Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Fingerprints of a bidimensional topological insulator in Bismuth nanocontacts JUAN JOSE PALACIOS, Universidad Autonoma de Madrid, DANIEL GOSALBEZ, CARLOS SABATER, Universidad de Alicante, JOAQUIN FERNANDEZ-ROSSIER, International Iberian Nanotechnology Laboratory, CARLOS UNTIEDT, Universidad de Alicante — We report on experimental and theoretical work of the electronic transport in Bismuth nanocontacts as created by repeated breaking and indentation using scanning tunneling microscopy techniques. The conductance exhibits a number of unusual features, not shared by normal metals, one of the most striking ones being the presence of plateaus at fractional values of the quantum of conductance at low temperatures. We understand this phenomenon on the basis of the formation of a bilayer of Bismuth (a predicted bidimensional topological insulator) which supports a maximum of a quantum of conductance as expected for its odd number of gapless edge modes. Theoretical transport results based on an atomistic tight-binding model with disorder and spin-orbit coupling permit us associate the fractional-valued plateaus to the final stages of the breaking of the bilayer.

Juan Jose Palacios
Universidad Autonoma de Madrid

Date submitted: 22 Dec 2011 Electronic form version 1.4