Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Magnetically Defined Qubits on 3D Topological Insulators[1] GERSON J. FERREIRA, Physics Institute of São Carlos, University of São Paulo, DANIEL LOSS, University of Basel — We explore potentials that break time-reversal symmetry to confine the surface states of 3D topological insulators into quantum wires and quantum dots. A magnetic domain wall on a ferromagnet insulator cap layer provides interfacial states predicted to show the quantum anomalous Hall effect. Here, we show that confinement can also occur at magnetic domain heterostructures, with states extended in the inner domain, as well as interfacial QAHE states at the surrounding domain walls. The proposed geometry allows the isolation of the wire and dot from spurious circumventing surface states. For the quantum dots, we find that highly spin-polarized quantized QAHE states at the dot edge constitute a promising candidate for quantum computing qubits. See [Ferreira and Loss, Phys. Rev. Lett. 111, 106802 (2013)].

[1]We acknowledge support from the Swiss NSF, NCCR Nanoscience, NCCR QSIT, and the Brazillian Research Support Center Initiative (NAP Q-NANO) from Pró-Reitoria de Pesquisa (PRP/USP).

Gerson J. Ferreira
Physics Institute of São Carlos, University of São Paulo

Date submitted: 15 Nov 2013 Electronic form version 1.4