Abstract Submitted
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**Berry phase and Rashba fields in realistic semiconductor quantum rings under tilted magnetic field**[1] VIVALDO LOPES-OLIVEIRA, VICTOR LOPEZ-RICHARD, Univ Fed de Sao Carlos, SERGIO EDUARDO ULLOA, Ohio University, OPTICAL, VIBRATIONAL, SPIN AND TRANSPORT PROPERTIES IN SEMICONDUCTOR NANOSTRUCTURES COLLABORATION, DEPARTMENT OF PHYSICS AND ASTRONOMY COLLABORATION — The geometric Berry phase has been experimentally measured and manipulated in InGaAs-based mesoscopic rings, as seen from magnetotransport data [1]. Motivated by these experiments, we present here an analysis of the influence of the magnetic field orientation and intensity on the Berry phase experienced by electrons in a realistic quantum ring structure (similar model has been used in ref. [2]). We use the k.p formalism and fully incorporate the effects of confinement asymmetry, as well as the resulting Rashba spin-orbit-coupling (SOC) fields within the same framework. We obtain spin maps for angle and magnetic field intensities for different levels. At the anticrossing regions, with strong level mixing produced by varying flux dependence, we observe pronounced asymmetry effects in the shape and character of excited states. The asymmetry plays an important role in determining the Berry phase of the different states. We also find that effects of varying magnetic field tilt and intensity, as well as SOC, are more pronounced in the ground state. The substantial phase modulation observed in the lower energy level manifold can be monitored and exploited in transport experiments. [1] F.Nagasawa et al. Nat. Comm. 4, 2526 (2013); [2] V.Lopes-Oliveira et al. PRB 90, 125315 (2014).

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