

## ***Seminar Announcement***

Date: Tuesday 7 November 2023

Time: 10:00-11:30

Room: Building West 2, 5F, Room 547

Organizer: H. Yuasa, ISEE hiromi.yuasa@ed.kyushu-u.ac.jp

We invited two speakers from CIC nanoGUNE in Spain. They will give seminars about magnetic materials properties and magneto-optics and their applications.

### **Title: Designing magnetic phase transitions in thin films and multilayers**

**Dr. Andreas Berger, Research Director of CIC nanoGUNE**

In the field of magnetism, magnetic state control and phase transitions have played a very important role for scientific and practical reasons, which has led to very advanced material designs in thin films and multilayers. One such example is the introduction of exchange graded magnetic films, which encompass a depth dependence of the exchange coupling strength, making it possible to fabricate magnetically anisotropic films, whose coercivity is essentially zero for a substantial temperature range. More complex layouts of exchange graded materials furthermore allow for the design of extended temperature ranges, in which the coercive field exhibits a plateau. Recently, such exchange graded materials have also been demonstrated to allow for a manipulation of critical behavior near the Curie temperature, including an extremely large design range for the magnetic onset critical exponent  $\beta$  in contrast to the perceived fundamental universality of phase transitions.



### **Title: Ultrasensitive Magneto-Optical Ellipsometry for depth-resolved Magnetometry**

**Ms. Carmen Martín Valderrama, PhD student of CIC nanoGUNE**

A major challenge in nano-scale magnetism and spintronics today revolves around the experimental confirmation of spatial magnetization configurations or spin structures along the depth of multilayer materials. This is crucially important because very relevant fundamental phenomena and cutting-edge devices rely heavily on the presence of these spin structures. In this regard, we envision the development of a Magneto-Optical Ellipsometry based tool and methodology that allows for depth resolved magnetometry and the application of this novel method to relevant scientific questions related to non-uniform magnetization states in magnetic materials. Throughout this talk we will see the steps accomplished towards this general objective, including the experimental verification of the reflection matrix description, the detection of non-collinear magnetic states and layer-resolved vector magnetometry. Moreover, we will highlight results obtained as part of the collaboration with Prof. Yuasa and her group at Kyushu University.

