

Jaron Kent-Dobias

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I work on explaining emergent collective behavior in statistical physics using renormalization group ideas and numeric experiments. Current work includes exploring the breadth of universality near first and infinite order transitions, scaling theories for disordered fracture, and developing more efficient simulations of lattice spin and continuous atomistic models.

Education

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

→ Thesis: **Novel critical phenomena** (PDF, Poster PDF, Presentation PDF).

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

→ Examination for Admission to Candidacy: Q1 PDF, Q2 PDF, Q3 PDF, Presentation PDF.

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

→ Total GPA of 3.779, major GPA of 4.000.

→ Graduated with high distinction and honors in physics.

→ Thesis: **Energy driven pattern formation in planar dipole–dipole systems** (PDF).

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

Publications

Glass phenomenology in the hard matrix model, Junkai Dong, Veit Elser, Gaurav Gyawali, Kai Yen Jee, Jaron Kent-Dobias, Avinash Mandaiya, Megan Renz & Yubo Su, [arXiv:1912.07558 \[cond-mat.stat-mech\]](#), submitted.

Essential singularities in universal scaling functions at the Ising coexistence line, Jaron Kent-Dobias & James P Sethna, [arXiv:1707.03791 \[cond-mat.stat-mech\]](#), under revision.

Elastic properties of hidden order in URu₂Si₂ are reproduced by a staggered nematic, Jaron Kent-Dobias, Michael Matty & B J Ramshaw, *Physical Review B* **102**, 075129 (2020) (PDF) · [arXiv:1910.01669 \[cond-mat.str-el\]](#).

Visualizing probabilistic models in Minkowski space with intensive symmetrized Kullback-Leibler embedding, Han Kheng Teoh, Katherine N Quinn, Jaron Kent-Dobias, Colin B Clement, Qingyang Xu & James P Sethna, *Physical Review Research* **2**, 033221 (2020) (PDF) · [arXiv:1912.06039 \[cond-mat.stat-mech\]](#).

Normal form for renormalization groups, Archishman Raju, Colin B Clement, Lorien X Hayden, Jaron Kent-Dobias, Danilo B Liarte, D Zeb Rocklin & James P Sethna, *Physical Review X* **9**, 021014 (2019) (PDF) · [arXiv:1706.00137 \[cond-mat.stat-mech\]](#).

Cluster representations and the Wolff algorithm in arbitrary external fields, Jaron Kent-Dobias & James P Sethna, *Physical Review E* **98**, 063306 (2018) (PDF) · [arXiv:1805.04019 \[cond-mat.stat-mech\]](#).

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, Jaron Kent-Dobias, 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 \[cond-mat.mtrl-sci\]](#).

Energy driven pattern formation in planar dipole–dipole systems in the presence of weak noise, Jaron Kent-Dobias & Andrew J Bernoff, *Physical Review E* **91**, 032919 (2015) (PDF) · arXiv:1406.3749 [cond-mat.soft].

Rock · Paper · Book, Brendan Gillett, Anastasia Patterson, Lily Stewart, Gretchen Allen, Garrett Wong, Kate MacDonnell, Carrie Latimer, Jaron Kent-Dobias, Siyao Xie, Jay Jonsson, Jacob Bades-Storch, Rob O’Neill, Jack Ma, Chelsea Carlson, Kitty Maryatt, *Scripps College Press* (2013).

Honors & Awards

Finalist, LeRoy Apker Award *August 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 *February 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 *March 2008*
Boy Scouts of America, Troop 636, Sammamish, WA

Second Degree Black Belt *December 2008*
True Martial Arts, Sammamish, WA

Teaching

Teaching Assistant *August 2014 – Present*
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

April 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

Spring 2012 – Spring 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

Spring 2012 – Fall 2013

Department of Physics, Harvey Mudd College

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

Tutor

Spring 2013

Department of Physics, Harvey Mudd College

- **Physics 18 – Fundamentals of Mechanics**: Spring 2013

Grader

Spring 2012 – Spring 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

September 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

Cluster-flip colloidal and atomistic algorithms with background potentials, Jaron Kent-Dobias & James P Sethna, *APS March Meeting 2020, B45.4* (Cancelled) (PDF).

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

Rejection-free cluster Monte Carlo in arbitrary external fields, Jaron Kent-Dobias & James P Sethna, *Statphys 27* (2019) (PDF).

Scaling and spatial correlations in the quasibrittle process zone, Jaron Kent-Dobias & James P Sethna, *APS March Meeting 2019, V56.11* (PDF).

Cluster representations and the Wolff algorithm in arbitrary external fields, Jaron Kent-Dobias & 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, Jaron Kent-Dobias & James P Sethna, *APS March Meeting 2018, X48.11* (HTML).

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

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

Posters

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

Exploring the quasibrittle process zone with real-space RG, *Jaron Kent-Dobias, James P Sethna & Ashivni Shekhawat*, *Statphys 26 (2016)* ([PDF](#)).

Energy driven pattern formation in planar dipole-dipole systems, *Andrew J Bernoff & Jaron Kent-Dobias*, *Harvey Mudd College 2014 Thesis Posters* ([PDF](#)).

Mapping the energy landscape of compact Langmuir domains, *Jaron Kent-Dobias, Harvey Mudd College Summer 2013 Physics Research* ([PDF](#)).

Impurity expulsion in colloidal crystals, *Jaron Kent-Dobias & Paul Jerger, Harvey Mudd College Summer 2012 Physics Research* ([PDF](#)).