Πανεπιστήμιο Κύπρου
University of Cyprus

School of Engineering
Department of Electrical and Computer Engineering

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Department of Electrical and Computer Engineering

Title: «*Approaches to the closest vector problem in MIMO detection*»

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Room KENTP. - A008, Old Campus
University of Cyprus

Abstract:
This talk provides an overview of one of the central problems in communication engineering in the last dozen years, whose solution allows us now to reach the 1 Gbps frontier in wireless systems such as LTE Advanced and WiMax.
The gains achieved by using multiple-input multiple output (MIMO) transmission links come at the expense of a much higher algorithmic complexity at the receiver side. The underlying detection problem is the closest vector problem (CVP) in a lattice. The talk will describe several approximate and exact solutions to CVP, emphasising the geometric manipulation of lattices that is carried out by the most relevant algorithms (maximum likelihood detection, zero-forcing, minimum mean square error, successive detection, sphere decoding and lattice reduction). A novel approach to the problem (by Monteiro and Kschischang) will also be presented, which maps the problem onto a graph-based path-minimisation problem.

Biography:
Francisco Monteiro obtained the PhD in Engineering at the University of Cambridge (in the Computer Laboratory), UK, in 2011, the ECE degree from Instituto Superior Técnico (IST), Technical University of Lisbon, and a Masters in EEC degree also from IST in 2003. He has been awarded two best paper awards at IEEE conferences (in 2004 and in 2007) and a Innovation Young Engineer Prize (3rd place) from the Portuguese Engineers Institution in 2002. During his PhD he also spent 4 months as a visiting scholar at the ECE department of the University of Toronto, Canada, sponsored by the Royal Academy of Engineering, by the Gulbenkian Foundation, by Fitzwilliam College (Cambridge), and by the Cambridge Philosophical Society. In the past he was a teaching assistant at the ECE department of IST and presently he is a tenure-track Assistant Professor at the Department of Information Science and Technology at ISCTE-University Institute of Lisbon and a researcher in the Radio Systems Group of the *Instituto de Telecomunicações*. Francisco is keen in public understanding of science and is a member of several societies promoting those objectives. He co-edited the book "MIMO Processing for 4G and Beyond: Fundamentals and Evolution", to be published by CRC Press / Taylor & Francis Group in May 2014.