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The Aharonov-Bohm effect in self-assembled InGaAs/GaAs quantum rings[1] V.M. FOMIN, V.N. GLADILIN, J.T. DEVREESE, TFVS, Dep. Fysica, Universiteit Antwerpen, B-2610 Antwerpen, Belgium, P. OFFERMANS, P.M. KOENRAAD, J.H. WOLTER, Dept. of Semiconductor Physics, TU Eindhoven, NL-5600 MB Eindhoven, The Netherlands, D. GRANADOS, J.M. GARCÍA, Instituto de Microelectrónica de Madrid, E-28760 Tres Cantos, Madrid, Spain — Based on the structural information from X-STM measurements on buried self-assembled InGaAs/GaAs quantum rings, we calculate the electron energy spectra and the magnetization as a function of the applied magnetic field. Since the lateral size of quantum rings substantially exceeds their height, the lateral electron motion is governed by the adiabatic potential related to the fast electron motion along the growth axis. The electron states are calculated by diagonalizing the adiabatic Hamiltonian. The oscillations of the electron orbital magnetic moment versus magnetic field are analysed as a function of angular modulations of the height, width and slopes of the rim as well as the chemical composition of a quantum-ring structure. Although the realistic quantum-ring shape differs strongly from an idealized circular-symmetric open-ring structure, Aharonov-Bohm oscillations survive.

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