Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Tunneling spectroscopy of a magnetic adatoms on topological insulator surfaces[1] M. MISIORNY, Chalmers Univ. of Technology, Göteborg, Sweden and Adam Mickiewicz Univ., Poznań, Poland, M. BJERNGAARD, Johns Hopkins Univ., Baltimore, USA and Univ. of Amsterdam, Amsterdam, The Netherlands, J. PAASKE, Univ. of Copenhagen, Copenhagen, Denmark — In this communication, we address the question of how the presence of a magnetic impurity on a topological insulator (TI) surface manifests in the inelastic electron tunneling spectroscopy (IETS) when such a system is probed by a STM. For this purpose, we consider a single magnetic adatom with arbitrary spin, whose dynamics is governed by the local magnetic anisotropy. The spin is exchange-coupled to two-dimensional helical surface electrons, corresponding to the surface of a three-dimensional TI like Bi2Se3, with its characteristic hexagonally warped Dirac cone band structure. Employing an effective exchange-tunneling model, we calculate the non-linear differential conductance from a spin-polarized STM tip to the helical substrate, valid in the perturbative regime of weak exchange-tunneling and including the nonequilibrium pumping of the adatom spin states. The interplay between the magnetic anisotropy and the spin-momentum locked surface electrons is shown to give a number of specific imprints in the IETS, which could be investigated by spin-resolved scanning tunneling spectroscopy.
M. Misiorny, M. Bjerngaard and J. Paaske, manuscript in preparation

[1]Work supported by the Polish Ministry of Science and Education as Iuventus Plus project (IP2014 030973) in years 2015-2016.

Maciej Misiorny
Chalmers Univ. of Technology, Göteborg, Sweden and Adam Mickiewicz Univ., Poznań, Poland

Date submitted: 06 Nov 2015 Electronic form version 1.4