Sethna, Matthew K Bierbaum, Karin A Dahmen, Carl P Goodrich, Julia R Greer, Lorien X Hayden, JK-D, Edward D Lee, Danilo B Liarte, Xiaoyue Ni, Katherine N Quinn, Archishman Raju, D Zeb Rocklin, Ashvini Shekhawat & Stefano Zapperi, *Annual Review of Materials Research* **47**, 217 (2017) [[arXiv:1609.05838](#)]

Energy driven pattern formation in planar dipole-dipole systems in the presence of weak noise, JK-D & Andrew J Bernoff, *Physical Review E* **91**, 032919 (2015) [[PDF](#) | [arXiv:1406.3749](#)]

Rock • Paper • Book, Brendan Gillett, Anastasia Patterson, Lily Stewart, Gretchen Allen, Garrett Wong, Kate MacDonnell, Carrie Latimer, JK-D, Siyao Xie, Jay Jonsson, Jacob Bandes-Storch, Rob O'Neill, Jack Ma, Chelsea Carlson, Kitty Maryatt, *Scripps College Press* (2013)

Honors & Awards



- Finalist, LeRoy Apker Award** *Aug 2014*
 American Physical Society
 An undergraduate physics achievement award to recognize outstanding achievements in physics by undergraduate students, and thereby provide encouragement to young physicists who have demonstrated great potential for future scientific accomplishment.
- Thomas B Brown Memorial Award** *May 2014*
 Department of Physics, Harvey Mudd College
 The Thomas B Brown Memorial award for senior research in physics is awarded for research results, originality in conception or in execution of research, diligence, and clarity of oral and written reports.
- The Chavin Prize** *May 2014*
 Department of Mathematics, Harvey Mudd College
 The Chavin Prize is awarded for outstanding senior theses in the mathematical sciences.
- Cornell Graduate Fellowship** *Feb 2014*
 Department of Physics, Cornell University
 The Graduate Fellowship is awarded upon admission to the students with the strongest academic and research records.
- Eagle Scout** *Mar 2008*
 Boy Scouts of America, Troop 636, Sammamish, WA
- Second Degree Black Belt** *Dec 2008*
 True Martial Arts, Sammamish, WA

Teaching



Teaching Assistant *Aug 2014 – May 2020*
Physics Department, Cornell University

- **Physics 1101 (General Physics I)**
 - Flipped classroom facilitation: Fall 2018
- **Physics 1112 (Physics I: Mechanics & Heat)**
 - Recitation, Lab & Grading: Spring 2015
- **Physics 1116 (Physics I: Mechanics & Special Relativity)**
 - Recitation & Lab: Falls 2014, 2017 & 2019
 - Grading: Falls 2014, 2017, 2019 & Spring 2019
- **Physics 6562 (Statistical Physics I)**
 - Flipped classroom facilitation: Springs 2016, 2017, 2018, 2019 & 2020
 - Grading: Springs 2017 & 2019
- **Physics 7653 (Statistical Physics II)**
 - Grading: Falls 2015, 2016, 2017, 2018 & 2019.

Academic Excellence Facilitator *Apr 2012 – May 2014*
Academic Excellence Program, Harvey Mudd College

Tutored students taking core courses in mechanics, electromagnetism, and special relativity.
Worked closely with faculty to improve both tutoring and lecturing.

Claremont Center for the Mathematical Sciences Lab Mentor *Jan 2012 – May 2014*
Department of Mathematics, Claremont Graduate University

Provided support for MATLAB, Mathematica, L^AT_EX, and Python for students and faculty throughout the Claremont Consortium.

Grader *Jan 2012 – May 2013*
Department of Physics, Harvey Mudd College

- **Physics 24 (Mechanics)**: Spring 2012
- **Physics 111 (Theoretical Mechanics)**: Fall 2012
- **Physics 161 (Electromagnetic Fields)**: Fall 2013

Physics 18 (Fundamentals of Mechanics) Tutor *Spring 2013*
Department of Physics, Harvey Mudd College

Grader *Jan 2012 – May 2014*
Department of Mathematics, Harvey Mudd College

- **Math 45 (Linear Algebra & Differential Equations)**: Spring 2012
- **Math 115 (Fourier Series & Boundary Value Problems)**: Spring 2014

Other Experience



Systems Administrator *May 2011 – May 2014*
Department of Computer Science, Harvey Mudd College

Administered Linux and Mac OS servers and managed a network of codependent systems.
Created and modified scripts written in Perl, Bash, and Python for a variety of system tasks.
Designed, set up and administered a cluster for use by other researchers.

Systems Consultant *Sep 2010 – May 2011*
Department of Computer Science, Harvey Mudd College

Wrote documentation and provided on-site user support for desktop and server systems. Led educational sessions on topics related to Unix administration and advanced usage.

Presentations



How to count in hierarchical landscapes: complexity in the mixed spherical models, JK-D, [StatPhys28 \(2023\)](#) ([PDF](#))

How to count in hierarchical landscapes: complexity in the mixed spherical models, JK-D, [\$\Sigma\Phi\$ International Conference on Statistical Physics \(2023\)](#) ([PDF](#))

Analytic continuation over complex landscapes, JK-D & Jorge Kurchan, [APS March Meeting 2022, Q08.15](#) ([PDF](#))

Analytic continuation over complex landscapes, JK-D, [Journées de Physique Statistique](#) ([PDF](#))

Glassy dynamics in the hard matrix model, JK-D & Veit Elser, [APS March Meeting 2021, R16.5](#) ([PDF](#))

Cluster-flip colloidal and atomistic algorithms with background potentials, JK-D & James P Sethna, [APS March Meeting 2020, B45.4](#) (Cancelled) ([PDF](#))

Inconsistent static and dynamic scaling in disordered brittle fracture, JK-D & James P Sethna, 122nd Statistical Mechanics Conference, Rutgers University, Short Talks (December 2019)

Rejection-free cluster Monte Carlo in arbitrary external fields, JK-D & James P Sethna, [Statphys 27 \(2019\)](#) ([PDF](#))

Scaling and spatial correlations in the quasibrittle process zone, JK-D & James P Sethna, [APS March Meeting 2019, V56.11](#) ([PDF](#))

Cluster representations and the Wolff algorithm in arbitrary external fields, JK-D & James P Sethna, [120th Statistical Mechanics Conference, Rutgers University, Short Talks \(December 2018\)](#)

An efficient cluster algorithm for the Ising model in an external field, JK-D & James P Sethna, [APS March Meeting 2018, X48.11](#) ([HTML](#))

Universal scaling and the essential singularity at the Ising first-order transition, JK-D & James P Sethna, [APS March Meeting 2017, V15.5](#) ([PDF](#))

Scaling theory of the process zone of quasibrittle materials: an avalanche crossover analysis, JK-D, Ashivni Shekhawat & James P Sethna, [APS March Meeting 2016, A43.3](#) ([PDF](#))

Posters



How to count in hierarchical landscapes, JK-D & Jorge Kurchan, [Youth in High-Dimensions: Recent Progress in Machine Learning, High-Dimensional Statistics and Inference \(2023\)](#) ([PDF](#))

Analytic continuation over complex landscapes, JK-D & Jorge Kurchan, [Random Matrices and Random Landscapes: Conference in honour of Yan Fyodorov's 60th birthday \(2022\)](#) ([PDF](#))

Analytic continuation over complex landscapes, JK-D & Jorge Kurchan, [Simons Collaboration on Cracking the Glass Problem Annual Meeting 2022](#) ([PDF](#))

Analytic continuation of complex landscapes, JK-D & Jorge Kurchan, [EPS Conference on Statistical Physics of Complex Systems 2021, P20](#) ([PDF](#))

Elastic properties of hidden order in URu_2Si_2 are reproduced by a staggered nematic, JK-D, Michael Matty & Brad Ramshaw, [APS March Meeting 2020, H71.63](#) (Cancelled) ([PDF](#))

Exploring the quasibrittle process zone with real-space RG, JK-D, James P Sethna & Ashivni Shekhawat, [Statphys 26 \(2016\)](#) ([PDF](#))

Energy driven pattern formation in planar dipole-dipole systems, JK-D & Andrew J Bernoff, Harvey Mudd College 2014 Thesis Posters ([PDF](#))

Mapping the energy landscape of compact Langmuir domains, JK-D & Andrew J Bernoff, Harvey Mudd College Summer 2013 Physics Research ([PDF](#))

Impurity expulsion in colloidal crystals, JK-D, Paul Jerger & Sharon Gerbode, Harvey Mudd College Summer 2012 Physics Research ([PDF](#))

Conferences, workshops & schools



Advanced Working Group on Slow Relaxation and Glassiness, September 2023. Cambridge, United Kingdom

StatPhys28, August 2023. Tokyo, Japan

$\Sigma\Phi$ International Conference on Statistical Physics, July 2023. Chania, Crete, Greece

Youth in High-Dimensions: Recent Progress in Machine Learning, High-Dimensional Statistics and Inference, June 2023. Trieste, Italy

Interdisciplinary challenges: from non-equilibrium physics to life sciences, April 2023. Rome, Italy

Simons Collaboration on Cracking the Glass Problem Annual Meeting, March 2023. New York, USA

Simons Collaboration on Cracking the Glass Problem Yearly Meeting, November 2022. Venice, Italy

Two days with Giorgio Parisi in Paris, October 2022. Paris, France

Jean-Philippe Bouchaud: a rare event?, September 2022. Paris, France

Random Matrices and Random Landscapes: Conference in Honor of Yan Fyodorov's 60th birthday, July 2022. Ascona, Switzerland

Beg Rohu Summer School: Out of Equilibrium Dynamics, June 2022. Saint Pierre Quiberon, France

A day with Giorgio Parisi in Rome, May 2022. Rome, Italy

Mathematics Meets Physics on Disordered Systems, April 2022. Cortona, Italy

APS March Meeting, March 2022. Chicago, Illinois, USA

Simons Collaboration on Cracking the Glass Problem Annual Meeting, March 2022. New York, USA

Journées de Physique Statistique, January 2022. Paris, France

Simons Collaboration on Cracking the Glass Problem Yearly Meeting, November 2021. Venice, Italy

EPS Conference on Statistical Physics of Complex Systems, September 2021. Trieste, Italy

Glassy Systems and Inter-Disciplinary Applications, June 2021. Cargese, Corsica, France

LPENS 5 Longest Days in Les Houches, June 2021. Les Houches, France

APS March Meeting, March 2021. Online participation

Simons Collaboration on Cracking the Glass Problem Annual Meeting, December 2020. Online participation

122nd Statistical Mechanics Conference, December 2019. Rutgers University, New Jersey, USA

StatPhys27, July 2019. Buenos Aires, Argentina

APS March Meeting, March 2019. Boston, Massachusetts, USA

120th Statistical Mechanics Conference, December 2018. Rutgers University, New Jersey, USA

APS March Meeting, March 2018. Los Angeles, California, USA

APS March Meeting, March 2017. New Orleans, Louisiana, USA

Renormalization Group Theory of Disordered Systems, July 2016. Paris, France

StatPhys26, July 2016. Lyon, France

APS March Meeting, March 2016. Baltimore, Maryland, USA