Abstract Submitted
for the NES15 Meeting of
The American Physical Society

Tunable light-matter interaction and the role of hyperbolicity in graphene-hBN system ANSHUMAN KUMAR, Massachusetts Institute of Technology, TONY LOW, University of Minnesota, KIN HUNG FUNG, Hong Kong Polytechnic University, PHAEDON AVOURIS, IBM T.J. Watson Research Center, NICHOLAS X. FANG, Massachusetts Institute of Technology — Hexagonal boron nitride (hBN) is a natural hyperbolic material which can also accommodate dispersive surface phonon-polariton modes. In this work, we examine theoretically the mid-infrared optical properties of graphene-hBN heterostructures derived from their coupled plasmon-phonon modes. We found that the graphene plasmon couples differently with the phonons of the two Reststrahlen bands, owing to their different hyperbolicity. This also leads to distinctively different interaction between an external quantum emitter and the plasmon-phonon modes in the two bands, leading to substantial modification of its spectrum. The coupling to graphene plasmons allows for additional gate tunability in the Purcell factor, and narrow dips in its emission spectra.

Anshuman Kumar
Massachusetts Institute of Technology

Date submitted: 30 Mar 2015 Electronic form version 1.4