University of Pavia

Ph.D. School of Electrical and Electronics Engineering and Computer Science
Ph.D. School in Microelectronics

Dynamic compression of the signal in charge sensitive amplifiers

Massimo Manghisoni
Università degli Studi di Bergamo, Italy

December 21st 2018, 16:40
Aula Seminari ex-Dipartimento di Elettronica, Piano D

Abstract: Since many years, Charge Sensitive Amplifiers have been used extensively in reading out capacitive sensors such as particle and X-ray detectors. In a front-end system, the amplifier is followed by a shaping stage and a further processor. For those applications in which charge information must be retained, the signal at the output of the front-end is digitized. The resolution of this system is limited by the noise of the preamplifier and by the number of bits of the ADC. In applications where a high resolution is required, suitable noise performance must be implemented in the preamplifier. On the other hand, such a high resolution cannot be preserved over the entire input signal range. The solution typically adopted consists of providing the system with a non-linear characteristic. The way in which this is achieved is not trivial. A solution based on the non-linear features of a MOS capacitor in the feedback of a charge amplifier has been investigated. Two analog readout channels have been designed. One, suitable for the readout of pixel detectors at the XFEL experiments, has been integrated in a 65 nm CMOS technology, the other one, conceived for the readout of Si-Li strip detectors, has been integrated in a 180 nm technology and will be used in the frame of the GAPS experiment to search for Dark Matter.

Bio: Massimo Manghisoni is an Associate Professor of Electronics at the University of Bergamo, Italy. His research activity has been mainly directed towards the design of analog front-end electronics for semiconductor radiation detector readout, of the development of instrumentation for the characterization of microelectronic devices and circuits, of the study of the impact of CMOS process scaling and ionizing radiation effects on the static and noise performance of microelectronic devices. Since 2000, Massimo Manghisoni has been working in several projects funded by the INFN and by the Italian Ministry for Education, University and Research. Presently, his research activity is focused on the design of analog front-end electronics for imaging application at FEL facilities and for astroparticle physics application for dark matter detection. Massimo Manghisoni is author or coauthor of more than 200 papers on international scientific journals and conference proceedings.

Organizer

Prof. Lodovico Ratti

Ph.D. Coordinators

Proff. Torelli and Di Barba

The seminar will take place in English
For more information: lodovico.ratti@unipv.it