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Vacancy induced localized states in graphene[1] J.M.B. LOPES DOS SANTOS, VITOR M. PEREIRA, CFP and Departamento de Física, Faculdade de Ciências , Universidade de Porto, F. GUINEA, Instituto de Ciencia de Materiales de Madrid, CSIC, Cantoblanco E28049 Madrid, Spain, N.M.R. PERES, Center of Physics and Departamento de Física, Universidade do Minho, P-4710-057, Braga, Portugal, A.H. CASTRO NETO, Department of Physics, Boston University, 590 Commonwealth Avenue, Boston, MA 02215, USA — We show, analytically, that vacancies in an half-filled honeycomb lattice induce the formation of quasi-localized electronic states. If particle-hole symmetry is broken, these states become resonances close to the Fermi level. We also calculate numerically the electronic density of states for a finite density of vacancies, and discuss the issue of electronic localization in these systems. Our results have also relevance for the problem of disorder in d-wave superconductor.

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