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Breakdown of elasticity in low temperature amorphous solids¹

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Understanding how a system responds to external perturbations is crucial to investigate the statistical correlations between the microscopic degrees of freedom. Close to a second order phase transition, long range correlations show up in the divergence of properly defined susceptibilities. In this talk I will explore this paradigm to investigate the nature of correlations in amorphous solids. The solution of structural glass models in high dimension predicts that deep in the glass phase a second order glass-to-glass transition arises at low enough temperature. I will thus investigate the behavior of elastic responses on approaching this phase transition showing that standard elasticity breaks down at the critical point. In the low temperature phase the elastic response is history and time dependent. This may clarify the very jerky nature of stress-strain curves of low temperature amorphous solids.

In collaboration with Giulio Biroli.

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