Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

What drives polymer glasses ductile?[1] SHI-QING WANG, SHIWANG CHENG, XIAOXIAO LI, PANPAN LIN, JIANNING LIU, University of Akron — The presentation aims to explore an important question in polymer physics: what makes polymer glasses of high molecular weight ductile? Upon deformation, load-bearing strands (LBS) emerge along the direction of the stress. Chain tension builds up in LBS due to the displacement of LBS. Segments that do not belong to LBS sequentially get activated by the LBS in the order of their proximity to LBS. If the chain network breaks down before driving the glass into a state of global plasticity, crazing and brittle fracture takes place instead of yielding and macroscopic plastic deformation. Fast deformation assures that chain pullout does not have time to materialize. Global plasticity also takes time to develop. Thus, the outcome is dictated by which process takes place first. In light of the recently proposed molecular model [1] for yielding and brittle-ductile transition of polymer glasses, we present different examples from experiment to illustrate the importance to understand the interplay between short-ranged intersegmental interactions and long-ranged intrachain networking. [1] S.Q. Wang *et al. J. Chem. Phys.* **141**, 094905 (2014).

[1]NSF-DMR (EAGER- 1444859)

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Date submitted: 14 Nov 2014 Electronic form version 1.4