Supplementary Methods and Discussion

S1.Height of the particle

The relative distance between the trapped particle and plate was changed by moving the latter in the z-direction using the piezo in a closed loop operation. The change in h was then inferred from the displacement of the piezo as sensed by the capacitor sensor. However, in doing so we have assumed that the displacement of the bottom plate does not affect the position of the focal spot of the optical trap. This is verified by doing the following experiment. We trap a particle far away in the bulk and then decrease h in steps of 400 nm till the particle gets stuck. At every h, we analyzed the radial profile and second moment of the brightness distribution of the image of the trapped and stuck particles. Second moment $M_2$ of an image of a particle is given by

$$M_2 = \frac{1}{M_0} \sum_{i,j} (i^2 + j^2)(x + i, y + j)$$

where $r_0$ is the radius of the diffraction pattern, $M_0$ is the integrated intensity inside an area of radius $r_0$ and $l(x,y)$ is the intensity of the pixel at $(x,y)$. Figure s1.(a),(b) show the images of the trapped and stuck particles at $h=7$ µm and $h=0$ and Fig. s1(c),(d) show the corresponding radial intensity profile of the images. Figure s1(e) shows variation of the second moment of the image of the trapped and stuck particles with h. At $h=0$, the stuck particle’s radial profile and second moment was found to match that of the

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trapped particle. Figure s1(c),(d) and(e) implies that the second moment and the radial profile of the image of the trapped particle remained unchanged as h is varied. We can, therefore, conclude that displacement of the bottom plate affects negligibly the position of the focal spot of the optical trap and the change in h can be inferred from the displacement of the piezo.
Figure s1  Height of the particle. The images of trapped and stuck particle at a, h=7\mu m b, h=0. The radial intensity distribution of the images of trapped (filled circles) and stuck particle (open circles) at c, h=7\mu m d, h=0 e, The variation of second moment of the images of trapped (filled circles) and stuck particle (open circles) as function of h.

S2. Measurement of the Mean square displacement

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Mean squared displacement \(\langle r^2 \rangle\) of a Brownian particle away from any interface is given by \(\langle r^2 \rangle = \langle x^2 \rangle + \langle y^2 \rangle + \langle z^2 \rangle = 6D_0 t\) where \(D_0\) is the diffusion coefficient of the particle in the bulk and \(\langle x^2 \rangle, \langle y^2 \rangle, \langle z^2 \rangle\) are the MSD of the particle along x, y and z axes respectively. However, as the particle approaches an interface (say the interface lies in the xy plane) the diffusion coefficient of the particle becomes anisotropic in the plane parallel (\(D_{\parallel}\)) and perpendicular (\(D_{\perp}\)) to the interface, i.e., \(\langle x^2 \rangle = \langle y^2 \rangle \neq \langle z^2 \rangle\) and \(\langle r^2 \rangle = \langle x^2 \rangle + \langle y^2 \rangle + \langle z^2 \rangle = (4D_{\parallel} + 2D_{\perp})t\). The above equation implies that MSD of an untrapped Brownian particle increases linearly with time. However, for a trapped particle (Brownian particle in a harmonic oscillator potential) at small \(t\) the MSD increases with time, but at large \(t\) the MSD, \(\langle x^2 \rangle\), saturates to a value \(\frac{2K_b T}{k_{opt}}\) which is independent of the diffusion coefficient of particle and time. Finite bandwidth of our measurement results in MSD in the long time limit, i.e., \(t \gg \gamma / k_{opt}\), to be

\[
\langle x^2 \rangle = \frac{4K_b T}{\pi k_{opt}} \left[ \tan^{-1} \left( \frac{2\pi f_u}{k_{opt}} \right) - \tan^{-1} \left( \frac{2\pi f_L}{k_{opt}} \right) \right],
\]

which depends on the frictional coefficient (\(\gamma\)) and is independent of time. The frictional coefficient and the diffusion constant are related by the Einstein relation, i.e., \(D_{\parallel} = \frac{K_b T}{\gamma}\).

The MSD (\(\langle x^2 \rangle\)) of the trapped particle in the x-y plane was measured from the x-position signal of the quadrant photo diode using the AC voltmeter mode of a
EG&G124A lockin amplifier. At each step a delay time of 2s was introduced before measuring the motion of the trapped particle. At every position the final data were obtained by averaging over five independent time series measurements, each lasting over 2 seconds which is much greater than $\gamma / k_{\text{opt}} = 4\text{ms}$ . The bandwidth of the measuring electronics is given by the lower and upper frequency cut-offs, $f_L = 10\text{Hz}$ and $f_u = 1\text{KHz}$, respectively. We have checked explicitly that $\langle x^2 \rangle = \langle y^2 \rangle$.

**S3. How close is sticking to glass transition?**

We have used the Maxwell’s model, which assumes that the system has an exponential relaxation process, to extract $\tau$ and $\eta_0$ out of the raw data. We have done so because a priori $\tau$ is not an experimentally determined quantity in our technique but rather a parameter extracted by fitting the data to a model. In what follows we will try to answer the question: How well does the Maxwell model explain the data?

A relaxation process in viscoelastic systems can be written as $G(t) = \frac{\eta_0}{\tau} e^{-t/\tau}$ ($\alpha=1$ in Maxwell’s model). However, in glasses the relaxation process is given by stretched exponential decay for which $\alpha$ is less than one. Figure s2 (a), (b) show numerically computed $G'$ (circles), $G''$ (stars) as a function of $\omega$ and $G'/G''$ respectively, for the stretched exponential case where $\alpha=0.5$, $\tau=1$. The curves in Fig.s2 (a), (b) are corresponding $G'$ (dash), $G''$ (solid) given by Maxwell’s model wherein $\alpha=1$, $\tau=1$ was used. Figure s2 (b) shows that variation of $G'$, $G''$ with $G'/G''$ of

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a stretched exponential relaxation process starts to match with the Maxwellian behaviour only beyond \( G'/G''=10 \). However, our data for the aging regime as shown in Fig s2(c) fits to the Maxwellian behaviour from \( G'/G''=0.1 \) and beyond.

**Figure s2.** Comparison of non exponential relaxation process and experimental data. \( G'' \) (stars), \( G' \) (circles) for a non exponential relaxation process as a function of a, \( \omega \), b, \( G'/G'' \). Curves correspond to \( G'' \) (solid) and \( G' \) (dash) for a Maxwellian relaxation process. c, Variation of experimentally obtained \( G', G'' \) with \( G'/G'' \).

**S4. Jamming and pinning analogies:**
Jamming state is obtained when a many-body system is blocked in a static configuration away from equilibrium, from which it takes long time to relax, often
long enough that the time scale is not a measurable quantity. Jamming of a many-body granular matter or the glass transition in viscous liquids occurs when the particles stick to one another and the single particle diffusivity is sharply reduced. The phase diagram consists of three axes, $K_B T/U$, $1/density$ and load. The system is unjammed and jammed for large and small values of these parameters, respectively. The single particle diffusivity vanishes at the boundary between jammed and unjammed phases. In the problem of sticking described here, the analogous quantities are $K_B T/U$, $k_{opt}$ and the shear stress respectively. Here the system is unstuck and stuck for large and small values of these parameters, respectively.

For the case of pinned elastic media such as the vortex matter in type II superconductors, the relevant axes are $1/pinning$ potential, vortex rigidity and externally imposed driving force. The system is depinned and pinned for large and small values of these parameters, respectively. The single particle diffusivity vanishes at the boundary between these two phases. History effects and memory effects are ubiquitous in this system as well.