

Nanoscience and Nanotechnology @ NEST

A Seminar of the IEEE WA joint EDS/SSCS/IPS Chapter

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Venue: Billings Room 3.04, 3rd floor. Electrical & Electronic Engineering Building, UWA - Crawley

This seminar is open to the public and admission is free to all IEEE members and non-members

Abstract:

In this talk selected research activities at Laboratorio NEST (National Enterprise for nanoScience and nanoTechnology) will be presented. Semiconductor nanowires and graphene will be the material systems discussed in order to achieve low-dimensionality electronic states that can be exploited to obtain novel properties of interest for single-electron/spin configurations and hybrid superconductor-semiconductor systems in view of (opto)electronics and thermoelectric applications. One-dimensional dynamics will also be analysed in the context of the integer and fractional quantum Hall effects in view of quantum computation architectures. Graphene potential for hydrogen storage applications will also be discussed. Finally, in line with the scope of today nanoscience, organic and peptidic nanostructures of interest for theranostics will be presented with an emphasis on single-molecule imaging techniques. This talk is sponsored by the Australian Nanotechnology Network and its broad scope is designed to stimulate collaborations and exchange programs between Australian institutions and the Scuola Normale Superiore in this field.

Biography:

Fabio Beltram obtained the Doctor Degree in Physics and in Electronic Engineering. He carried out research activity from 1986 to 1991 in Bell Labs, since 1992 he is at the Classe di Scienze of the Scuola Normale Superiore where he is now Professor of Physics of Matter and Director of the Nanoscience Laboratory (Laboratorio NEST). At present he is Director of Scuola Normale Superiore and Commissario Straordinario of the Domus Galilaeana and of the Domus Mazziniana. Fabio Beltram is Fellow of the American Physical Society, Senior Member of IEEE, and Grande Ufficiale of the Ordine al Merito della Repubblica Italiana. Fabio Beltram and his group carry out research work in the field of nanoscience and nanotechnology with a rather broad spectrum of topics. His results appeared in about four hundred publications on international journals and patents. Since his doctoral research FB has always worked on the physics and device applications of semiconductor and hybrid superconductor-semiconductor nanostructures. In this area he obtained a number of significant results in optoelectronic and electronic devices and on electronic and photonic properties of heterostructures and nanostructures. Some of his more relevant contributions are on the coherent dynamics, many body effects and photonic design in low-dimensional electronic systems (superlattices, 2D, 1D and 0D systems). Many of these investigations were carried out within (and yielded important contributions to) the field of advanced functional devices of interest for optoelectronics, quantum computing and quantum cryptography (several international and European patents were filed). Increasingly in the last ten years Fabio Beltram has also carried out research activity in the field of molecular biophysics in order to apply his expertise in nanotechnology and in the engineering of nanostructures to significant issues in nanobiotechnology and biomedicine. Novel imaging methods, nanostructured probes for theranostics and for the molecular-level study of biological processes are the focus of these investigations. The scope of these activities includes (i) peptide modelling, design and application for delivery, sensing and advanced-imaging applications in vitro and in vivo, (ii) organic- and inorganic-nanoparticle design and production for a number of biomedical applications, and, more recently, (iii) exploitation of aptamers for drug delivery. In these two subareas, at Scuola Normale Superiore, he successfully coordinated or participated as local coordinator in a number of European, International or Italian projects that funded his group's activity and were pivotal for the creation of Laboratorio NEST a multi-disciplinary, multi-institution nanoscience initiative established at SNS (www.laboratorionest.it, where further details on FB's activities can be found).

