Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Self-Organized Criticality in a Bead Pile MIKE WINTERS, D.T. JACOBS, Department of Physics, 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"). A 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 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 zirconium beads sometimes had a distribution that deviated from a power-law times an exponential when the beads were dropped from larger heights, and occasionally the distribution showed a distinct enhancement of the probability for large avalanches when beads were dropped from smaller heights. Using data collected over many years, it was found that the density and type of bead did not appear to affect the avalanche distribution. We compare our experimental results to a numerical simulation. We acknowledge support from NSF DMR-0649112.

D.T. Jacobs
Department of Physics, The College of Wooster, Wooster OH 44691

Date submitted: 21 Nov 2008 Electronic form version 1.4