



The Abdus Salam  
**International Centre  
for Theoretical Physics**



**IAEA**  
International Atomic Energy Agency

**WELCOME to the**

**Joint ICTP-IAEA School on Systems-on-Chip based on FPGA for  
Scientific Instrumentation and Reconfigurable Computing**

**20 November – 01 December, 2023**

**ICTP Organizers**

**Maria Liz CRESPO**

**Andres CICUTTIN**

**IAEA Organizers**

**Kalliopi KANAKI**

**Mladen BOGOBAC**



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## SCHOOL PROGRAMME

- The School is held at the ICTP AGH:
  - Informatics Lab and Kastler Lecture Hall (first week)
  - Informatics Lab and Giambiagi Lecture Hall (second week)
- School website: <https://indico.ictp.it/event/10225/>
- [Detailed schedule](#) can be consulted at the school website
- School's email (secretariat): [smr3891@ictp.it](mailto:smr3891@ictp.it)



## SCHOOL PROGRAMME

- Typical daily timetable (9:00 – 18:30):

Timetable	
9:00 - 10:00	lectures
10:00 - 10:30	coffee-break
10:30 - 12:30	lectures
12:30 - 14:00	lunch
14:00 - 16:00	lectures / lab activities
16:00 - 16:30	coffee-break
16:30 - 18:30	lab activities

- Wednesday, 22 November 2023, 19:00: *Welcome Reception (AGH)*



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## PARTICIPANTS

- Requests for participation: 207 applicants from 48 different countries
- **Selected: 44 participants from 26 different countries**

Algeria

Argentina

Bangladesh

Brazil

Cameroon

Colombia

Cuba

Ecuador

El Salvador

Guatemala

Honduras

India

Indonesia

Iran

Malaysia

Mexico

Nigeria

Pakistan

Peru

Romania

Russia

Sudan

Tunisia

Turkey

Uruguay

Venezuela



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## **FACULTY**

**SISTERNA Cristian (Argentina)**

**RINCON CALLE Fernando (Spain)**

**RONGEN Heinz (Germany)**

**VALCARENGHI Luca (Italy)**

**CASTOLDI Piero (Italy)**

**DUPONT DE DINECHIN Florent (France)**

**REAZ Mamun Bin Ibne (Bangladesh)**

**HALL-WILTON Richard John (Sweden)**

**JOVALEKIC Nikola (Netherlands)**



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## **FACULTY**

**BALLINA ESCOBAR Maynor (Guatemala)**

**FLORIAN SAMAYOA Werner (Guatemala)**

**GARCIA ORDOÑEZ Luis (Guatemala)**

**MOLINA Romina (Argentina)**

**MORALES ARGUETA Ivan (Guatemala)**

**SILVA Agustin (Argentina)**

**VALINOTI Bruno (Argentina)**



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## **Topics**

**FPGA and System-on-Chip (SoC) technology**

**SoC Architecture and Design Methodology**

**C for Embedded Systems**

**VHDL (Hardware Description Language)**

**High Level Synthesis (HLS)**

**Real Time Operating System (FreeRTOS)**

**The FloPoCo arithmetic core generator**

**Reconfigurable Virtual Instrumentation (RVI) based on SoC-FPGA**



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## **Topics**

**FPGA for Accelerating Machine Learning Algorithms**

**Programmable Hardware Acceleration in Communications Networks**

**Handling High Data Rates in Data Acquisition Systems**

**Semiconductor and Quantum Detectors Developments**

**Digital Pulse Processing Techniques for Detectors**

**HyperFPGA: Experimental Infrastructure for Reconfigurable  
Supercomputing**

**Agent-based Reinforcement Learning for Quantum Computing**

**The Open Standard RISC-V Architecture**

**Academic Writing Strategy for Impacted Journal**

Maria Liz Crespo, ICTP, [mcrespo@ictp.it](mailto:mcrespo@ictp.it)

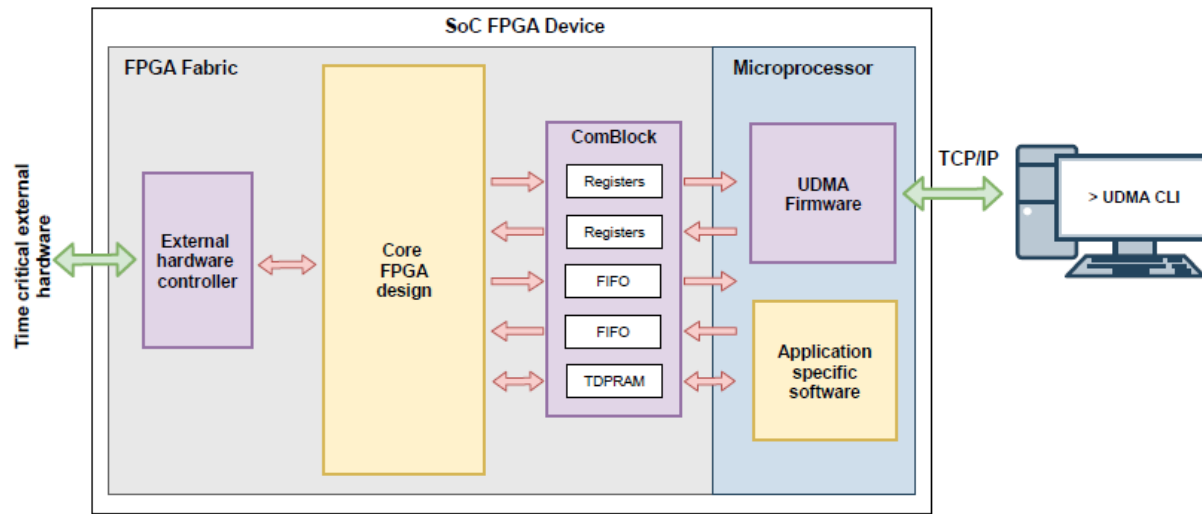


## Lab Activities

- **Virtual Machines (VM) in a Cloud Instance**
- **Vivado IDE 2022.2 (Xilinx)**
- **ZedBoard: Xilinx Zynq-7000 All-Programmable SoC**
- **GitLab link (guides for lab activities):**  
<https://gitlab.com/ictp-mlab/smr-3891/-/wikis/home>
- **Lab Tutors will assist you during the lab activities**

## Lab Activities

- **SoC-FPGA Development Framework:**



- **Projects:**

- Pulse Acquisition and Detector Characterization (SiPM)
- Digital Pulse Processing (DPP) for Isotope Identification
- DPP for X-ray Photon Detection and Energy Measurement

## Recommendations:

- 1) Be on time
- 2) Attend at least 90% of the lectures + labs to receive the Diploma
- 3) Feel free to ask questions!



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# WHAT ABOUT YOU?

NAME

COUNTRY

UNIVERSITY / INSTITUTE

AREA OF RESEARCH

INTEREST IN THE SCHOOL