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Droplets as cohesive granular materials at the edge of stability

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Granular materials, ranging from rice and sand to fine powders, and their large-scale manifestations such as earthquakes, landslides, and avalanches, are simultaneously commonplace and deceptively complex. These complex systems exist at the boundary between solid-like and fluid-like, and they are often highly nonlinear, dissipative, and at the edge of stability. Additionally, these materials can offer macroscopic insights into behaviors typically associated with molecular liquids and solids. In recent years we have developed a method to produce cohesive microscopic droplets which can form perfect crystalline or disordered aggregates. These granular aggregates provide model systems for studying various physical phenomena that are not accessible by investigating molecular systems. The experiments enable us to study broad questions which relate to real-world problems like predicting the failure and fracture of materials, flow through a hopper, and the size and temporal distribution of avalanches.

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Keyword-2

droplets

Keyword-3

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