We study experimental flow curves of four different (athermal) yield-stress fluids with different interparticle interactions near the jamming concentration (random close packing, ~64% volume fraction) where the yield stress develops. We demonstrate that by an appropriate scaling with the distance to jamming, all rheology data can be collapsed onto a single master curve for below jamming and another one above jamming. In spite of differing interactions in the four different systems, the master curves are found to be characterized by universal scaling exponents are found for the four systems. A two-state microscopic theory of heterogeneous dynamics is presented to rationalize the observed transition from yield stress (Herschel-Bulkley) to simple shear thinning (Cross) behavior, and to connect the rheological exponents to microscopic exponents for the divergence of the length- and timescales of the heterogeneous dynamics.

In thermal systems, a yield stress develops around the glass transition, that happens around ~58% volume fraction. We find the flow curves of hard-sphere colloidal glasses and thermal emulsions can be rescaled in a similar fashion around the glass transition. The exponents of the rescaling then describe the crossover between athermal jamming and the thermal glass transition.

Flow curves of castor oil-in-water emulsions (different concentrations) showing two regimes.

Rescaling: all flow curves collapse onto two master curves that meet in the higher shear rate regime.