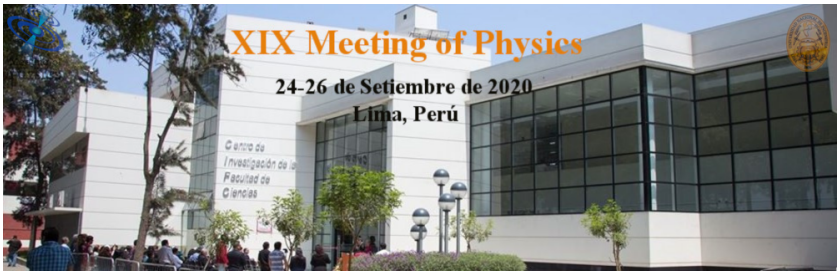

Contribution ID : **64** Type : **video conference**

Spin-orbit phenomena in graphene-based spin devices

Thursday, 24 September 2020 15:30 (30)

Two dimensional materials have provided unique insights in condensed matter physics, yielding a multitude of novel effects. Among them, graphene has shown to be an outstanding material owing to its exceptional and tunable electrical properties. In graphene, spin information can propagate over long distances and also be manipulated by proximity induced phenomena [1,2,3], providing thus the building blocks for developing graphene-based spintronic devices.

In this talk, I will discuss recent spin transport experiments in van der Waals heterostructures consisting of graphene and transition metal dichalcogenides. First, I will describe how proximity induced spin-orbit effects lead to an anisotropic spin dynamics in graphene and enable to manipulate spin transport. In the second part, I will show how spin-orbit proximity effects can induce an efficient generation and detection of spin currents, that is comparable to the largest reported to date. These findings provide a novel route for spin generation free from magnetic materials and pave the way for the development of ultra-compact and low power consumption magnetic memory devices.

[1] W. Han et al. Nat. Nano. 9 974, (2014)
[2] W. Savero Torres et al. MRS Bulletin 45(5), 357-365, (2020)
[3] W. Savero Torres et al. 2D Mat. 4, 041008, (2017)
[4] L. A. Benítez, J.F. Sierra, W. Savero Torres et al. Nat. Phys. 14, 303-308, (2018)
[5] L. A. Benítez, W. Savero Torres et al. Nat. Mat. 19, 170-175, (2020)

Primary author(s) : Dr SAVERO TORRES, Williams (1Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC and the Barcelona Institute of Science and Technology (BIST), Barcelona, Spain); Mr BENÍTEZ, Luis Antonio (2Universidad Autònoma de Barcelona, Barcelona, Spain); Dr SIERRA, Juan Francisco (Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC and the Barcelona Institute of Science and Technology (BIST), Barcelona, Spain); Dr COSTACHE, Marius Vasile (Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC and the Barcelona Institute of Science and Technology (BIST), Barcelona, Spain); Prof. VALENZUELA, Sergio Osvaldo (Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC and the Barcelona Institute of Science and Technology (BIST), Barcelona, Spain and Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain)

Presenter(s) : Dr SAVERO TORRES, Williams (1Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC and the Barcelona Institute of Science and Technology (BIST), Barcelona, Spain)

Session Classification : Materials Science and Nanotechnology

Track Classification : Materials Science and Nanotechnology