

**Mohammad Sherafati (ICMM, Spain):**

**Title:** "On the road to the defect-induced ferromagnetism in graphene"

**Abstract:** It's been now a few decades that a relentless quest for a new class of metal-free, lightweight and biocompatible magnets such as magnetic molecules and organic magnets has opened a novel multidisciplinary research field. When it comes to light weight and biocompatibility no material surpasses the carbon allotropes such as graphite, fullerene and especially the fascinating two-dimensional wonderland, graphene. Since its isolation in 2004, this one single sheet of graphite, which is the lightest, the thinnest and the strongest material ever, has reinvigorated the field of carbon-based magnetism due to its two dimensionality and remarkable electronic, thermal and mechanical properties. The Holy Grail here is to produce a flexible magnet at room temperature made of graphene whose magnetism could easily be switched on and off by a gate voltage.

There is by now significant theoretical and experimental evidence that the defects such as vacancies or adsorbates such as hydrogen can induce magnetic moments in this otherwise non-magnetic material. However, the defect-induced magnetism in graphene still remains one of the hottest and also highly contentious topics in both theory and experiment. This is mainly because the interaction between the magnetic moment and the extended electronic states in graphene - responsible for the Kondo effect and the quenching of the magnetic moment- and the collective interactions between random distributions of such defects – responsible for the desired ferromagnetism- are from complete understanding and realization.

In this talk I will present the current status of the defect-induced magnetism in carbon-based materials and in particular, discuss the origins of the controversies in the Kondo problem and magnetic ordering in graphene. Then, in the light of the most prominent theoretical and experimental works, I will highlight the open questions and challenges to realize the room-temperature ferromagnetic graphene.