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Breaking news in fracture of elastic networks

In this talk, I will focus on the fracture behavior of elastic networks. I will show how network and spring properties (such as connectivity and rupture thresholds) control fracture, that is unavoidably more and more abrupt when increasing the system size [1]. Next, the simulation predictions will be compared against novel shear rheology experiments on networks formed by collagen molecules extracted from different sources and self-assembled at different conditions. We show that, despite their structural complexity, also collagen networks exhibit fracture behavior that is mainly controlled by the average network connectivity. Furthermore, plasticity at the network and fiber level can fine-tune the fracture strain [2]. Finally, I will conclude the talk by describing our on-going effort of using machine learning techniques to predict failure in disordered elastic networks.

[1] S. Dussi, J. Tauber, J. van der Gucht – arXiv:1907.11466
[2] F. Burla/S.Dussi, *et al.* "Disorder protects collagen networks from fracture" - arXiv:1911.06248