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Origin Of Magnetism in Graphene Nanostructures[1] WEN YING RUAN, School of Physics, Georgia Institute of Technology, Atlanta 30332, USA, YIYANG SUN, SHENG-BAI ZHANG, Department of Physics, Applied Physics, and Astronomy, Rensselaer Polytechnic Institute, Troy, NY 12180, USA, MEI-YIN CHOU, School of Physics, Georgia Institute of Technology, Atlanta 30332, USA, and IAMS, Academia Sinica, Taipei, Taiwan — The magnetic orderings of traditional magnetic materials originate from their partially filled d- or f-electron bands. Surprisingly, theoretical and experimental studies show that graphene nanostructures which contain only s and p electrons can also exhibit magnetic ground states. On the basis of the bonding properties of pi-electrons, we propose a theoretical model to explain the origin of magnetism in graphene nanostructures. Our theory is justified via examples ranging from nanoflakes to nanoribbons. Our theory also provides a simple physical insight into Lieb's theorem about the ground state magnetic momentum of a bipartite system.

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