

2nd International Summer School on: Intelligent signal processing for FrontiEr Research and Industry OUTLINE PROGRAMME

This programme is being updated with full details of the speakers and classes in the next coming weeks.

Outline of parallel sessions (in preparation: soon available stay tuned)

July 14: Bastille Day (National Day in France)

Afternoon/Evening registration & posters installation

in the Entrance Hall of the Physics department, Building Condorcet

Outreach: Poster exhibition with posters from both Academia and Industry will be installed for the whole duration of the School in the Entrance Hall of the Physics Department, Building Condorcet.

July 15: Introduction to Signal Processing in Astrophysics, Medical Physics and Particle Physics

A set of introductory lectures will review why increased signal processing on-detector (local intelligence) capability is requested for the instruments that are developed for future frontier projects in Astrophysics, Particle Physics and for Next generation Medical Imaging devices.

WELCOME COCKTAIL PARTY: at the BioPark Coffee Break Area

July 16: Introduction session on Advanced Very Deep Sub Micron CMOS technologies, 3D technologies and Industry trends

Intelligent devices as those reviewed in the previous day lectures need compact and closely integrated Front-End processing. The micro-electronic engineers are thus challenged to use cutting-edge Very Deep Sub Micron (VDSM) technology and novel integration techniques for designing this new generation of Front-End circuits, both for the fundamental research and many areas in the applied life. This is a very exciting and fast evolving technology field, tackled by this session that will also show how high tech and Fundamental Physics Research are closely linked here.

PUBLIC LECTURE: Place in Paris to be announced (8-10pm)

The Higgs Boson and the Two Infinities -- Le Boson de Higgs et les Deux Infinis
This Public Event will be given in english by Michel SPIRO, Physicist, Conseiller Scientifique au Commissariat a l'Energie Atomique, Former President of CERN Council as well as Professor at the Ecole Polytechnique.

July 17: Intelligent Front-End Processing for calorimeters

Intelligent calorimeters are the first application that will illustrate what has been discussed in the lectures given on July 16. How it is requested by Fundamental research in High Energy Astrophysics or the upgrades of the LHC for instance is

described in these lectures. They cover the high processing capability introduced on the Front-End ASIC that sits on the detectors; how the new technology allows confronting very difficult environmental conditions (no-accessibility in space or deep-underground, high radiation levels, extreme reliability requirements etc.); real time sophisticated filtering and triggering architectures.

July 18: Intelligent Front-End Processing for tracking devices

Intelligent tracking devices are the second application in this school of what the two first day lectures. It will address the cases of large area tracking devices built with Silicon strips or strixels (short strips) and with Scintillating Fibers read out by SiPMs as developed for instance in High Energy Astrophysics Experiments or for HL-LHC (ex: LHCb upgrade). The Physics motivations and related performance needs requesting such high tech devices will be discussed together with the use of the high technologies aspects reviewed Day 2, including novel real time triggering capability.

July 19: Intelligent Pixel-based devices

Intelligent Pixel-based devices are more and more widely used in both research and applied life. They greatly benefit of the advances in the semi-conductor technology and in advanced micro-electronics CMOS technology as introduced in the second day lectures. The lectures will show with some detailed examples how by combining these technologies, the pixels are becoming more and more intelligent devices of great use for challenging applications in Astrophysics, Particle Physics as well as Novel Medical Imaging.

July 20: FREE DAY => let's enjoy Paris and surroundings in the summertime

July 21: Data transmission challenges, new trends in Telecom ; the interconnected worlds

In most of today real life applications and Fundamental research fields, the high speed, high rate and highly reliable data transmission is a major request. Telecom Industry is evolving very fast and some trends particularly appealing of this R&D field is reviewed here such as Optical Wireless Communication, new Photonics related trends. This day set of lectures will start with an introductory lecture that will set the main parameters and goals of this field.

July 22: Data transmission challenges and needs for Frontier applications in Astrophysics, HEP & Medical Imaging

Once the signal processing has been achieved by the Front-End (on detector) system the filtered and compacted data must be sent to another step of the Full processing chain. This means in most of today life or fundamental research devices: high rate, high-speed data transmission most of the time in difficult environmental conditions. To achieve this data transmission task in the requested high performance conditions, the new Telecom technologies introduced in the previous day lectures are required.

The applications to an Astrophysics case, HL-LHC (especially LHCb) and to New Medical Imaging are reviewed.

July 23: Novel Massive Parallel Computing (MPC) hardware and Software tools; new trends in MPC-related Industry

The real time, high performance, high rate high speed data processing is a demand in many fields of the modern life and thus it is a very active and fast evolving industrial field on both the hardware and software sides. Today lectures will review after an introductory lecture what are the main aspects of this topic and its novel developments and industrial trends.

SCHOOL BANQUET: in preparation

July 24: Massive Parallel Computing needs and challenges in Astrophysics, Particle Physics and Medical Imaging

The application of the previous day lectures to the needs and challenges in Astrophysics, Particle Physics and Medical Imaging will be reviewed here with special emphasis on some especially challenging cases such as the Square Kilometer Array (SKA) experiment, the HL-LHC experiments and the new requests from the Medical World.

July 25: New trends on Test bench & evaluation/characterization tools

Developing fancy and challenging on-detector circuits with a high filtering and processing potential is quite appealing. Similarly developing high performance data transmission system, sophisticated overall signal processing architecture in extreme running conditions are as well requested and exciting topics to work on. But besides developing such devices based on very advanced technology tools sometimes, it is of the utmost importance to ensure that what is developed fulfils all the requests before building the final instrument. It means developing the proper test benches using the best characterization tools. It is an essential step in the R&D process where the engineering and physicists "worlds" work in close collaboration.

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The series of Labs and computer-aided sessions as well as the dedicated master-classes on Q&A basis will complete this programme of plenary lectures given in the morning sessions and the overview lectures at the end of the Day.

The list of Labs and computer-aided classes will be soon available

Moreover two other Public Lectures are being organized during the school on the following topics:

"Industrial and Fundamental research partnership : Myth or reality ?" in preparation with Mairie de Paris and High Tech Industrial representatives

"New trends in Medicine and Advanced Technology" at Paris Descartes
University of Medicine

Very soon more details on these public events.