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Negative post-buckling stiffness of meta-beams CORENTIN COULAIS, University of Leiden, Netherlands, JOHANNES OVERVELDE, KATIA BERTOLDI, Harvard University, MARTIN VAN HECKE, University of Leiden, Netherlands — We study the mechanical response of meta-materials whose building blocks undergo buckling. Euler elastica theory describes buckling of slender beams and predicts a positive post-buckling stiffness. Here, we demonstrate experimentally, numerically and theoretically that this limit breaks down when beams become non-slender and that the post-buckling stiffness eventually becomes negative. We further show that the poisson ratio can play the role of an additional design parameter and demonstrate experimentally and numerically that the mechanical response of auxetic meta-beams can indeed become unstable. This paves the way to a new generation of elastic switches, that can be triggered by simple uni-axial experiments.

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