

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Strong coupling and parametric amplification in mechanical modes of graphene JOHN MATHEW, Tata Institute of Fundamental Research, Mumbai, India, RAJ PATEL, Tata Institute of Fundamental Research, Mumbai, India, Birla Institute of Technology Science, Pilani - K.K.Birla Goa Campus, India, ABHINANDAN BORAH, RAJAMANI VIJAYARAGHAVAN, MANDAR DESHMUKH, Tata Institute of Fundamental Research, Mumbai, India — We demonstrate strong dynamical coupling and parametric amplification in mechanical modes of a graphene drum using an all electrical configuration. Low tension in the system allows large electrostatic tunability of the modes thus enabling dynamic pumping experiments. In the strong coupling regime a red detuned pump gives rise to new eigenmodes having highly tunable mode splitting (cooperativity ~ 60) with coherent energy transfer. The coupling is also used to amplify the modes under the action of a blue detuned pump. In addition, self-oscillations and parametric amplification of the fundamental vibrational mode is demonstrated with a gain of nearly 3. The low mass and high frequency of these atomically thin resonators could prove useful for studying mode coupling in the quantum regime.

Mandar Deshmukh
Tata Institute of Fundamental Research, Mumbai, India

Date submitted: 06 Nov 2015

Electronic form version 1.4