University of Pavia
Ph.D. School in Electrical and Electronics Engineering and Computer Science
Ph.D. School in Bioengineering and Bioinformatics

SEMINAR

Modelling of the interaction between EM fields and biological system and their impact on biomedical applications

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Abstract: The attention to the effects of electromagnetic exposure of biological systems has induced during the last decades an important theoretical and experimental activity oriented to understand the interaction mechanisms between fields and tissues. The research activity is focused on the action of the field on the tissue components and on the possibility of modifying cellular behaviours. An effect at biological level is defined not thermal (or specific) if it is not directly associated to a temperature change, but to a different modification of the biological subsystem involved. The induced movements of electrical charges inside the tissues can act, for example, on the cells, that show by themselves an electrical activity. This action, well known to the scientific community from the Galvani and Volta experiments, can induce harmful effects, but, on the contrary, is widely used in electro-medical systems for diagnostic (ECG, EEG, ….) or therapeutic (e.g., pacemaker and defibrillator, DBS) applications. The seminar, using a multilevel scientific approach, evaluates some of the proposed models and their implications, not only looking at the safety standards, but also at the emerging biomedical applications.

Bio: Guglielmo D'Inzeo received the degree as Electronic Engineer at the University of Rome in 1975. In 1976 he joined the Department of Electronics at the same University with a fellowship from the National Research Council (CNR). His research activities have been concerned with active and passive microwaves components' design and with bioelectromagnetism. In the bioelectromagnetic area his fields of interest are the interaction of electromagnetic fields with biological tissues, the effects of microwaves and ELF fields on biological samples and humans, and the modelling of the interaction mechanisms. He is author or co-author of more than seventy papers on international refereed journals and books. From 1997 to 2006 he was Chairman of the Electronic Engineering Department at "La Sapienza" University.

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Seminar in English

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