

Title	<b>Ultrafast spectroscopy of super high frequency mechanical modes of doubly clamped beams</b>
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Abstract	<p>We use ultrafast pump-probe spectroscopy to study the mechanical vibrations in the time domain of doubly clamped silicon nitride beams. Beams with two different clamping conditions are investigated. Finite element method calculations are performed to analyse the mode spectra of both structures. By calculating the strain integral on the surface of the resonators, we are able to reproduce the effect of the detection mechanism and identify all the measured modes. We show that our spectroscopy technique combined with our modelling tools allow the investigation of several different modes in the super high frequency range (3-30 GHz) and above, bringing more information about the vibration modes of nanomechanical resonators.</p>
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