Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**Stress localization, stiffening, and yielding in a model colloidal gel** EMANUELA DEL GADO, Department of Physics and Institute for Soft Matter Synthesis and Metrology, Georgetown University, JADER COLOMBO, Department of Civil, Environmental and Geomatic Engineering, ETH Zurich, GEORGETOWN UNIVERSITY COLLABORATION, ETH ZURICH COLLABORATION — We investigate the yielding of a model colloidal gel using numerical simulations and different shear protocols. Under increasing deformation, the elastic regime is followed by a significant stiffening before yielding takes place. A space-resolved analysis of deformations and stresses unravel how the complex load curve observed is the result of stress localization and that the yielding can take place by breaking a very small fraction of the network connections. The strong localization of tensile stresses triggers the breaking of a few network nodes at around 30% of strain and increasing the deformation further favors breaking but also shear-induced bonding, eventually leading to the damage and the reorganization of the gel structure upon yielding. In particular, at low enough shear rates, density and velocity profiles display significant spatial inhomogeneity during yielding in agreement with experimental observations.

Emanuela Del Gado
Department of Physics and Institute for Soft Matter Synthesis
and Metrology, Georgetown University

Date submitted: 14 Nov 2014 Electronic form version 1.4