Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

**Antimonene: Experiments and theory of surface conductivity**[1]
JUAN JOSE PALACIOS, PABLO ARES, Universidad Autonoma de Madrid, SAHAR PAKDEL, Universidad Autonoma de Madrid, University of Tehran, WENDEL PAZ, FELIX ZAMORA, JULIO GOMEZ-HERRERO, Universidad Autonoma de Madrid — Very recently antimony has been demonstrated to be amenable to standard exfoliation procedures opening the possibility of studying the electronic properties of isolated few-layers flakes of this material, a.k.a. antimonene [1]. Antimony is a topological semimetal, meaning that its electronic structure presents spin-split helical states (or Dirac cones) on the surface, but it is still trivially metallic in bulk. Antimonene, on the other hand, may present a much reduced electronic bulk contribution for a small number of layers. A novel technique to make electrical contacts on the surface of individual thin flakes (5-10 monolayers) has allowed us to measure the (surface) conductivity of these in ambient conditions. Our measurements show a high conductivity in the range of $1 - 2\,e^2/h$, which we attribute to the surface Dirac electrons. We have also carried out theoretical work to address the origin of this value, in particular, the importance of scattering between the Dirac electrons and the bulk bands. Our calculations are based on density functional theory for the electronic structure and Kubo formalism for the conductivity, the latter considering random disorder and the presence of water. [1] P. Ares et al., Advanced Materials 28, 6515 (2016)

[1]Ministerio de Economia y Competitividad, Grant FIS2016-80434-P

Juan Jose Palacios
Universidad Autonoma de Madrid

Date submitted: 10 Nov 2016 Electronic form version 1.4