



NANO COLLOQUIA 2025 - S3 SEMINAR

A personal journey through the middle earth between quantum and classical physics: gas phase synthesis and studies of nanoparticles

Thursday May 08, 2025 - 14:30

ON-SITE - S3 Seminar Room, Third Floor, Physics Building ONLINE - <u>https://tinyurl.com/NanoColloquia</u>

Speaker: Sergio D'Addato - Università di Modena e Reggio Emilia and Cnr Nano

Abstract

Gas phase synthesis of nanoparticles (NPs) has been attracting considerable attention in the scientific community due to its own characteristics that make it particularly well suited for fundamental studies [1] and of potential technological applications. Since its early developments in the 1990's, when this bottom-up, physical synthesis method was used to generate beams of clusters in ultra-high vacuum, this technology and its variants have been used for the generation of NPs. Alternative to chemical methods, physical synthesis, and in particular the use of Gas Aggregation Sources (GAS) can be single-step and ligand-free, resulting in a more accurate analysis of the NP structure and of their electronic, optical and magnetic behavior. This behavior can present quantum and classical physics characteristics at the same time. Some of our experimental activity on core@shell, metal@oxide and oxide NPs will be described, through a selection of examples encompassing some potential application in nanotechnology. First, a brief description of the main characteristics of the growth process of clusters and NPs in the GAS will be given. Successively, some relevant case studies will be shown:

- Experimental efforts to obtain magnetic stabilization in magnetic core@shell NPs by controlling their structure and morphology.
- Plasmonic NPs and their use in photovoltaic cells.
- Plasmonic NPs and their coupling with reducible oxides with possible applications in photo- and electro-catalysis.

Reference

[1] Y. Huttel (ed.) Gas Phase Synthesis of Nanoparticles. Wiley-VCH (2017)

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Host: Massimo Rontani (segreteria.s3@nano.cnr.it)



