Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

What Makes Effective Gating Possible in Two-Dimensional Heterostructures?[1] IGOR ZUTIC, University at Buffalo, PREDRAG LAZIC, Rudjer Boskovic Institute, KIRILL D. BELASHCHENKO, University of Nebraska-Lincoln — Electrostatic gating provides a way to obtain key functionalities in modern electronic devices and to qualitatively alter materials properties. While electrostatic description of such gating gives guidance for related doping effects, inherent quantum properties of gating provide opportunities for intriguing modification of materials and unexplored devices. Using first-principles calculations for Co/bilayer graphene, Co/BN, and Co/benzene, as well as a simple physical model, we show that magnetic heterostructures with two-dimensional layered materials can manifest tunable magnetic proximity effects [1]. van der Waals bonding is identified as a requirement for large electronic structure changes by gating. In particular, the magnitude and sign of spin polarization in physisorbed graphene can be controlled by gating, which is important for spintronic devices [2,3]. [1] P. Lazić, K. D. Belashchenko, and I. Žutić, arXiv:1510.05404. [2] P. Lazić, G. M. Sipahi, R. K. Kawakami, and I. Žutić, Phys. Rev. B **90**, 085429 (2014). [3] H. Dery et al., IEEE Trans. Electron. Dev. **59**, 259 (2012).

[1]Supported by U.S. ONR Grant N000141310754, U.S. DOE-BES Award DE-SC0004890, NSF DMR-1124601, the Center for NanoFerroic Devices, the Nanoelectronics Research Initiative, and NSF DMR-1308751.

Igor Zutic
University at Buffalo

Date submitted: 04 Nov 2015 Electronic form version 1.4