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Flakes of artificial graphene in magnetic fields[1] ESA RASANEN, Tampere University of Technology, Finland, MICHAEL AICHINGER, RICAM and Uni Software Plus, Linz, Austria, STEFAN JANECEK, RICAM, Linz, Austria — Artificial graphene [1] (AG) is a man-made nanomaterial that can be constructed by arranging molecules on a metal surface [2] or by fabricating a quantum-dot lattice in a semiconductor heterostructure [3]. In both cases, AG resembles graphene in many ways [1-4], but it also has additional appealing features such as tunability with respect to the lattice constant, system size and geometry, and edge configuration. Here we solve numerically the electronic states of various hexagonal AG flakes similar to those in Ref. [2]. In particular, we demonstrate the formation of the Dirac point as a function of the lattice size and its response to an external, perpendicular magnetic field. Secondly, we examine the complex behavior of the energy levels as functions of both the system size and magnetic field. Eventually, we find the formation of "Hofstadter's butterfly"-type patterns in the energy spectrum.

[1] For a recent review, see M. Polini et al., Nature Nanotech. 8, 625 (2013).
[2] K. K. Gomes et al., Nature 483, 306 (2012).
[3] M. Gibertini et al., Phys. Rev. B 79, 241406(R) (2009).
[4] E. Rasanen et al., Phys. Rev. Lett. 108, 246803 (2012).

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