

MAR17-2016-020504

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

Atomic-scale control of graphene magnetism by using hydrogen atoms

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Incorporating magnetism to the long list of graphene capabilities has been pursued since its first isolation in 2004. In this talk I will show how we use a scanning tunneling microscope to explore and manipulate graphene pi-magnetism at an atomic level. Our work shows how the absorption of single H atoms on graphene magnetizes the graphene regions around them. In contrast to common magnetic materials, where the magnetic moments are localized in a few angstroms, the induced graphene magnetic moments extend over several nanometers and present an atomically modulated spin texture. Our measurements also prove that the induced magnetic moments couple strongly at very long distances following a particular rule: magnetic moments sum-up or neutralize critically depending on the relative H-H adsorption sites [1]. [1] H. Gonzalez-Herrero, J. M. Gomez-Rodriguez, P. Mallet, M. Moaied, J. J. Palacios, C. Salgado, M.M. Ugeda, J. Y. Veullen, F. Yndurain, I. Brihuega, *Science*, 352, 437 (2016)