

COLLOQUIA DFA A.A. 2022-2023

COLLOQUIUM DFA

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LUCA CIPELLETTI

UNIVERSITY OF MONTPELLIER

"A unified state diagram for the yielding transition of soft colloids"

ZOOM MEETING - YOUTUBE STREAMING



A unified state diagram for the yielding transition of soft colloids

Concentrated colloidal suspensions and emulsions are a prototypical example of amorphous soft solids, widespread in technological and industrial applications and intensively studied as model systems in physics and material sciences. Soft solids are easily fluidized by applying a mechanical stress, thereby they undergo a so-called yielding transition. Although the yielding transition has been actively investigated, no consensus on a unified description has emerged so far. Here, we investigate yielding in three classes of soft solids, using analytical and numerical modelling and experiments probing simultaneously the microscopic dynamics and mechanical response under an imposed oscillatory shear deformation of variable amplitude. We find that at the microscopic level yielding consists in a transition, sharper than for rheological quantities, between two distinct dynamical states. We propose a lattice model with dynamical coupling between neighboring sites that captures the generic features of our experiments, leading to a unified state diagram for yielding. Disorder in the dynamical coupling plays a major role in the emergence of first-order-like vs second-order-like features in yielding, allowing for reconciling previous contrasting observations on the nature of the transition.

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WEBSITE

ZOOM MEETING

LINK YOUTUBE

<https://indico.dfa.unipd.it/event/576/>

<https://unipd.link/ColloquiumDFA-27-10-2022>

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