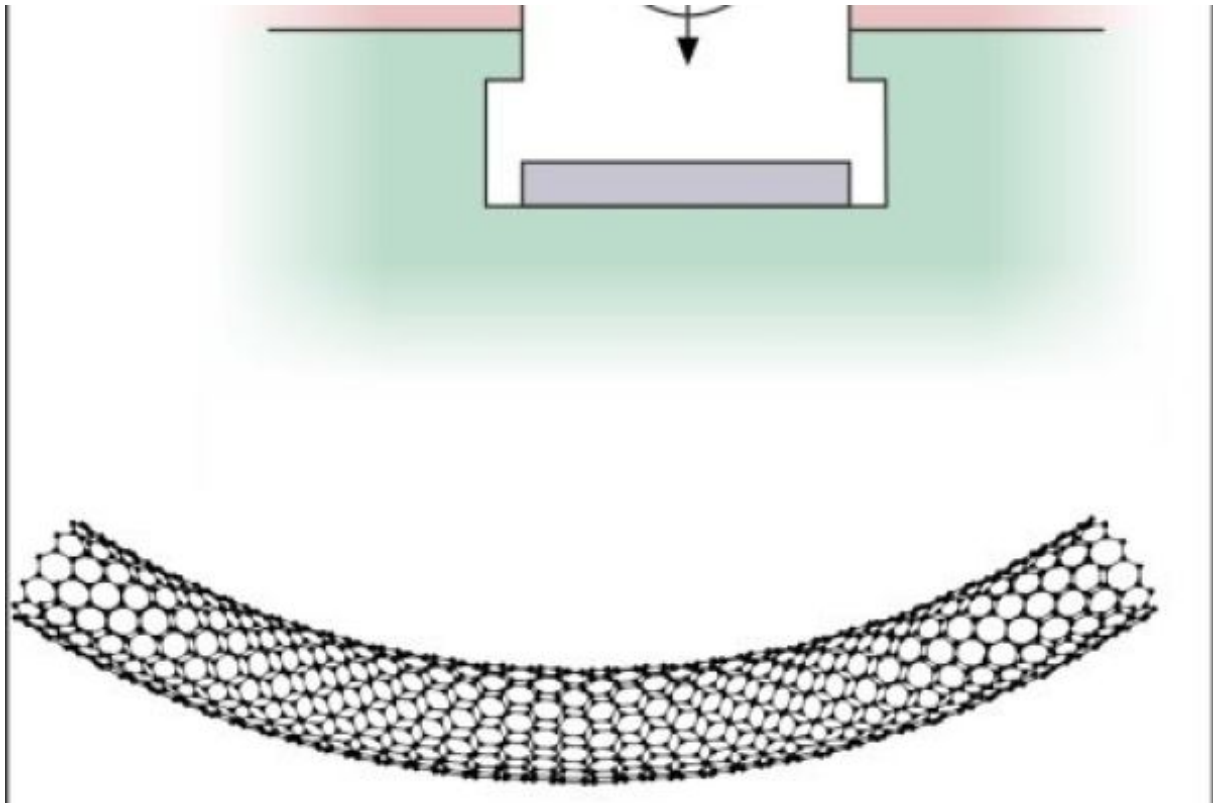




Nanotubes and Symmetry Breaking

Symmetry breaking in a mechanical resonator made from a carbon nanotube in *Nature Communications*.

November 25, 2013

Researchers at ICFO have recently announced the first experimental observation of a fundamental property of mesoscopic vibrational systems using a nanomechanical resonator based on a single carbon nanotube. The scientific results have been recently published in *Nature Communications*.

Nanotubes behave as semi-flexible polymers in the sense that they can bend by a sizeable amount, but, when integrating a nanotube in a mechanical resonator, the bending is expected to break the symmetry of the restoring potential.

The study, carried out by the NanoOptoMechanics group led by Prof. Adrian Bachtold, allowed researchers to detect and measure motion in the resonator at nearly zero-frequency,

in response to resonant excitations at high-frequencies. The observed effect is actually a consequence of the lack of inversion symmetry of mechanical vibrations, a property that should be generic for mesoscopic vibrational systems of current interest.

The authors also found that symmetry breaking leads to the spectral broadening of mechanical resonances, and to an apparent quality factor that drops below 100 at room temperature.