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Electron tunneling in chaotic quantum ring¹ BRANISLAV VLAHOVIC, IGOR FILIKHIN, SERGEI MATINYAN, North Carolina Central University — Single electron confinement states of two dimensional InAs/GaAs quantum ring (QR) are considered under the effective approach [1]. The symmetry of the QR shape is violated as it is in well-known Bohigas annular billiard [2]. For weak violation of the symmetry, the energy spectrum may be represented by a set of quasi-doublets. We study the correlation between electron localizations and quasi-doublet splitting for complete spectrum. The bands with different “radial” quantum numbers are well determined within our calculations. The inter-band tunneling is considered in relation to the chaotic properties of the QR. We propose an alternative interpretation of the experimental data [3] to that made in Ref. [3], where the “first experimental evidence for chaos-assisted tunneling” in a microwave annular billiard was reported. We show that this effect can be explained by inter-band tunneling that occurs due to the anti-crossing of the levels having different “radial” quantum numbers. [1] I. Filikhin, V. M. Suslov and B. Vlahovic, Phys. Rev. B 73, 205332 (2006). [2] O. Bohigas, D. Boose, R. Egydio de Carvvalho, and V. Marvulle, Nucl. Phys. A 560, 197 (1993). [3] C. Dembowski et al., PRL 84 (2000) 867; R. Hofferbert et al., Phys. Rev. E 71, 046201 (2005).

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