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Analysis of inter-event times for avalanches on a conical bead pile with cohesion SUSAN LEHMAN, NATHAN JOHNSON, CATHERINE TIEMAN, ELLIOT WAINWRIGHT, Department of Physics, College of Wooster, Wooster, OH — We investigate the critical behavior of a 3D conical bead pile built from uniform 3 mm steel spheres. Beads are added to the pile by dropping them onto the apex one at a time; avalanches are measured through changes in pile mass. We investigate the dynamic response of the pile by recording avalanches from the pile over tens of thousands of bead drops. We have previously shown that the avalanche size distribution follows a power law for beads dropped onto the pile apex from a low drop height. We are now tuning the critical behavior of the system by adding cohesion from a uniform magnetic field and find an increase in both size and number for very large avalanches and decreases in the mid-size avalanches. The resulting bump in the avalanche distribution moves to larger avalanche size as the cohesion in the system is increased. We compare the experimental inter-event time distribution to both the Brownian passage-time and Weibull distributions, and observe a shift from the Weibull to Brownian passage-time as we raise the threshold from measuring time between events of all sizes to time between only the largest system-spanning events. These results are both consistent with those from a mean-field model of slip avalanches in a shear system [Dahmen, Nat Phys 7, 554 (2011)].

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