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Rheology and Jamming in Soft Colloidal System[1] ANINDITA BASU, TIM STILL, Department of Physics and Astronomy, University of Pennsylvania, PAULO ARRATIA, Mechanical Engineering and Applied Mechanics, University of Pennsylvania, KERSTIN NORDSTROM, Department of Physics and Astronomy, University of Pennsylvania, JERRY GOLLUB, Department of Physics and Astronomy, Haverford College, DOUGLAS DURIAN, ARJUN YODH, Department of Physics and Astronomy, University of Pennsylvania — Recent simulations have proposed that the jamming transition can be understood in the framework of critical phenomena, and thus can be described by various asymptotic scaling laws. We use thermosensitive colloidal suspensions and a commercially available rheometer to study the shear response of soft colloidal glass across the jamming transition. We carry out steady-state (viscometry) and time-dependent (oscillatory) rheology experiments in the vicinity of the jamming transition. Both viscometry and oscillatory stress data exhibit asymptotic scaling and presence of critical exponents reminiscent of second-order phase transition, as reported in recent simulations. Critical scaling of frequency indicates the presence of a diverging time-scale associated with the jamming transition. We attempt to understand these critical exponents based on the microscopic interactions of the colloidal systems.

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