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The effective temperature and the universal scaling behavior of aging colloidal glass system PING WANG, CHAOMING SONG, HERNAN MAKSE, City College of New York, New York, NY 10031 — Mostly due to the enormous practical importance of glassy systems there has been a vast literature describing different theoretical frameworks for glasses, yet without a common theory applicable to the diverse range of systems undergoing a glass transition. Here we present experimental results on a simple glassy system pointing to a unifying view of out-of-equilibrium systems. We investigate correlation and response functions to external fields to monitor the aging of a colloidal glass composed of highly concentrated hard spherical particles suspended in an refraction index matched fluid for visualization. Our analysis reveals that even though the system is aging far from equilibrium, it behaves as it is equilibrated at a constant temperature, independent of the age. This temperature is larger than the bath, and can be rationalized by the cage dynamics in the system. Global and local fluctuations in the observables are also studied showing a common scaling behavior with the age of the system. While these results can be interpreted within the framework of unifying formulations of aging, the observed scaling forms of the correlation functions do not conform to the theoretical predictions.

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