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Ferromagnetism on graphene multilayers by hydrogen adsorption

JUAN J. PALACIOS, MOHAMMED MOAIED, JOSE V. ALVAREZ, Universidad Autónoma de Madrid, MARIA J. CATURLA, Universidad de Alicante — A remarkable theoretical prediction for graphene is that, in theory, it can be permanently magnetized by the adsorption of H atoms. Unfortunately, this will only be possible if the adsorption is selectively realized in such a way that all H atoms occupy the same sublattice so that the contributions of the H-induced local magnetic moments add up due to the expected ferromagnetic coupling in this situation. Inspired by recent experiments, I will show that such selectivity can be naturally achieved on the graphite surface. Due to the sublattice broken symmetry on the surface, a spontaneous arrangement of the hydrogen atoms where all end up adsorbed on the same sublattice takes place at room temperature in a reasonable time scale. First-principles calculations combined with kinetic Monte Carlo simulations and model Heisenberg-like Hamiltonians derived from them give a complete account of the emergence of this novel ferromagnetism.

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