Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Tracking particles during avalanches on a conical bead pile[1]
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— A conical bead pile subject to slow driving and an external magnetic field is used as a simple system to investigate the effect of cohesion on avalanche dynamics, including event size and time between events. Steel beads are dropped onto the pile from different heights, and avalanches are recorded by the change in mass as beads fall off the pile. Our experimental results for the probability distribution function compare well to the results of an analytic theory from a mean-field model of slip avalanches [Dahmen, Nat Phys 7, 554 (2011)]. The model also makes predictions about behaviors, such as event duration, which we previously could not measure experimentally. To more fully characterize the avalanching behavior of the pile over time, a high-speed camera is now in use to record the largest avalanches. To capture the full conical pile using a single camera, the camera with a wide-angle lens was placed nearly directly above the pile apex. We have modified particle tracking algorithms shared by N.T. Ouellette for our system and are tracking 5000 surface beads during each avalanche. Results from these new measurements allow a more complete characterization of avalanche behavior, including avalanche duration and the extent of the avalanche over the pile.

[1]Research supported by NSF CBET 1336116

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Date submitted: 11 Nov 2016 Electronic form version 1.4