Tutorial
on

Combined Effects of Ionizing Radiation and Electromagnetic Interference on Integrated Circuits and Systems

Monday 29 October at 13.00-17.00

Abstract:

Technology scaling, which made electronics accessible and affordable for almost everyone on the globe, has advanced IC and electronics since sixties. Nevertheless, it is well recognized that such scaling has introduced new (and major) reliability challenges to the semiconductor industry. This tutorial addresses the background mechanisms impacting reliability of very deep submicron (VDSM) integrated circuits (ICs). Issues like ionizing radiation (Total-Ionizing Dose: TID and Single-Event Effects: SEEs) and electromagnetic interference (EMI) are presented and their combined effects on the reliability of modern ICs is discussed. Reliability failure mechanisms for radiation, the way they are modeled and how they are impacting IC lifetime will be covered. Laboratory test setup and recent results from experimental measurements are described. Classic design solutions to counteract with TID, SEEs and EMI in VDSM ICs are introduced. Single-event upset (SEU-) tolerant SRAM cell design based on Spice simulations are performed at the end of the tutorial.

Lecturer:

Fabian Vargas is graduated in Electrical Engineering from the Pontifícia Universidade Católica do Rio Grande do Sul (1988), MSc. in Computer Science from the Universidade Federal do Rio Grande do Sul (1991) and PhD. in Microelectronics from the Institut National Polytechnique de Grenoble (1995). F. Vargas has experience in Computer Science, focusing on Computer Systems Architecture, acting on the following topics: fault-tolerant systems design for critical applications, design of on-chip sensors for reliability insurance, design for electromagnetic/radiation tolerance and on-line testing. Prof. Vargas is an IEEE Senior Member and a Golden Core Member of the IEEE Computer Society since 2003.