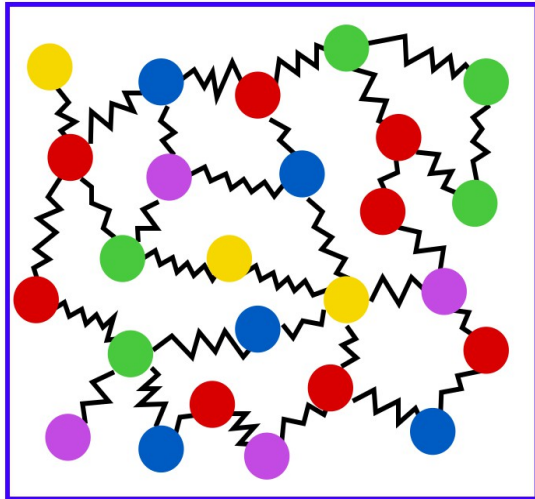


Are amorphous solids disguised spin-glasses?

The elastic behavior of ordered solids such as crystals is well described in terms of deformations of the underlying ordered lattice.

Amorphous solids, like glasses, instead are much less understood due to the lack of any symmetry guide to the problem.



When an amorphous structure is deformed, the response of the system is typically very jerky and intermittent. At sufficiently low temperatures, stress-strain curves display drops related to avalanches of motion.

This happens because upon straining, the system undergoes local structural failures that trigger elastically other ones giving rise to a cascade.

In a coarse grained simplified description, local degrees of freedom are kind of two level systems interacting through long range elasticity in a disordered way.

This phenomenological description has been studied a lot at zero temperature and out of equilibrium but much less is known at finite temperature in equilibrium.

The purpose of this internship is to address this problem. Our aim is to find out whether these

two level systems can undergo a spin-glass transition or instead they present a different kind of physical behaviour.

The project can be adapted to the inclinations of the candidate. On the one hand it is possible to study the problem mixing a phenomenological approach with numerical simulations.

On the other hand it is also possible to analyze exactly solvable mean field models of elasticity with disorder. In both cases a necessary prerequisite is a strong background in statistical physics.

The internship will be co-directed by G. Biroli and P. Urbani (permanent researchers) and M. Baity Jesi (postdoc) at IPhT. The intern will be involved in all Parisian events and activities of the Simons collaboration “Cracking the Glass Problem”.

Contacts

giulio.biroli@cea.fr

pierfrancesco.urbani@cea.fr

marco.baity-jesi@cea.fr