Future of microelectronics-microelectronics of the future

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The miniaturization of electronic components has brought the feature size of devices into the nanometer domain. Microelectronics has merged smoothly into nanoelectronics, and nanoelectronic technologies are now expected to provide the basis for continued scaling of Moore's law into the next decade. Parallel to such "evolutionary" path, new phenomena have emerged, new materials and structures have been obtained that could lead to devices and circuits alternative to the currently dominating CMOS. In this presentation, an overview will be given of the underlying physics and fabrication issues of various nanoelectronic technologies, their current state of the art, and their perspectives for future applications. From the material point of view, molecular systems will be discussed for their use in organic electronics and optoelectronics, as well as single-molecule electron device. Looking at semiconducting nanostructures, the role and performance of nanowire/nanotube transistors will be analyzed. On the circuit/architecture level, we will show how direct physical (electrical or magnetic) interactions between neighbouring nanodevices can provide local interconnectivity and open new ways for the realization of logic gates.

Prof. Dr. Paolo Lugli

Paolo Lugli graduated in Physics at the University of Modena, Italy, in 1979. In 1981 he joined Colorado State University, Fort Collins, CO, where he received his Master of Science in 1982 and his Ph.D. in 1985, both in Electrical Engineering. In 1985 he joined the Physics Department of the University of Modena as Research Associate. From 1988 to 1993 he was Associate Professor of ``Solid State Physics'' at the ``Engineering Faculty'' of the 2nd University of Rome ``Tor Vergata''. In 1993 he was appointed as Full Professor of ``Optoelectronics'' at the same University. In 2003 he joined the Technical University of Munich were he was appointed head of the newly created Institute for Nanoelectronics.

His current research interests involve the modeling, fabrication and characterization of organic devices for electronics and optoelectronics applications, the design of organic circuits, the numerical simulation of microwave semiconductor devices, and the theoretical study of transport processes in nanostructures. He is author of more than 250 scientific papers and co-author of the books "The Monte Carlo Modelling for Semiconductor Device Simulations" (Springer, 1989) and “High Speed Optical Communications“ (Kluver Academic, 1999). In 2004, he served as General Chairman of the IEEE International Conference on Nanotechnology held in Munich.

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