



National Centre for Scientific Research
"Demokritos"



European School of Antennas 2016

"ADVANCED MATERIALS FOR ANTENNAS"
(LBORO-NCSR) ATHENS, June 20-24 2016

Organizers:

Professor Yiannis Vardaxoglou, Loughborough University (LBORO),
Dr. Antonis Alexandridis, National Centre for Scientific Research "Demokritos" (NCSR)

The huge growth and evolution of wireless communications increases the need for the development of innovative antennas with advanced characteristics. The extensive use of wireless terminals demands antennas with smaller dimensions and enhanced radiation performance. There is a strong need for the development of innovative reconfigurable antennas that are able to change and adapt accordingly some of their operating characteristics. Towards that direction, a significant research activity is being evolved which is related to the composition or the structure of innovative materials (chemical compounds, mixtures or metamaterials) with suitably selected properties which, when incorporated into the development of an antenna, can drastically improve its characteristics (e.g. antenna miniaturization, tuning frequency and polarization reconfigurability).

A key of this course is the synergy between Materials Science and Antenna Technology aiming at the optimization of the antenna functionality. During the course, the basic principles of material science will be presented for the structure and the properties of the materials used in microwave and antennas applications. There will be a number of lectures focusing on the so called "functional materials" with tunable dielectric and/or magnetic properties. In addition the theoretical background and the recent evolutions in the area of metamaterials for innovative antennas will be presented. Hands on simulations and measurements of reconfigurable antenna prototypes using magneto-dielectric materials are also planned during the course. The course also includes case studies with characterization measurements of selected materials.

Topics of the course:

- Material basics (structure and properties of materials)
- Functional materials (adjustable ϵ_r , silicon based, ferrites with adjustable μ_r and mixtures)
- Synthetic Metamaterials (nanoscale to 3D printed materials)
- Magnetodielectric materials and antenna reconfigurability (theoretical analysis and modelling)
- Case studies (hands on measurements of selected material parameters and antennas with polarisation and frequency tuning)

Learning outcomes:

Attending this course the students will gain experience in the following:

- Material and metamaterial characterization measurements and instrumentation
- Antenna design, simulation and far-field measurements
- Metamaterial design and application to antennas

Lecturers:

Prof. **Sergei Tretyakov** (Aalto University), Prof. **George Eleftheriades** (Toronto University)
Dr. **Michalis Pissas** and Dr. **Antonis Alexandridis** (Materials and Antennas Labs of NCSR)
Dr. **Will Whittow** and Prof. **Yiannis Vardaxoglou** (LBORO)



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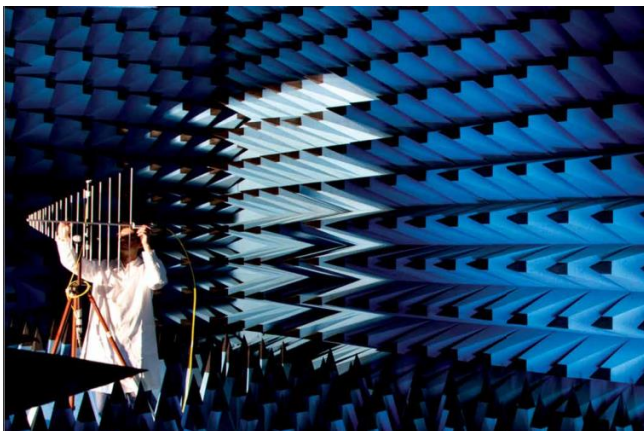
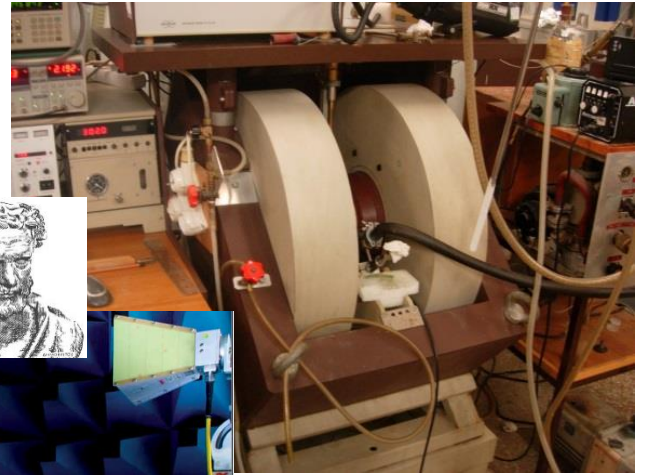


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Venue:

- The NCSR is a pleasant green campus with superb conference facilities and ideal climate in June. It is situated on the foot on Mount Hymettus in a suburb of Athens about 12km to the north from downtown Athens.
- There is easy interconnection by Metro with the Athens city centre, where there are numerous hotels overlooking the Acropolis.
- Excursions to the Acropolis and archaeological sites will be organised.



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Athens, Greece