UNIVERSITÉ DU LUXEMBOURG

Physics Colloquium

17th of October, 2019 at 9:00 am
Coffee at 8:45 am

Campus Limpertsberg
Bâtiment des Sciences – room BS 1.03

Talk by Prof. Maria Fyta
University of Stuttgart

Invited by Physics Research Unit.

Unraveling the potential of nanostructures in molecular detection: a modeling paradigm

The potential and efficiency of nanostructured materials in sensing molecules is being investigated through computational means. Two different types of materials are taken into account: a functionalized metallic nanogap and a quasi 2D-layer. The former is viewed with respect to DNA sequencing, the latter as a probe for sensing small gas molecules. Using a number of computational tools, ranging from the electronic region up to the mesoscale, a variety of characteristics of these materials is being tackled. Specifically, optoelectronic and quantum transport properties, as well as conformational arrangements and bonding details are analyzed. Of high interest is the specific interaction of the molecules with the material probe. All results will be discussed on the basis of tuning nanomaterials for enhancing the molecular specificity towards sensing applications. In the end, in order to manifest the importance of this modeling approach, learning algorithms based on relevant experimental data attempt to provide additional insight.

Biography: Maria Fyta studied Physics at the University of Crete in Greece, where she also obtained her Master's degree and a PhD in Condensed Matter Physics in 2005. She then moved to Harvard University and the Kaxiras group as a postdoctoral fellow. In 2005 she returned to Europe and the Technical University of Munich for another postdoctoral stay in the Netz group. In 2010 she was awarded a European Marie Curie fellowship. In 2012 she moved to the University of Stuttgart where she is a junior professor since then. Fyta is using computational methods to investigate the properties of different systems ranging from tunable nanostructures and defective materials to functionalized nanopores. She is specifically interested in the interface between Condensed Matter Physics and Biophysics and the interaction of materials with biomolecules. In these areas, she has established many international collaborations and co-authored many publications. Fyta has advised a number of undergraduate and graduate theses and has taught courses in Physics at the freshmen and graduate level.