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Self-organized Criticality or not in Spherical Bead Piles LARRY MARKLEY, MARY MILLS, D.T. JACOBS, The College of Wooster, Wooster OH 44691 — This experiment examined a conical bead pile and the distribution of avalanche sizes when using uniform 3mm zirconium spheres ("beads") and then dropping beads from different heights on central vs. random locations on the pile. The bead pile is built by pouring beads onto a circular base where the bottom layer of beads had been glued randomly. Beads are then individually dropped from a fixed height after which the pile is massed. This process is repeated for thousands of bead drops. By measuring the number of avalanches of a given size that occurred, the resulting distribution could be compared to a power law description as predicted by self-organized criticality. We found that the probability, P(s), for avalanches of size s depends very strongly on how the beads are dropped onto the pile. If beads are individually dropped on the pile's apex from a low drop height, then P(s) is a simple power law in s. At higher drop heights still falling on the apex of the pile, an energy dissipation function is the best descriptor. However, for drops that occur pseudo-randomly over the entire surface of the pile, the falling beads undergo ballistic reflections and ejections rather than settling on the pile to produce avalanches. We acknowledge support from NSF-REU DMR 0649112.

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