Abstract Submitted
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The role of broken potential symmetry for nanomechanical resonators ALEXANDER EICHLER[1], JOEL MOSER, ICFO - The Institute of Photonic Sciences, MARK DYKMAN, Michigan State University, ADRIAN BACHTOLD, ICFO - The Institute of Photonic Sciences — Vibrational modes in nanomechanical systems as well as in nonlinear microwave cavities can have broken inversion symmetry, which can significantly affect the mode dynamics. We demonstrate a technique that allows us to reveal the symmetry breaking and to study its manifestation in linear and nonlinear resonant response. We study vibrational modes of carbon nanotubes, where the symmetry breaking is associated with the nanotube bending. We find that symmetry breaking leads to spectral broadening of mechanical resonances, and to an apparent quality factor that drops below 100 at room temperature. The low quality factor at room temperature is a striking feature of nanotube resonators whose origin has remained elusive for many years. Our results shed light on the pivotal role played by symmetry breaking in the dynamics of carbon nanotube mechanical resonators (to be published in Nature Communications).

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