



The Abdus Salam

**International Centre
for Theoretical Physics**

Advanced Workshop on FPGA-based Systems-On-Chip for Scientific Instrumentation and Reconfigurable Computing

**26 Nov 2018 - 07 Dec 2017
ICTP**

**Venue: Giambiagi Lecture Hall (AGH)
Informatics Laboratory (AGH)**

**Organizers: Andres Cicuttin (ICTP)
Maria Liz Crespo (ICTP)**

**Nizar Abdalah (Microsemi Corp., USA)
Pirouz Bazargan Sabet (Lip6, France)
Stefano Levorato (INFN Trieste, Italy)**



Typical Daily Program (9:00 – 18:30)

Timetable	
9:00 - 10:00	lecture
10:00 - 10:30	coffee-break
10:30 - 12:30	lecture
12:30 - 14:00	lunch
14:00 - 16:00	lecture / lab tutorial
16:00 - 16:30	coffee-break
16:30 - 18:30	hands-on

Secretariat: Federica Delconte (ICTP), smr3249@ictp.it



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Faculty

Lecturers, Speakers, Lab Assistants:

- **Cristian Sisterna**, UNSJ, Argentina
- **Fulvio Tessarotto**, INFN, Italy
- **Igor Knonorov**, TUM, Germany
- **Florent De Dinechin**, INSA, France
- **Fernando Rincon Calle**, UCLM, Spain
- **José Antonio De La Torre Las Heras**, UCLM, Spain
- **Marco Santambrogio**, PoliMi, Italy
- **Carlos Sosa Paez**, UNSL, Argentina
- **Romina Molina**, UNSL, Argentina
- **Kasun S. Mannatunga**, ICTP
- **Rodrigo Melo**, INTI, Argentina
- **Garcia Ordoñez Luis**, ICTP
- **Bruno Valinoti**, INTI, Argentina

Hands-On

Cristian Sisterna

FPGA-based Systems-On-Chip Technology: Hardware and Software

- Lab activities:

Vivado IDE 2018.2

Zynq-7 family SoC

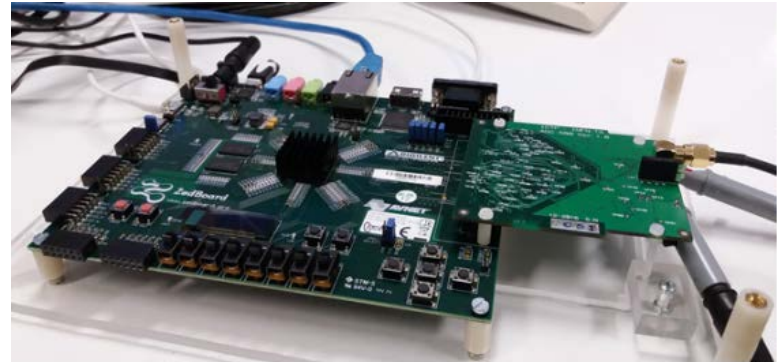
ZedBoard development kit

- Lab tutorials:

Carlos Sosa Paez

Romina Molina

Rodrigo Melo





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Hands-On

Fernando Rincon Calle

- FreeRTOS operating system for SoC
- TCP/IP communication with FreeRTOS
- High Level Synthesis (HLS)
- HLS and IDE Integration

José Antonio De La Torre

- Python fundamentals
- PyQT for Graphical User Interface (GUI) Development



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Hands-On

- Reconfigurable Virtual Instrumentation (RVI) based on SoC
- The RVI communication block (CommBlock)
- Data transfer characterization in Zynq devices
- How to access the RVI CommBlock from a PC

**Andres Cicuttin,
Kasun S. Mannatunga
Rodrigo Melo
Bruno Valinoti
Luis Garcia Ordoñez**



Nuclear Instrumentation

- Fundamentals of Particle Detectors

Fulvio Tessarotto

- A Single Photon Detector System Based on Micropattern Gaseous Electron Multiplier
- Thick-GEM based Particle Detector System: from Signal Generation to Data Acquisition and Processing
- A data acquisition and processing system based on SoC for particle detectors

Stefano Levorato, Luis Garcia Ordoñez

- Front-Ends and DAQ for Particle Physics experiments
- The new generation of Intelligent FPGA based DAQ architectures

Igor Knonorov



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Scientific Computing

- Selected topics in digital design for FPGA
- Digital arithmetic and numerical representations
- Floating point operators: Square Root and Division

Pirouz Bazargan Sabet

- FPGAs computing just right thanks to application-specific arithmetic
- The FloPoCo arithmetic core generator

Florent De Dinechin

- From FPGA-based Reconfigurable Systems to Autonomic Heterogeneous Computing Systems

Marco Santambrogio



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From a Hi-Tech Company

- The Era of All Programmable SoC: challenges for instrumentation and supercomputing
- SoC FPGA Design Verification and Timing Concepts
- The RISK V architecture

Nizar Abdallah

Then...

- Academic writing skills for research journal article

Mamun Bin Ibne Reaz



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Workshop Webpage

- <http://indico.ictp.it/event/8342/overview>
- Welcome reception (Thursday 29 at 19:00, AGH Cafeteria)
- Group Picture (Tuesday 4 at 14:00)



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ICTP Programmes

- <https://www.ictp.it/programmes.aspx>
- **ICTP fellowships**
 - Sandwich Training Educational Programme (STEP) for PhD students
<https://www.ictp.it/programmes/step.aspx>
 - Training and Research in Italian Laboratories (TRIL at the MLAB)
<https://www.ictp.it/tril.aspx>
- **Associates and Federated Institutes**
 - https://www.ictp.it/programmes/career-development.aspx#anchor_1159



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Scientific Calendar

- <https://www.ictp.it/scientific-calendar.aspx>
- **Want to propose a conference, school or workshop?**
 - <https://www.ictp.it/call-for-proposals.aspx>
- **2019**
 - Advanced Workshop on Modern FPGA Based Technology for Scientific Computing
<http://indico.ictp.it/event/8680/>
 - Regional School and Conference on Fully-Programmable Systems-On-Chip for Scientific Instrumentation (Gauhati University, India)
<http://indico.ictp.it/event/8733/>