

Abstract Submitted  
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**Transient Memories in Experiments on Sheared Non-Brownian Suspensions** JOSEPH PAULSEN, SIDNEY NAGEL, University of Chicago — A novel kind of memory has been observed in simulations of cyclically sheared non-Brownian suspensions [1]. Here we report on experiments designed to see these effects in the lab. In this type of memory, a system remembers a set of shear amplitudes but forgets most of them later on, even as they are continually applied. If noise is added, the system can store all memories indefinitely. While exceedingly counterintuitive, these properties can be understood from simple considerations, and the phenomenon is expected to be generic—the same effect is seen in simulations and experiments on traveling charge-density waves [2]. We perform experiments on a non-Brownian suspension at low Reynolds number, motivated by previous work with this system [3]. In our experiments, we form multiple memories that appear to forget in the same fashion. The final and crucial point is whether the forgetting is sufficiently gradual, so that one memory erodes away as another takes over. This key point distinguishes multiple transient memories from other classes of memory, where forgetting is immediate and unforgiving.

[1] N.C. Keim & S.R. Nagel, PRL 107, 010603 (2011).

[2] S.N. Coppersmith et al., PRL 78, 3983 (1997).

[3] L. Corté, P.M. Chaikin, J.P. Gollub, & D.J. Pine, Nature Phys. 4, 420 (2008).

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