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**Thermal stiffening of 2D elastic ribbons**[1] DUANDUAN WAN, Univ of Michigan - Ann Arbor, MARK BOWICK, Syracuse University, DAVID NELSON, Harvard University — We use molecular dynamics to study the vibration of a thermally fluctuating 2D atomically-thin elastic membrane clamped at both ends. We identify the eigenmodes from peaks in the frequency domain of the time-dependent height and track the dependence of the eigenfrequency of a given mode on the bending rigidity of the membrane, taking care also of the subtle effects of thermal contraction in generating a tension. We find that the effective bending rigidity tends to a constant as the bare bending rigidity vanishes, supporting theoretical arguments that the macroscopic bending rigidity of the membrane as a whole arises from a strong renormalization of the microscopic bending rigidity. In the situation of one end clamped, we observe three phases: a crumpled phase, a phase of vibrating about the z=0 plane where the membrane initially lies, and a spontaneous symmetry breaking phase of vibrating about a tilt plane in the upper or lower half space.

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