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Graphene Nanoelectromechanical Systems are Unique[1]

TCHEFOR NDUKUM, BRITT BAUGHER, KEVIN FISCHER, PABLO JARILLO-HERRERO, MIT — Graphene Nanoelectromechanical systems (GNEMS) with their light mass show a lot of interesting novel physics effects compared to conventional Nanoelectromechanical systems (NEMS). Superior gate tunability of the order of >10MHz/V at room temperature as well as high quality factors of $\sim 10^5$ at mK temperatures for the fundamental mode have already been obtained. Studying their high frequency modes, we have observed for the first time avoided crossing between graphene modes as well as between graphene modes and their suspended contacts. In addition we have studied the atypical variation of the mode dispersion versus gating resulting from tensioning and electrostatic coupling to the gate. In particular, we measure an additional frequency shift near 0Vg which could be due to a strong electromechanical coupling near the Dirac Point.

[1]NSF, ONR, CMSE

Tchefor Ndukum
tchefor@mit.edu
MIT

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