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Geometrically-protected reversibility in hydrodynamic Loschmidt-echo experiments RAPHAËL JEANNERET, ESPCI-Université Paris Diderot, DENIS BARTOLO, ESPCI-ENS Lyon, BARTOLO LAB TEAM — We demonstrate an archetypal Loschmidt-echo experiment where thousands of droplets interact in a reversible fashion via a viscous fluid. Firstly, we show that, unlike equilibrium systems, periodically driven microfluidic emulsions self-organize and geometrically protect their macroscopic reversibility. This self-organization is not merely dynamical, it has a clear structural signature akin to the one found in a mixture of molecular liquids. Secondly, we evidence that above a maximal shaking amplitude both structural order and reversibility are lost simultaneously in the form of a 1st order non-equilibrium phase transition. Thirdly, we account for this discontinuous transition, in term of a memory-loss process.

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