Abstract Submitted for the MAR13 Meeting of The American Physical Society

Spin textures in graphene-topological insulator heterostructures<sup>1</sup> JUNHUA ZHANG, CHRISTOPHER TRIOLA, ENRICO ROSSI, Department of Physics, College of William and Mary — We study the spin texture of the bands of heterostructures formed by graphene and strong three dimensional topological insulators (3DTIs). We find that in these systems, via the proximity effect, graphene can acquire nontrivial spin textures and we identify the conditions for their realization. The presence of spin textures in the graphene layer opens the possibility to realize ideal 2D spin-selective systems with the unique properties of graphene, such as the extremely high room-temperature mobility. In addition, we find that in graphene-3DTI heterostructures some of the spin structures are characterized by the locking of the spin and valley degrees of freedom and should allow the realization of novel valley-spintronics effects.

<sup>1</sup>Work supported in part by the Jeffress Memorial Trust, Grant No. J-1033.

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Date submitted: 09 Nov 2012

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