Physics 7653: Statistical Physics

http://www.physics.cornell.edu/sethna/teaching/653/

Material for Week 3

Exercises due Tuesday Sep 12

Last correction at September 1, 2017, 10:53 am

Pre-class Preparation

Thursday

Read: Crackling Noise, James P. Sethna, Karin Dahmen, and Christopher R. Myers, *Nature* **410**, 242 (2001). Focus in particular on Fig. 7 and related discussion

12.9: Hysteresis and Barkhausen noise

submit electronically by 9:30 Wednesday evening.

Tuesday

Read: Universality beyond power laws and the average avalanche shape, Stefanos Papanikolaou, Felipe Bohn, Rubem L. Sommer, Gianfranco Durin, Stefano Zapperi, and James P. Sethna, *Nature Physics* **7** 316-320 (2011). See also From Rice Krispies to earthquakes, physicists unravel the mechanics of 'crackling' in the Cornell Chronicle (Anne Ju).

Pre-class question: submit electronically by 9:30 Monday evening.

Eddy currents and the average avalanche shape. The breakthrough that allowed us to find the 'correct' answer experimentally for the shape was to avoid eddy currents. But a complete theory ought to be able to incorporate eddy currents as well. Speculate as to how they might arise (corrections to scaling, or a new renormalization group fixed point, . . .)

Exercises

12.11 Extreme value statistics: Gumbel, Weibull, and Fréchet.

12.13: Avalanche size distribution