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New Analysis Techniques for Avalanches in a Conical Bead Pile with Cohesion CATHERINE TIEMAN, SUSAN LEHMAN, Department of Physics, College of Wooster, Wooster, OH — Avalanche statistics and pile geometry for 3 mm steel spheres dropped on a conical bead pile were studied at different drop heights and different cohesion strengths. The pile is initially built on a circular base and is subsequently slowly driven by adding one bead at a time to the apex of the pile. We investigate the dynamic response of the pile by recording avalanches off the pile over the course of tens of thousands of bead drops. The level of cohesion is tuned through use of an applied uniform magnetic field. Changes in the pile mass and geometry were investigated to determine the effect of cohesion and drop height on the angle of repose. The angle of repose increased with cohesion strength, and decreased somewhat for higher drop heights. The packing density of beads is expected to decrease as magnetic cohesion increases, but for our 20 000-bead pile, this effect has not been observed. The proportion of beads removed from the pile by different avalanche sizes was also calculated. Although larger avalanches are much rarer occurrences, they carry away a larger fraction of the total avalanched mass than small avalanches. As the pile cohesion increases, the number of small and medium avalanches decreases so that this mass loss distribution shifts more strongly to large sizes.

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