Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Tunable optical second-harmonic generation from bilayer MoS2 by controlled inversion symmetry breaking CLAUDIA RUPPERT, TU Dortmund/Columbia Univ., YILEI LI, Stanford Univ./Columbia Univ., LEI WANG, Cornell Univ./Columbia Univ., EN-MIN SHIH, JAMES HONE, Columbia Univ., TONY HEINZ, Stanford Univ./Columbia Univ. — Due to the presence of a center of inversion, optical second-harmonic generation (SHG) from an unperturbed bilayer 2H-MoS_2 crystal is strongly suppressed compared to the non-centrosymmetric monolayer. In this paper, we show that SHG from bilayer MoS_2 is enhanced when it is supported on a fused silica substrate. This enhancement originates from lifting of inversion-symmetry induced by substrate interactions. Further, by applying an out-of-plane electrostatic field in a back-gating geometry, we demonstrate highly tunable SH radiation from supported MoS_2 bilayers. Complementing recent work on bilayer WSe_2 [1], where the sample is primarily studied in the hole-doped regime, the bilayer MoS_2 samples in our study are shown to be in the electron-doped regime. Through a comparison of the field-induced change in the second-order nonlinear susceptibilities of monolayer and bilayer MoS_2, we identify the importance of interlayer coupling in the tunable SHG from bilayer MoS2. [1] Huakang Yu, Deep Talukdar, Weigao Xu, Jacob B. Khurgin, and Qihua Xiong, Nano Lett. 15 5653 (2015)

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Date submitted: 06 Nov 2015 Electronic form version 1.4