



## The 2020 Around-the-Clock Around-the-Globe Magnetism Conference: Invited speakers information

**Name:** José Maria

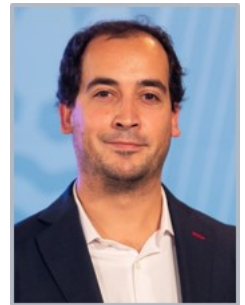
**Surname:** Porro

**Affiliations:**

(1) BCMaterials, Basque Center for Materials, Applications and Nanostructures

(2) Ikerbasque, the Basque Foundation for Science

**Country:** Spain



**Title of the talk:** Neutron and synchrotron radiation as probes to study magnetic materials

### **Biography:**

José Maria Porro has a Physics PhD in Materials Science, from the University of the Basque Country (2014), under the supervision of the Ikerbasque Research Professor Paolo Vavassori, nanomagnetism group co-leader at CIC nanoGUNE in Donostia-San Sebastián, Basque Country, Spain. He has post-doctoral experience as a research associate for 3.5 years at the Large Scale Structures group of the ISIS neutron and muon source of the Rutherford Appleton Laboratory, Science and Technology Facilities Council, of the United Kingdom. He was also a visitor scientist for three years at the I10 beamline of the Diamond Light Source, the synchrotron facility of the United Kingdom. In 2017 he secured a Marie Skłodowska-Curie Individual Fellow at the BCMaterials, the Basque Centre for Materials, Applications and Nanostructures of the Basque Country. Currently he holds an Ikerbasque Research Fellow position at BCMaterials. His expertise is focalized in nanomagnetism and, more recently, in the field of Heusler-type magnetic shape memory alloys. He has demonstrated hands-on experience in the design and fabrication of micro and nano-patterned structures, as well as in their characterization by means of standard lab-based techniques, combined with a strong experience in the usage of large scale structures such as neutron and synchrotron sources to complement the characterization of the studied materials.

### **Abstract:**

One of the key aspects for the development of new materials relies on the ability to profoundly study their fundamental properties. The usage of neutron and synchrotron radiation sources provides scientists with unique tools to probe matter in a wide range of length and timescales, accessing to both the structure and time-resolved dynamics of the materials issue of study. In this talk, an introduction to different neutron and synchrotron radiation scattering techniques will be presented, together with some

specific science cases related to magnetism and magnetic materials studied with these techniques. More concretely, the following techniques and science cases will be presented:

1. X-Ray Photon Correlation Spectroscopy to study the magnetization dynamics of artificial spin ices.
2. Transmission X-Ray Microscopy to study the propagation of magnetic charges in artificial spin ices.
3. Powder Neutron Diffraction to study the origin of magnetism in Heusler-type Magnetic Shape Memory Alloys.
4. A combination of Single Crystal Neutron Diffraction and X-Ray Magnetic Circular Dichroism to study the magnetism in high temperature Magnetic Shape Memory Alloys.

A brief introduction to the field of artificial spin ices and to Heusler-type magnetic shape memory alloys will also be presented.

#### **References:**

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[2] S. A. Morley, J. M. Porro, A. Hrabec, M. C. Rosamond, G. Burnell, M. Y. Im, P. J. Fischer, S. Langridge, C. H. Marrows, "Field-driven mobility of emergent magnetic charges in square artificial spin-ice", *Sci. Rep.* 9, 15989, 2019

[3] J. M. Porro, S. A. Morley, D. Alba-Venero, R. Macedo, M. C. Rosamond, E. H. Linfield, R. L. Stamps, C. H. Marrows, S. Langridge, "Magnetization dynamics of weakly interacting sub-100nm square artificial spin-ices", *Sci. Rep.* 9, 19967, 2019

[4] A. Pérez-Checa, J. M. Porro, J. Feuchtwanger, P. Lázpita, T. C. Hansen, C. Mondelli, A. Sozinov, J. M. Barandiarán, K. Ullakko, V. A. Chernenko "Role of Fe addition in Ni–Mn–Ga–Co–Cu–Fe ferromagnetic shape memory alloys for high-temperature magnetic actuation", *Acta Materialia* 196, 549-555, 2020