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Collective dynamics of dense particles at a liquid interface ANTOINE LAGARDE, Institut Jean Le Rond D'Alembert, Sorbonne Universite, CHRISTOPHE JOSSERAND, LadHyX, Ecole Polytechnique, SUZIE PROTIERE, Institut Jean Le Rond D'Alembert, Sorbonne Universite — When two millimeter-sized identical objects are deposited at a liquid interface, the individual deformations they create may overlap, leading to an attractive capillary force. This everyday phenomenon that one can observe at the surface of water is central in many applications, from industrial processes where it is used to manufacture objects with a specific microstructure to Nature where fire ants gather into a raft to survive floods. The interaction between two identical spherical particles is now rather well understood, but the many-body interaction of non-identical aggregates still lacks a convincing description. Here, we experimentally study the aggregation of randomly distributed dense millimeter-sized beads placed at an oil-water interface. The particles are attracted by their neighbors and form an axisymmetric monolayer called a granular raft. The interfacial deformation created by such an object exceeds by at least one order of magnitude the deformation of a single bead, leading to high capillary forces that strongly depend on the number of particles in each raft. Thanks to a precise understanding of the interaction between two rafts, we undertake a statistical description of the aggregation process of a n-body system into a single giant granular raft.

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