Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Thermal fluctuations and elastic relaxation in the compressed exponential dynamics of colloidal gels MEHDI BOUZID, JADER COLOMBO, EMANUELA DEL GADO, Georgetown University — Colloidal gels belong to the class of amorphous systems, they are disordered elastic solids that can form at very low volume fraction, via aggregation into a rich variety of networks. They exhibit a slow relaxation process in the aging regime similar to the glassy dynamics. A wide range of experiments on colloidal gels show unusual compressed exponential of the relaxation dynamical properties. We use molecular dynamics simulation to investigate how the dynamic change with the age of the system. Upon breaking and reorganization of the network structure, the system may display stretched or compressed exponential relaxation. We show that the transition between these two regimes is associated to the interplay between thermally activated rearrangements and the elastic relaxation of internal stresses. In particular, ballistic-like displacements emerge from the non local relaxation of internal stresses mediated by a series of "micro-collapses". When thermal fluctuations dominate, the gel restructuring involves instead more homogeneous displacements across the heterogeneous gel network, leading to a stretched exponential type of relaxation.

Mehdi Bouzid
Georgetown University

Date submitted: 06 Nov 2015 Electronic form version 1.4