Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Detection of inverse Rashba-Edelstein effect at Cu/Bi interface using lateral spin valves MIREN ISASA, CIC nanogune, San Sebastian, Spain, M. CARMEN MARTÍNEZ-VELARTE, Universidad Zaragoza, Zaragoza, Spain, ESTITXU VILLAMOR, CIC nanogune, San Sebastian, Spain, LUIS MORELLÓN, Universidad Zaragoza, Zaragoza, Spain, JOSE M. DE TERESA, Universidad Zaragoza-CSIC, Zaragoza, Spain, MANUEL R. IBARRA, Universidad Zaragoza, Zaragoza, Spain, LUIS E. HUESO, FELIX CASANOVA, CIC nanogune, San Sebastian, Spain; IKERBASQUE, Bilbao, Spain — The spin-orbit coupling (SOC) can be exploited to generate and detect pure spin currents, which are key elements in the field of spintronics. One important example is the spin Hall effect. A novel SOC phenomenon, the inverse Rashba-Edelstein effect (IREE), is attracting a large interest. IREE arises from the Rashba coupling that appears at interfaces or surface states (SSs), leading to the conversion of a 3D spin current into a 2D charge current. An interesting system to study the IREE is thus the SS of a semimetal such as Bi. In this work [1], we study the spin-to-charge conversion in Bi using a device based on a lateral spin valve (LSV) geometry. We demonstrate a spin-to-charge current conversion in the LSV. The analysis of the obtained results leads us to argue that the spin-to-charge conversion occurs at the Cu/Bi interface, therefore detecting IREE. Moreover, we evaluate the IREE length, which characterizes the spin-to-charge conversion ratio, as a function of temperature. This ratio changes sign at a certain temperature threshold (125 K), in excellent agreement with the experimental observation of a change in the type of carriers that dominate the electronic transport in Bi.

[1] M. Isasa et al, arXiv: 1409.8540 (2014).

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Date submitted: 13 Nov 2014 Electronic form version 1.4