Textbooks covering the renormalization group

[1] James P. Sethna. *Statistical Mechanics: Entropy, Order Parameters, and Complexity, `http://www.physics.cornell.edu/sethna/StatMech/`*. Oxford University Press, Oxford, 2006.

[2] John Cardy. *Scaling and renormalization in statistical physics*, volume 5. Cambridge university press, 1996.

[3] Mehran Kardar. *Statistical physics of fields*. Cambridge University Press, 2007.

[4] Paul M Chaikin and Tom C Lubensky. *Principles of condensed matter physics*. Cambridge university press, 2000.

[5] James J Binney, NJ Dowrick, AJ Fisher, and MEJ Newman. The theory of critical phenomena: An introduction to the renormalization group (oxford science publications). 1992.

[6] Nigel Goldenfeld. Lectures on phase transitions and the renormalization group. 1992.

[7] Michael Plischke and Birger Bergersen. *Equilibrium statistical physics*. World Scientific Publishing Co Inc, 1994.

The renormalization group

[1] Kenneth G Wilson and John Kogut. The renormalization group and the expansion. *Physics Reports*, 12(2):75–199, 1974.

[2] Benjamin B. Machta, Ricky Chachra, Mark Transtrum, and James P. Sethna. Parameter space compression underlies emergent theories and predictive models. *Science*, 342:604–607, 2013.

[3] Archishman Raju, Colin B. Clement, Lorien X. Hayden, Jaron P. Kent-Dobias, Danilo B. Liarte, D. Zeb Rocklin, and James P. Sethna. Renormalization group and normal form theory. *(submitted)*, 2017.

[4] J M Kosterlitz and D J Thouless. Ordering, metastability and phase transitions in two-dimensional systems. *Journal of Physics C: Solid State Physics*, 6(7):1181, 1973.

[5] James P. Sethna, Benjamin B. Machta, and Ricky Chachra. Why is science possible? `http://www.lassp.cornell.edu/sethna/Sloppy/WhyIsSciencePossible.html`, 2013.

[6] Anne Ju. Physicists unify the structure of scientific theories. `http://www.news.cornell.edu/stories/2013/10/physicists-unify-structure-scientific-theories`, Oct 31, 2013.

Onset of chaos

[1] Mitchell J Feigenbaum. Universal behavior in nonlinear systems. *Physica D: Nonlinear Phenomena*, 7(1-3):16–39, 1983.

[2] Predrag Cvitanovic. Universality in chaos. *Bristol, Adam Hilger, Ltd., 1984, 519 p.*, 1984.

[3] S. Ostlund, D. Rand, J. P. Sethna, and E. D. Siggia. Universal properties of the transition from quasi-periodicity to chaos in dissipative systems. *Physica D*, 8:303–342, 1983.

Crackling noise, depinning, and avalanches

[1] J. P. Sethna, K. A. Dahmen, and C. R. Myers. Crackling noise. *Nature*, 410:242–250, 2001.

[2] Daniel S Fisher. Collective transport in random media: from superconductors to earthquakes. *Physics reports*, 301(1):113–150, 1998.

[3] Per Bak. *How nature works: the science of self-organized criticality.* Springer Science & Business Media, 2013.

[4] Per Bak, Chao Tang, and Kurt Wiesenfeld. Self-organized criticality. *Physical review A*, 38(1):364, 1988.

[5] J. P. Sethna, K. Dahmen, S. Kartha, J. A. Krumhansl, B. W. Roberts, and J. D. Shore. Hysteresis and hierarchies - dynamics of disorder-driven 1st-order phase-transformations. *Physical Review Letters*, 70:3347–3350, 1993.

[6] D. J. Pine, J. P. Gollub, J. F. Brady, and A. M. Leshansky. Chaos and threshold for irreversibility in sheared suspensions. *Nature*, 438(7070):997–1000, Dec 15 2005. Copyright - Copyright Nature Publishing Group Dec 15, 2005; Document feature - Equations; Graphs; ; Diagrams; Last updated - 2014-04-30; CODEN - NATUAS.

[7] Stefanos Papanikolaou, Felipe Bohn, Rubem Luis Sommer, Gianfranco Durin, Stefano Zapperi, and James P. Sethna. Universality beyond power laws and the average avalanche shape. *Nature Physics*, 7:316–320, 2011.

[8] Gianfranco Durin and Stefano Zapperi. Chapter 3 - the barkhausen effect. In Giorgio Bertotti and Isaak D. Mayergoyz, editors, *The Science of Hysteresis*, pages 181 – 267. Academic Press, Oxford, 2006.

[9] Yanjiun Chen, Stefanos Papanikolaou, James P. Sethna, Stefano Zapperi, and Gianfranco Durin. Avalanche spatial structure and multivariable scaling functions; sizes, heights, widths, and views through windows. *Physical Review E*, 84:061103, 2011.

[10] M. C. Kuntz and J. P. Sethna. Noise in disordered systems: The power spectrum and dynamic exponents in avalanche models. *Physical Review B*, 62:11699–11708, 2000.

[11] Matthew Kuntz, Paul Houle, and James P. Sethna. Crackling noise. `http://SimScience.org/crackling/`, 1998.

[12] James P. Sethna. Hysteresis and avalanches. `http://www.lassp.cornell.edu/sethna/hysteresis/hysteresis.html`, 1996.

Surfaces and growing interfaces

[1] Mehran Kardar, Giorgio Parisi, and Yi-Cheng Zhang. Dynamic scaling of growing interfaces. *Physical Review Letters*, 56(9):889, 1986.

[2] ST Chui and JD Weeks. Phase transition in the two-dimensional coulomb gas, and the interfacial roughening transition. *Physical Review B*, 14(11):4978, 1976.

Flocking and active matter

[1] John Toner, Yuhai Tu, and Sriram Ramaswamy. Hydrodynamics and phases of flocks. *Annals of Physics*, 318(1):170–244, 2005.

[2] Jesse L. Silverberg, Matthew Bierbaum, Itai Cohen, and James P. Sethna. Collective motion of moshers at heavy metal concerts. *Physical Review Letters)*, 110:228701, 2013.

[3] M. C. Marchetti, J. F. Joanny, S. Ramaswamy, T. B. Liverpool, J. Prost, Madan Rao, and R. Aditi Simha. Hydrodynamics of soft active matter. *Rev. Mod. Phys.*, 85:1143–1189, Jul 2013.

[4] Sidney R. Nagel. Experimental soft-matter science. *Rev. Mod. Phys.*, 89:025002, Apr 2017.

Nonperturbative functional ('Exact') RG (Two applications)

[1] Ivan Balog, Gilles Tarjus, and Matthieu Tissier. Criticality of the random field Ising model in and out of equilibrium: A nonperturbative functional renormalization group description. *Phys. Rev. B*, 97:094204, Mar 2018.

[2] Léonie Canet, Bertrand Delamotte, and Nicolás Wschebor. Fully developed isotropic turbulence: Nonperturbative renormalization group formalism and fixed-point solution. *Phys. Rev. E*, 93:063101, Jun 2016.

2D Conformal field theory

[1] John Cardy. Conformal field theory and statistical mechanics. *Exact methods in low-dimensional statistical physics and quantum computing*, pages 65–98, 2008.

[2] Paul Ginsparg. Applied conformal field theory. *arXiv preprint hep-th/9108028; Les Houches school 'Fields, strings, and critical phenomena', ed. E. Brezin and J. Zinn-Justin*, 1988.

SLE

[1] John Cardy. SLE for theoretical physicists. *Annals of Physics*, 318(1):81–118, 2005.

Conformal bootstrap

[1] Sheer El-Showk, Miguel F Paulos, David Poland, Slava Rychkov, David Simmons-Duffin, and Alessandro Vichi. Solving the 3d Ising model with the conformal bootstrap. *Physical Review D*, 86(2):025022, 2012.

[2] David Simmons-Duffin. TASI lectures on the conformal bootstrap. *arXiv preprint arXiv:1602.07982*, 2016.

[3] David Poland and David Simmons-Duffin. The conformal bootstrap. *Nature Physics*, pages 535–539, 2016.

[4] John Golden and Miguel F Paulos. (no) bootstrap for the fractal Ising model. *arXiv preprint arXiv:1411.7932*, 2014.

Disordered systems

[1] Daniel S Fisher, Geoffrey M Grinstein, and Anil Khurana. Theory of random magnets. *Physics Today*, 41(12):56–67, 1988.

[2] A. J. Bray and M. A. Moore. Scaling theory of the random-field Ising model. *J. Phys. C*, 18(L927), 1985.

[3] D. S. Fisher. Scaling and critical slowing down in random-field Ising systems. *Phys. Rev. Lett.*, 56:416, 1986.

[4] Marc Mezard and Andrea Montanari. *Information, physics, and computation.* Oxford University Press, 2009.

Networks

[1] Duncan S. Callaway, John E. Hopcroft, Jon M. Kleinberg, M. E. J. Newman, and Steven H. Strogatz. Are randomly grown graphs really random? *Phys. Rev. E*, 64:041902, Sep 2001.

Glasses

[1] Andrea J Liu and Sidney R Nagel. Nonlinear dynamics: Jamming is not just cool any more. *Nature*, 396(6706):21–22, 1998.

[2] Andrea J Liu and Sidney R Nagel. The jamming transition and the marginally jammed solid. *Annu. Rev. Condens. Matter Phys.*, 1(1):347–369, 2010.

[3] Cristina Toninelli, Giulio Biroli, and Daniel S Fisher. Jamming percolation and glass transitions in lattice models. *Physical review letters*, 96(3):035702, 2006.

[4] Carl P. Goodrich, Andrea J. Liu, and James P. Sethna. Scaling ansatz for the jamming transition. *Proceedings of the National Academy of Sciences*, 113, 2016.

[5] J. P. Sethna, J. D. Shore, and M. Huang. Scaling theory for the glass-transition (vol 44, pg 4943, 1991). *Physical Review B*, 47:14661–14661, 1993.

[6] François Sausset, Gilles Tarjus, and Pascal Viot. Tuning the fragility of a glass-forming liquid by curving space. *Physical review letters*, 101(15):155701, 2008.

[7] Steven A Kivelson and Gilles Tarjus. In search of a theory of supercooled liquids. *Nature Materials*, 7(11):831–833, 2008.

[8] Marc Mezard and Andrea Montanari. *Information, physics, and computation.* Oxford University Press, 2009.

Quantum phase transitions

[1] Subir Sachdev. *Quantum phase transitions.* Wiley Online Library, 2007.

[2] SL Sondhi, SM Girvin, JP Carini, and D Shahar. Continuous quantum phase transitions. *Reviews of Modern Physics*, 69(1):315, 1997.

Fracture

[1] Mikko J Alava, Phani KVV Nukala, and Stefano Zapperi. Statistical models of fracture. *Advances in Physics*, 55(3-4):349–476, 2006.

[2] Elisabeth Bouchaud. Scaling properties of cracks. *Journal of Physics: Condensed Matter*, 9(21):4319, 1997.

[3] Ashivni Shekhawat, Stefano Zapperi, and James P. Sethna. From damage percolation to crack nucleation through finite-size criticality. *Physical Review Letters*, 110:185505, 2013.

[4] Claudio Manzato, Ashivni Shekhawat, Phani K. V. V. Nukala, Mikko J. Alava, James P. Sethna, and Stefano Zapperi. Fracture strength of disordered media: Universality, interactions and tail asymptotics. *Physical Review Letters*, 108:065504, 2012.

[5] Yan-Jiun Chen, Stefano Zapperi, and James P. Sethna. Crossover behavior in interface depinning. *Phys. Rev. E*, 92:022146, 2015.

Cell membranes

[1] Benjamin B. Machta, Sarah L. Veatch, and James P. Sethna. Critical Casimir forces in cellular membranes. *Physical Review Letters*, 109:138101, (2012).

[2] Sarah L Veatch and Sarah L Keller. Separation of liquid phases in giant vesicles of ternary mixtures of phospholipids and cholesterol. *Biophysical journal*, 85(5):3074–3083, 2003.

[3] S. L. Veatch, P. Cicuta, P. Sengupta, A. HonerkampSmith, D. Holowka, and B. Baird. Critical fluctuations in plasma membrane vesicles. *ACS Chemical Biology*, 3:287, 2008.

[4] Ben Machta, Ellyn Gray, Mariam Nouri, Nicola LC McCarthy, Erin M Grey, Ann L Miller, Nicholas J Brooks, and Sarah Veatch. Stabilizing membrane domains antagonizes n-alcohol anesthesia. *bioRxiv*, page 057257, 2016.

[5] Ellyn Gray, Joshua Karslake, Benjamin B Machta, and Sarah L Veatch. Liquid general anesthetics lower critical temperatures in plasma membrane vesicles. *Biophysical journal*, 105(12):2751–2759, 2013.

Plastic flow in metals

[1] J. P. Sethna. Crackling wires. *Science (Perspective)*, 318:207–208, 2007.

[2] Michael Zaiser. Scale invariance in plastic flow of crystalline solids. *Advances in Physics*, 55(1-2):185–245, 2006.

[3] M-Carmen Miguel, Alessandro Vespignani, Stefano Zapperi, Jérôme Weiss, and Jean-Robert Grasso. Intermittent dislocation flow in viscoplastic deformation. *Nature*, 410(6829):667–671, 2001.

[4] J. P. Sethna, M. K. Bierbaum, K. A. Dahmen, C. P. Goodrich, J. R. Greer, L. X. Hayden, J. P. Kent-Dobias, E. D. Lee, D. B. Liarte, X. Ni, K. N. Quinn, A. Raju, D. Zeb Rocklin, A. Shekhawat, and S. Zapperi. Deformation of crystals: Connections with statistical physics. *Annual Review of Materials Research*, 47:217–246, 2017.

[5] Yong S. Chen, Woosong Choi, Stefanos Papanikolaou, Matthew Bierbaum, and James P. Sethna. Scaling theory of continuum dislocation dynamics in three dimensions: Self-organized fractal pattern formation. *International Journal of Plasticity*, 46:94–129, 2013.

[6] Yong S. Chen, Woosong Choi, Stefanos Papanikolaou, and James P. Sethna. Supplemental movies for "Bending crystals: the evolution of grain boundaries and fractal dislocation structures". `http://www.lassp.cornell.edu/sethna/Plasticity/SelfSimilarity.html`, 2010.

Fermi liquid theory and the RG

[1] Joseph Polchinski. Effective field theory and the fermi surface. *arXiv preprint hep-th/9210046*, 1992.

[2] Rev Shankar. Renormalization-group approach to interacting fermions. *Reviews of Modern Physics*, 66(1):129, 1994.

Random matrix theory

[1] S. Adam, P. W. Brouwer, J. P. Sethna, and X. Waintal. Enhanced mesoscopic fluctuations in the crossover between random-matrix ensembles. *Physical Review B*, 66:165310, 2002.

Abrupt transitions

[1] J.S. Langer. Statistical theory of the decay of metastable states. *Annals of Physics*, 54(2):258 – 275, 1969.

[2] A. Buchel and J. P. Sethna. Elastic theory has zero radius of convergence. *Physical Review Letters*, 77:1520–1523, 1996.

[3] A. Buchel and J. P. Sethna. Statistical mechanics of cracks: Fluctuations, breakdown, and asymptotics of elastic theory. *Physical Review E*, 55:7669–7690, 1997.

[4] J. Kent-Dobias and J. P. Sethna. Essential Singularities in Universal Scaling Functions at the Ising Coexistence Line. *ArXiv e-prints*, July 2017.

Infinite and strong disorder RG

[1] Daniel S. Fisher. Critical behavior of random transverse-field Ising spin chains. *Phys. Rev. B*, 51:6411–6461, Mar 1995.

[2] Daniel S Fisher. Phase transitions and singularities in random quantum systems. *Physica A: Statistical Mechanics and its Applications*, 263(1-4):222–233, 1999.

Crossover scaling

[1] J. P. Sethna. Statistical mechanics - Crackling crossover. *Nature Physics (News and Views)*, 3:518–519, 2007.

[2] David R. Nelson. Crossover scaling functions and renormalization-group trajectory integrals. *Phys. Rev. B*, 11:3504–3519, May 1975.

[3] Yan-Jiun Chen, Stefano Zapperi, and James P. Sethna. Crossover behavior in interface depinning. *Phys. Rev. E*, 92:022146, 2015.

Droplet breakup

[1] Jens Eggers and Todd F Dupont. Drop formation in a one-dimensional approximation of the navier–stokes equation. *Journal of fluid mechanics*, 262:205–221, 1994.

[2] Itai Cohen and Sidney R Nagel. Testing for scaling behavior dependence on geometrical and fluid parameters in the two fluid drop snap-off problem. *Physics of Fluids*, 13(12):3533–3541, 2001.

[3] Itai Cohen, Michael P Brenner, Jens Eggers, and Sidney R Nagel. Two fluid drop snap-off problem: Experiments and theory. *Physical Review Letters*, 83(6):1147, 1999.

[4] Wendy W Zhang and John R Lister. Similarity solutions for capillary pinch-off in fluids of differing viscosity. *Physical review letters*, 83(6):1151, 1999.

[5] Jens Eggers. Nonlinear dynamics and breakup of free-surface flows. *Reviews of modern physics*, 69(3):865, 1997.

[6] Joseph D Paulsen, Justin C Burton, Sidney R Nagel, Santosh Appathurai, Michael T Harris, and Osman A Basaran. The inexorable resistance of inertia determines the initial regime of drop coalescence. *Proceedings of the National Academy of Sciences*, 109(18):6857–6861, 2012.

Logical satisfiability and criticality in algorithms for solving NP-complete problems

[1] Scott Kirkpatrick and Bart Selman. Critical behavior in the satisfiability of random boolean expressions. *Science*, 264:1297–1300, 1994.

[2] Bart Selman and Carla P. Gomes. Satisfied with physics. *Science*, 297:784–5, 2002.

[3] Marc Mezard and Andrea Montanari. *Information, physics, and computation*. Oxford University Press, 2009.

Fun

[1] Alexander A. Alemi, Matthew Bierbaum, Christopher R. Myers, and James P. Sethna. You can run, you can hide: The epidemiology and statistical mechanics of zombies. *Phys. Rev. E*, 92:052801, Nov 2015.

[2] Jesse L. Silverberg, Matthew Bierbaum, Itai Cohen, and James P. Sethna. Collective motion of moshers at heavy metal concerts. *Physical Review Letters)*, 110:228701, 2013.

[3] Eric M Kramer and Alexander E Lobkovsky. Universal power law in the noise from a crumpled elastic sheet. *Physical Review E*, 53(2):1465, 1996.

[4] P. A. Houle and J. P. Sethna. Acoustic emission from crumpling paper. *Physical Review E*, 54:278–283, 1996.

[5] LI Salminen, AI Tolvanen, and Mikko J Alava. Acoustic emission from paper fracture. *Physical Review Letters*, 89(18):185503, 2002.

[6] Anne Ju. Mapping the Zombie Apocalypse. `http://www.news.cornell.edu/essentials/2015/03/mapping-zombie-apocalypse`, March 5, 2015.

[7] Matthew K. Bierbaum, Alexander A. Alemi, Paul Ginsparg, and James P. Sethna. Zombietown USA. `http://mattbierbaum.github.io/zombies-usa/`, April 12, 2016.

[8] Morgan Freeman and James P. Sethna. Are We Here for a Reason? from *Through the Wormhole with Morgan Freeman*. `http://www.sciencechannel.com/tv-shows/through-the-wormhole/are-we-here-for-a-reason-2/`, May 13, 2013.