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Self-Organized Criticality in a Bead Pile MEGAN MILLER, TUAN NGUYEN, ELIZABETH BAKER, D.T. JACOBS, Physics Department, The College of Wooster, Wooster OH 44691 — This experiment examined a conical bead pile and the distribution of avalanche sizes when using uniform 3mm stainless steel spheres ("beads"). A bead pile is built by pouring beads onto a circular base where the bottom layer of beads has 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 during the experiment, the resulting distribution could be compared to a power law description as predicted by self-organized criticality. We had found in an earlier experiment that glass beads dropped from a small height were consistent with a simple power-law, but if dropped from larger heights then a power-law times an exponential was needed. The stainless steel beads always had a distribution that deviated from a simple power-law with larger deviations as the beads were dropped from larger heights. In addition, we observed a different power-law exponent than that found for glass beads yet a similar dependence on drop height. We acknowledge support from NSF-REU grant DMR 0243811.

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