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Designing topological states, spin textures and spin interferometers by shape deformations[1] MARIO CUOCO, ZUJIAN YING, PAOLA GENTILE, CNR-SPIN and Dipartimento di Fisica, Universit di Salerno, I-84084 Fisciano (Salerno), Italy, CARMINE ORTIX, Institute, Institute for Theoretical Solid State Physics, IFW-Dresden, Helmholtzstrae 20, D-01069 Dresden, Germany — Low-dimensional semiconducting nanomaterials play a relevant role in the area of topological states of matter. However, apart from these conventional material geometries the most recent advances in nanotechnology have made it possible to have at hand an entirely novel family of low-dimensional nanostructures: flexible semiconductor nanomaterials which are bent into curved, deformable objects ranging from semiconductor nanotubes, to nanohelices. Motivated by the excitement in both topological states of matter and novel shape deformed nanostructures, we have theoretically considered the possible interplay between curvature effects on the electronic properties and the topological properties of the quantum states in low-dimensional nanomaterials. We present the intricate twist between spin texture and spin transport in shape deformed nanostructures. We show that non-uniform Rashba spin-orbit coupling in shape deformed nanowires leads to spin textures with a tunable topological character. These topologically non trivial spin patterns affect the electron spin interference in the deformed quantum ring, thereby resulting in different geometry-driven electronic transport behavior [1]. [1] Z.-J. Ying, P. Gentile, C. Ortix, and M. Cuoco, Phys. Rev. B 94, 081406(R) (2016).

[1]EC-FET OPEN project CNTQC, N. 618083 (http://www.nano2qc.eu/)

Mario Cuoco
CNR-SPIN and Dipartimento di Fisica, Universit di Salerno

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