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Dynamics and mechanical properties of glassy polymers under cylindrical confinement AMIT SHAVIT, ROBERT RIGGLEMAN, University of Pennsylvania — Even after two decades of active research surrounding glassy polymers under confinement, we still lack a complete understanding of the changes in mechanical properties as a bulk material is confined. Understanding the properties of glassy polymers in confinement is relevant not only for our fundamental understanding, but also for applications in semiconductor manufacturing and fabrication of novel materials. Here, we used molecular dynamics simulations to investigate dynamical and mechanical properties of glass-forming polymers in bulk and pillar geometries. We examine how the free surface influences the dynamics locally in the film, and we show that the dynamics in the surface are several orders of magnitude faster than in the bulk, which is similar to the enhancement we see in thin-films. Finally, we show that the mechanical properties of the bulk differ significantly from the pillar, and that the path to the glassy state has significant consequences for the overall material properties.

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