

## "Universal avalanches: from nanocrystals to earthquakes to stars ?"

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The deformation of many solid and granular materials is not continuous, but discrete, with intermittent slips similar to earthquakes. A comparison of our model predictions with data suggests that the statistical distributions of the slips, such as the slip-size distributions, reflect tuned criticality, with approximately the same regular (power-law) functions, and the same tunable exponential cutoffs, for systems spanning 13 decades in length, from tens of nanometers to hundreds of kilometers; for compressed nano-crystals, amorphous materials, sheared granular materials, lab-sized rocks, and earthquakes. The similarities are explained by a simple analytic model. The studies draw on methods from the theory of phase transitions, the renormalization group, and numerical simulations. Connections to other systems with avalanches, such as magnets, stars, and neuron firing avalanches in the brain are also discussed.

