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Labyrinthine phase and slow dynamics in a driven magnetic granular medium SIMON MERMINOD, TIMOTHEE JAMIN, ERIC FALCON, MICHAEL BERHANU, Matter and Complex Systems (MSC), University Paris Diderot, CNRS, Paris, DIVISION OF NON-EQUILIBRIUM PHYSICS TEAM —
Labyrinthine patterns arise in two-dimensional physical systems submitted to competing interactions, ranging from the fields of solid-state physics to hydrodynamics. Here we experimentally investigate a labyrinthine phase in an out-of-equilibrium system constituted of vibrated granular particles. Once sufficiently magnetized, they self-organize into short chains of particles in contact and randomly orientated. We quantitatively characterize the transition from a granular gas state to a labyrinthine phase, and we explain the formation of these chains using a simple model. Interestingly, the labyrinthine phase does not display any steady state: its morphology evolves with the aging time on very long timescales. Experiments suggest that here, slow dynamics involves strong structural rearrangements and therefore is comparable to slow dynamics in structural glasses. We characterize this aging process and evaluate to what extent this analogy holds.

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