

# 3rd International Summer School on INtelligent Signal Processing for FrontlEr Research and Industry

Monday 14 September 2015 - Friday 25 September 2015

Hamburg



## Book of Abstracts



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**Welcome Cocktail (and Sign-Up for the Labs)**

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**Welcome**

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**Introduction to Signal Processing in Astrophysics, Medical Physics and Particle Physics / 4**

**Increasing intelligence on Astrophysics Instruments: the Gravitational Waves experiments as an example case (Part I)**

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**Introduction to Signal Processing in Astrophysics, Medical Physics and Particle Physics / 5**

**Increasing intelligence on Astrophysics Instruments: the Gravitational Waves experiments as an example case (Part II)**

**Introduction to Signal Processing in Astrophysics, Medical Physics and Particle Physics / 6**

**IMAGING TECHNOLOGY FOR TRANSLATIONAL MEDICINE**

Prof. XIE, Qingguo<sup>1</sup>

<sup>1</sup> *Huazhong University of Science and Technology, CN*

**Introduction session on Advanced Very Deep Sub Micron CMOS technologies, 3D technologies and Industry trends / 7**

## **Lecture Tittle to be announced**

**Introduction session on Advanced Very Deep Sub Micron CMOS technologies, 3D technologies and Industry trends / 8**

## **VERTICAL INTEGRATION in NEW DEVICES**

This is the first lecture dedicated to the VDSM and 3D vertical interconnects, the second one dedicated specifically to the VDSM technology will be given on September 23, by G. Deptuch (FNAL)

**Intelligent Front-End Processing on Instruments / 9**

## **New Calorimetry techniques and Intelligent Signal Processing: FRONT-END ELECTRONICS in IMAGING CALORIMETRY**

**Intelligent Front-End Processing on Instruments / 10**

## **Signal Processing on Detectors filled with Noble Gas: The Direct search for Dark Matter and Long Baseline Neutrino experiments**

**Corresponding Author(s):** marc.schumann@lhep.unibe.ch

The focus is on the experiments using Noble gases.

**Intelligent Front-End Processing on Instruments (cont'd) / 11**

## **On-detector High Signal Processing for next generation HEP trackers : TRACK TRIGGERING, NO**

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**Corresponding Author(s):** paula.collins@cern.ch

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## **PROCESSING the SIGNALS from PIXEL DETECTORS in X-RAY IMAGING at FELs**

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## **Signal Processing for Gravitational Waves Experiments**



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**TECHNOLOGICAL CHALLENGES for REALTIME PROCESSING of PIXEL INFORMATION**

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**Large tracking detectors for the HL-LHC with novel trigger systems - ATLAS case**

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Data transmission challenges, new trends in Telecom ; the interconnected worlds / 17

**RECENT ADVANCES in SILICON PHOTONICS - part 1**

VIVIEN, Laurent<sup>1</sup>

<sup>1</sup> *Institut d'Electronique Fondamentale - CNRS, Si photonics, University of Paris Sud, FR*

Data transmission challenges, new trends in Telecom ; the interconnected worlds / 18

**RECENT ADVANCES in SILICON PHOTONICS - part 2**

Data transmission challenges and needs for Frontier applications in Astrophysics and Particle Physics / 19

**DATAFLOW: current and future data-transmission applications in the data-acquisition systems at the LHC**

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Data transmission challenges and needs for Frontier applications in Astrophysics and Particle Physics / 20

**DATA TRANSMISSION CHALLENGES & NEEDS for FRONTIER TELECOM APPLICATIONS in MEDICAL IMAGING**

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**Massive Parallel and High Performance Computing (MPC-HPC) / 22**

**HIGH PERFORMANCE and MASSIVE PARALLEL COMPUTING needs and challenges for Astrophysics: the gravitational waves experiments case**

**Corresponding Author(s):** badri.badrikrishnan@gmail.com

**Massive Parallel and High Performance Computing (MPC-HPC) / 23**

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**New Test Bench and Demonstrators developed for Future Experiments/Projects (cont'd) / 26**

**Test systems in HEP: Lab-based test benches and test beams**

**Corresponding Author(s):** hendrik.jansen@desy.de

**New Test Bench and Demonstrators developed for Future Experiments/Projects (cont'd) / 27**

**EXAMPLES of SPECIFIC TEST SYSTEMS For ASTRO-PHYSICS**

**New Test Bench and Demonstrators developed for Future Experiments/Projects (cont'd) / 28**

**Medical Imaging Applications and Demonstrators: Chal-**

## **Challenges in PET Imaging**

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<sup>1</sup> *University Carlos III, Madrid*

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## **DISCUSSION SESSION**

Focus will be on the lectures given on September 15 and 16.

**Discussion/Public Lecture / 42**

## **COLLOQUIUM on LOOKING FOR THE DARK MATTER HIDING IN THE UNIVERSE**

**Corresponding Author(s):** tobias.haas@xfel.eu

**Discussion/Public Lecture / 43**

## **DISCUSSION SESSION**

Focus on the Lectures given on September 17 and 18.

**Discussion/Public Lecture / 44**

## **Discussion session**

Focus on the saturday morning lectures; as for the other discussion sessions of the school the attendance is free.

**Discussion/Public Lecture / 45**

## **COLLOQUIUM on THE EUROPEAN X-RAY LASER PROJECT XFEL: scientific and industrial impacts and perspectives**

**Corresponding Author(s):** harald.sinn@desy.de

**Discussion/Public Lecture / 46**

## **INSTRUMENTATION ..... THE GREAT ENABLER**

(Lecture moved from the first day)

**Discussion/Public Lecture / 47**

## **COLLOQUIUM on FUTURE COLLIDERS**

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## **Registration**

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## **The LISA PATHFINDER**

**Massive Parallel and High Performance Computing / 50**

## **New challenges and Needs on Massive Parallel and High Performance Computing (cont'd): the New Particle Physics Experiments case**

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## **PARTICLE DETECTORS as MONITORS for CANCER THERAPY**

**Corresponding Author(s):** riccardo.faccini@roma1.infn.it

**New Test Bench and Demonstrators developed for Future Experiments/Projects (cont'd) / 55**

## **PARTICLE DETECTORS as MONITORS for CANCER THERAPY**

**Corresponding Author(s):** riccardo.faccini@roma1.infn.it

**Introduction session on Advanced Very Deep Sub Micron CMOS technologies, 3D technologies and Industry trends / 57**

## **VDSM...HOW DEEP ? : benefits and limitations**

Note that due to Lecturer's time constraint this lecture has been moved of date and time.

Massive Parallel and High Performance Computing (MPC-HPC) / 61

## **Introductory Tutorial To New Automata Processors, Part1**

This Tutorial serves as introduction to the Lab sessions initiating to this new type of processors.

Massive Parallel and High Performance Computing (MPC-HPC) / 62

## **Introductory Tutorial To New Automata Processors, Part 2**

This Tutorial serves as introduction to the Lab sessions initiating to this new type of processors.

Massive Parallel and High Performance Computing / 66

## **PET & PET IMAGE RECONSTRUCTION**

SPECIAL POSTER SESSION / 67

### **Development of a Data Compressor for the CMS Phase II Pixel Detector**

Corresponding Author(s): [stamatios.poulios@pi.infn.it](mailto:stamatios.poulios@pi.infn.it)

SPECIAL POSTER SESSION / 68

### **Development of Coincidence Sorter and Communication Protocol between the Boards on PET System**

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SPECIAL POSTER SESSION / 69

### **The Use of Gold Nanoparticles and Spectroscopic Detectors in Contrast-enhanced Digital Mammography**

Corresponding Author(s): [l.dummott@surrey.ac.uk](mailto:l.dummott@surrey.ac.uk)

SPECIAL POSTER SESSION / 70

### **Circuit Data Flow (CIDAF): A generic, flexible, discrete-time simulator**

Corresponding Author(s): [luigi.calligaris@stfc.ac.uk](mailto:luigi.calligaris@stfc.ac.uk)

SPECIAL POSTER SESSION / 71

### **Microwave Kinetic Inductance Detectors for Astronomy**

**SPECIAL POSTER SESSION / 72**

**Multi-Grid High Gas Proportional Scintillation Counter: A New Approach**

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**SPECIAL POSTER SESSION / 73**

**Development of an Intelligent Platform Management Controller for the Pulsar IIB**

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**SPECIAL POSTER SESSION / 74**

**Data Sourcing Firmware for CMS L1 Tracking Trigger**

Corresponding Author(s): tcpaiva@umass.edu

**SPECIAL POSTER SESSION / 75**

**Simulations, Testing and Results for the Pixelization of LYSO Crystals for Gamma Detectors Using the Sub-Surface Laser Engraving Techniques**

**SPECIAL POSTER SESSION / 76**

**Integration of the Camera Backplane of the Gamma Cherenkov Telescope for the Cherenkov Telescope Array**

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**SPECIAL POSTER SESSION / 77**

**Search for Narrow High Mass Resonances Decaying to Z and Higgs Bosons**

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**SPECIAL POSTER SESSION / 78**

**Simulation of a Silicon Sensor Edge-on Illuminated with an X-Ray Beam**

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**SPECIAL POSTER SESSION / 79**

## **SiPM-MAROC gamma-camera prototype with Monolithic NaI(Tl) scintillator**

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SPECIAL POSTER SESSION / 80

## **2.5Gb/s Optical Wireless Communication System for Particle Detectors in High Energy Physics**

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SPECIAL POSTER SESSION / 81

## **Light Weight Radiation Sensors**

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## **Muon Tomography**

Corresponding Author(s): chiara.giroletti@bristol.ac.uk

SPECIAL POSTER SESSION / 83

## **Edge Studies on Sensors for the LHCb VELO Upgrade**

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SPECIAL POSTER SESSION / 84

## **LHCb VELO Upgrade**

Corresponding Author(s): emma.buchanan@bristol.ac.uk

SPECIAL POSTER SESSION / 85

## **A Pattern Recognition Mezzanine Based on Associative Memory FPGA Technology for L1 Track Triggering at HL-LHC**

Corresponding Author(s): giacomo.fedi@pi.infn.it

SPECIAL POSTER SESSION / 86

## **NEXT: The Front-End Electronics for the 1.8-kchannel SiPM Tracking Plane in the NEW Detector**

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**SPECIAL POSTER SESSION / 87**

**Demonstrator Plans for FPGA-Based L1 Track-Finding with Hough Transform**

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**SPECIAL POSTER SESSION / 88**

**Development of Novel Pixel Sensors based on 3D CMOS Technology for Tracking Devices**

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