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A family of systematically softened glass-formers ZANE SHI, PABLO DEBENEDETTI, FRANK STILLINGER, Princeton University — We present a computational study of a family of binary glass-forming mixtures that interact via the generic $U = 4\epsilon[\lambda(\sigma/r)^n - \alpha(\sigma/r)^6]$, where $n = 7, 8, 9, 10, 11, 12$. λ and α are chosen such that the location and depth of the potential minimum are constant across all members of the family. We investigate the effects of softening on thermodynamic quantities such as energy and entropy, as well as dynamic properties such as diffusion and scattering. We also investigate the effects of softening on the energy landscape. In spite of the imposed constraint on well depth and location, we find profound effects of softening on all aspects of liquid and glassy behavior. The stability of the glasses is greatly enhanced by softening (soft liquids make hard glasses), and the relaxation rates in the corresponding liquids increase markedly upon softening. We present a comprehensive analysis of kinetic and thermodynamic fragilities in this family of glass-formers.

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