- **Latest experimental results from 3D device characterization**

Several research groups are working on the development of prototypes of vertically integrated ICs and monolithic sensors. The workshop offers the opportunity to show the first experimental results from 3D device characterization.

- **Implications for system integration (cooling, mechanics, etc.)**

Use of 3D processes for pixel detectors may pose some specific challenges to the design and integration of the overall detection system.

- **CAD tools for 3D IC design**

Design of vertically integrated circuits and sensors requires the development of new tools or the modification and adaptation of the existing ones.

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Dates
from 22 April 2010 09:00
to 24 April 2010 18:00

Location
Collegio Riboldi Auditorium
Chiesa dei Santi Giacomo e Filippo
Via Luigi Porta, 4, I-27100 Pavia

http://eil.unipv.it/MaKaC/conferenceDisplay.py?confId=0

Università degli Studi di Pavia
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VIPS 2010

Workshop on Vertically Integrated Pixel Sensors

22-24 April

Scientific Programme
VIPS 2010

Vertical integration (3D for short) processes and vertical interconnect techniques are being explored by industry for several applications, such as memories, pixel sensor arrays, microprocessors and FPGAs. They are deemed capable to make up for some important performance limitation facing CMOS feature size scaling. Digital circuits, in particular, may greatly benefit from interconnect length reduction both in terms of power dissipation and logical span of control. In the case of a heterogeneous integration approach, separate parts of the design can be manufactured using the process that best suits its specific needs, then assembled in a vertical stack. In general, the 3D approach enables the design of low mass, high density circuits with the possibility of isolating the various building blocks, for instance analog from digital parts. The workshop aims to bring together physicists and engineers working on the development of vertically integrated pixel sensors. Particular attention is paid to detector design for high energy physics (HEP) experiments at the future high luminosity colliders and for photon science applications. The main purpose of the workshop is to provide a place for the people working in the field to exchange ideas and share knowledge, and to make the community aware of the different options available to access vertical integration technologies. The main topics of the workshop are listed in the following.

- **Vertical integration processes and interconnect techniques**

Different 3D processes and methods for vertical interconnections are available through research laboratories and commercial foundries. They may provide solutions for particular requirements of different applications.

- **Homogeneous CMOS 3D Ics**

Interconnection techniques are available to vertically integrate bulk CMOS layers. They are widespread in the microelectronic industry and may provide a high yield solution for 3D front-end electronics and monolithic sensors.

- **Heterogeneous 3D Ics**

The different parts of the detector (front-end, sensing electrode) can be manufactured using the process that best suits its specific needs, then assembled in a vertical stack.

- **SOI pixel detectors**

Silicon on insulator CMOS processes is a natural choice for the design of 3D monolithic detectors, where the front-end electronics is integrated in the device layer while the sensing medium is provided by the supporting silicon layer beneath the buried oxide.

- **Monolithic active pixel sensors**

Vertical integration of CMOS wafers can be exploited for the development of a new class of three dimensional monolithic active pixel sensors (MAPS).

- **Front-end electronics and signal processing**

The use of vertical integration processes allows the IC designer to increase the front-end complexity, to include new functions and implement new signal processing techniques in the detector readout.

- **Pixels for future high luminosity colliders**

3D integration technologies may satisfy the requirements (high granularity, low mass, high speed) set by the experiments at the future high luminosity colliders, such as the ILC, the SuperB Factory and the SLHC.

- **Photon detection and imaging**

Scientific instrumentation for application in biology, biochemistry and material analysis may greatly benefit from the use of 3D technologies to design fast, high resolution imagers.

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