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Twisted Sandpiles: A Structural Signature of Jamming in Granular Materials ERIC CORWIN, HEINRICH JAEGER, SIDNEY NAGEL, The James Franck Institute and Department of Physics,The University of Chicago — When the temperature is increased, a glass loses its rigidity and begins to flow. If sufficient shear stress is applied to a granular material, it too will lose its rigidity and flow. There is no ambiguity between the rigid and flowing phases in both cases. However glasses and liquids have nearly identical structure. Are jammed states and flowing states in a granular system structurally different? And if so is there a measurement which would yield a signature of this difference? We have created an experimental technique that measures the contact-force distribution during shearing flow to address these questions. The distribution of forces is sensitive to minute variations in particle to particle distances. As such, it provides a microscopic view of the nearest-neighbor position correlations. At the onset of jamming we find a qualitative change in the force distribution. This, in turn, hints that there may be a similar structural signature in glasses. Further, we also measure a new granular temperature in granular systems which may be analogous to the glass-transition temperature in liquids.

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