Supplemental Material for "Universal non-Debye low-frequency vibrations in sheared amorphous solids"

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In this document, we provide additional figures and details related to the results presented in the main text.

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A. Strain required to achieve Shear-stabilization

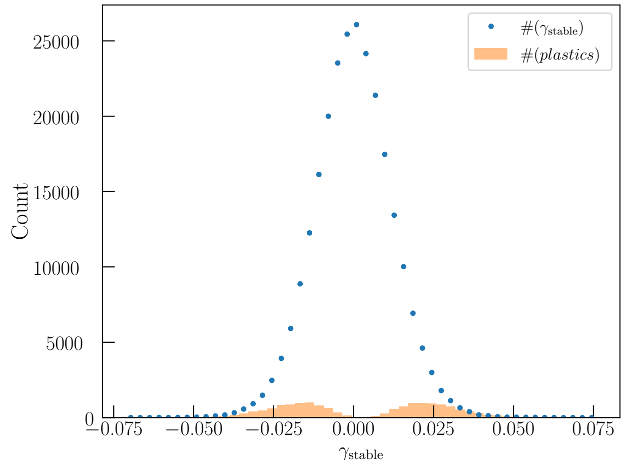

FIG. S1. Frequency distribution of strains required to attain shear-stability, in the *Zero-shear-stress* protocol, in systems of size $N = 256$. The orange bars indicate the number of plastic events encountered by samples that undergo strains in the corresponding intervals. They account for $\sim 6.2\%$ of all samples. In the *Zero-shear-stress* protocol, we encounter plastic events during AQS. Here we show that the proportion of straining trajectories that encounter them, while small, is not insignificant.

B. Internal Bond-Stresses

1. *Distributions*

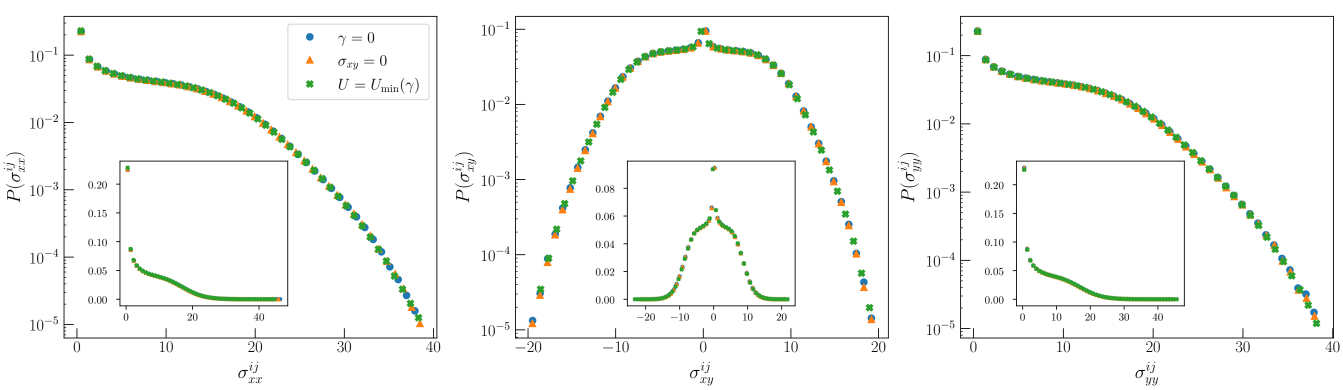

FIG. S2. Distributions of bond-stresses, from configurations of systems of size $N = 256$. The *Unstrained*, *Zero-shear-stress* and *Shear-strain-energy-minimized* configurations all exhibit *identical* distributions.

2. *Visualization*

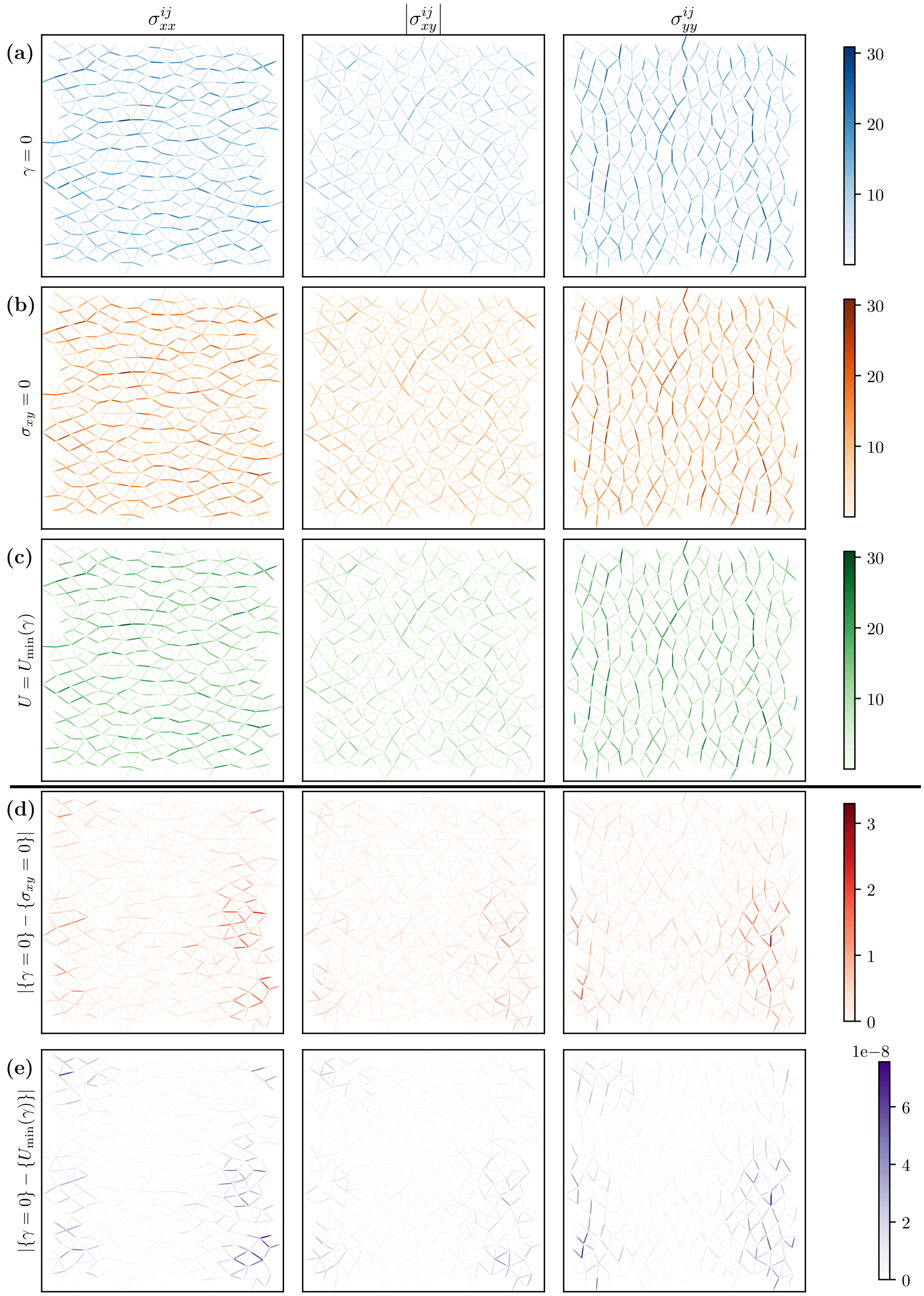

FIG. S3. Components of the stress tensor at each 'bond' in a two-dimensional configuration of a system of size $N = 256$. **(a)** an unstrained configuration, **(b)** The same configuration strained to achieve zero-shear-stress. **(c)** The same configuration as in **(a)**, energy minimized with a strain degree of freedom. **(d)** The difference in bond stresses between the *Unstrained* and *Zero-shear-stress* configurations is an order of magnitude smaller than the original stress. **(e)** The difference in bond stresses between the *Zero-shear-stress* and *Shear-strain-energy-minimized* configurations is zero up to numerical precision.

C. Large Systems

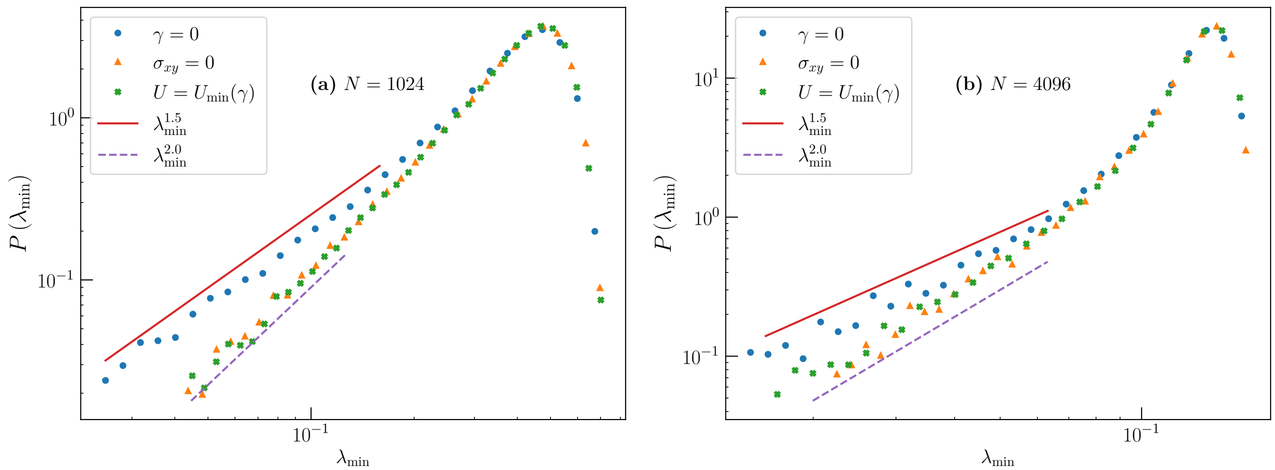

FIG. S4. Minimum eigenvalue distributions of the *Unstrained* and shear-stabilized configurations in 2D, corresponding to larger system sizes: (a) $N = 1024$ and (b) 4096. The lines indicate pure power-laws. The deviation from $\omega_{\min}^4$ persists as larger system sizes are probed, and is not diminished with the reduced stress fluctuations shown in Fig. 1 of the main text.

D. Approach to Universal Distribution

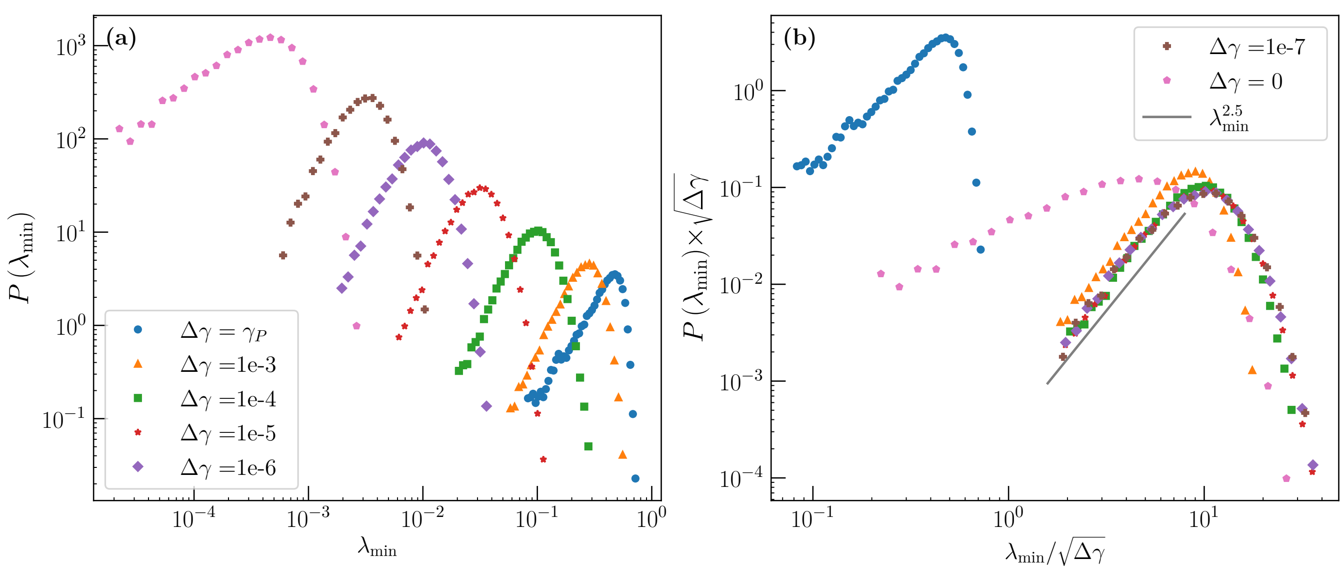

FIG. S5. Minimum eigenvalue distributions of a system of size $N = 1024$, upon approaching a plastic event. The (blue) circles display the distribution of eigenvalues in the initial, unstrained state. The (pink) hexagons are distributions of eigenvalues measured at closest approach to the plastic strain γ_P. The other distributions belong to configurations at specific strains away from γ_P.