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Aging dynamics of a colloidal glass - time resolved viscoelastic properties and the role of flow history[1] CHINEDUM OSUJI, AJAY NEGI, Yale University — Many colloidal suspensions are inherently out of equilibrium and display a slow evolution of their dynamics over time. However, many features of the glass transition as encountered in polymer and molecular glasses are not conserved. This phenomenon is still not completely understood and little is known of the connection between flow history, as a determinant of the initial system state, and subsequent aging dynamics. Further, the changes in the energy landscape during aging can be understood from the frequency and strain dependence of the shear modulus but the non-stationary nature of these systems frustrates investigation of their instantaneous underlying properties. Here we discuss the use of stress jump experiments that investigate the role of flow history on aging, and the systematic reconstruction of the frequency and strain dependence as a function of age for a repulsive colloidal glass undergoing structural arrest and aging. We uncover a connection between the aging behavior and the rate of flow cessation that is additionally reflected in the dynamics of residual stress relaxation. Strikingly, the frequency dependence at fixed times can be rescaled onto a master curve, implying a simple connection between the aging of the system and the change in the frequency dependent modulus.

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