

**COST ACTION IC1401**

# **Memristors: at the crossroad of Devices and Applications**

## ***Cross-Workgroup Round Table Discussion Meeting***

**March 21, 2016 – Milano (Italy)**

To date, memristor represents the latest technology breakthrough to build electronics devices with characteristics that show an intriguing resemblance to the brain's synapses. Memristor devices have been proposed as building block to achieve low-power and adaptive brain-like novel computing architectures that could outperform existing supercomputers.

The *COST ACTION IC 1401 Workshop - Memristors: at the crossroad of Devices and Applications* will be a multidisciplinary forum where researchers of different backgrounds will have the opportunity to work in unison so as to overcome barriers in the area of memristors and to grasp the latest advances in the field of memristor technology and memristive systems' applications.

The program essentially consists of two main sessions with invited keynotes focused on the State-of-the-Art in Memristor Devices and Memristor Systems for Applications (e.g. Neuromorphic Systems, Sensory platforms, Memristor-based analog and/or digital circuits, ...). Each session is followed by a series of invited short speeches aimed to address open/solved issues in matching the features of memristor devices and systems (e.g. materials, volatility/non-volatility, scalability, CMOS compatibility, reliability issues, memristor theory and simulation tools) and the desiderata in their applications (e.g. neuromorphic computing, spiking networks, digital logic, analog circuits, ...). The round table discussions permit to cross-fertilize ideas and provide insights.

### **SESSIONS**

Session 1A. **Memristors Devices: Technology, modelling and applications**

Session 1B. Open/Solved Issues in Memristor Devices & Round Table

Session 2A. **Memristor Systems: Circuits, architectures, and algorithms**

Session 2B. Open/Solved Issues in Memristor Systems & Round Table

### **Workshop Organizing Committee:**

Sabina SPIGA, CNR-IMM

Fernando CORINTO, Politecnico Torino

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[http://www.ece.ucy.ac.cy/labs/holistic\\_elab/COST\\_IC\\_1401/Pages/Workshops/Workshop\\_3/Workshop\\_3.htm](http://www.ece.ucy.ac.cy/labs/holistic_elab/COST_IC_1401/Pages/Workshops/Workshop_3/Workshop_3.htm)

**The participation to the workshop is free of charge**



COST is supported by the EU  
Framework Programme  
Horizon 2020

The workshop will be located at the CNR  
area, via Alfonso Corti 12, Milano (Italy)  
Room Sala Convegni & EXPO

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### **Programme**

**8:40 – 9:00** Registration

**9:00 - 9:10** Welcome (Sabina Spiga & Fernando Corinto & Julius Georgiou)

#### **9:10 - 10:40 Session 1A.**

### **Memristors Devices: Technology, modelling and applications**

*(25 talk + 5 min Q&A)*

**Chair: Sabina Spiga**

- 9:10 **D. Ielmini** (Politecnico di Milano, Italy)  
“Memristive device based on phase change and resistive switching”
- 9:40 **B. Dieny** (SPINTEC, CEA/Grenoble, Grenoble, FRANCE)  
“Magnetic-based memristive devices”
- 10:10 **R. Tetzlaff** (Technische Universität Dresden, Germany)  
“Systematic Design of Memristor Circuits?”

#### **10:40 – 11:00 Coffee break (Room Expo)**

#### **11:00 - 12:50. Session 1B.**

### **Open/Solved Issues in Memristor Devices & Round Table**

*(7 min. talks + 3 min Q&A)*

**Chair: Damien Deleruyelle and Rodrigo Picos**

- 11:00 **P. Fantini** (Micron, Agrate Brianza, Italy)  
“Future issues on ultracaled non-volatile memories”
- 11:10 **L. Larcher** (Università di Modena e Reggio Emilia, Italy)  
“Multiscale (from physics to circuits) modeling of RRAM devices: challenges and open issues”
- 11:20 **Alon Ascoli** (Technische Universität Dresden, Germany)  
“History erase effects in a non-volatile memristor”



- 11:30 **Stefano Brivio** (CNR-IMM, Agrate Brianza, Italy)  
*"Oxide RRAMs: can binary go analog?"*
- 11:40 **Themis Prodromakis** (University of Southampton, UK)  
*"The right tool for the right job"*
- 11:50 **Damien Querlioz** (Université Paris-Sud, Orsay, France)  
*"Magnetic-based Memristive Devices"*
- 12:00 **Salvatore Iannotta** (IMEM-CNR, Parma, Italy)  
*"Memristive materials and devices towards integrating sensing and logic"*
- 12:10 **Sandro Carrara** (EPFL - École Polytechnique Fédérale de Lausanne, Switzerland)  
*"Memristive-biosensors"*

**12:20 – 12:50 Round Table Discussion**

**Chair :** R. Tetzlaff, Themis Prodromakis, Sabina Spiga

**12:50 – 14:20 - Buffet lunch and informal discussion (Room Expo)**

**14:20-15:10 Session 2A.**

**Memristor Systems: Circuits, architectures, and algorithms**  
(25 talk + 5 min Q&A)

**Chair:** Fernando Corinto

- 14:20 **Bernabé Linares-Barranco** (CSIC, Sevilla, Spain)  
*"Memristive Neuromorphic Systems"*
- 14:50 **Shahar Kvatinsky** (Technion - Israel Institute of Technology, Israel)  
*"Breaking the Wall with Memristors"*
- 15:20 **Yusuf Leblebici** (Microelectronic Systems Laboratory, EPFL, Lausanne, Switzerland)  
*"Design and Co-integration of ReRAM elements and crossbar arrays with CMOS peripheral circuitry"*

**15:50 – 16:10 Coffee Break (Room Expo)**



**16:10- 17:40. Session 2B.**  
**Open/Solved Issues in Memristor Systems & Round Table**  
(7 min. talks + 3 min Q&A)

**Chair: Bernabé Linares-Barranco and Maciej Ogorzalek**

- 16:10 **Arne Heitmann** (EECS, RWTH Aachen, Germany)  
*“Static Variability Compensation Techniques in Nanoscaled Memristive Circuits”*
- 16:20 **Dietmar Fey** (Friedrich-Alexander-Universität Erlangen-Nürnberg -Germany)  
*“Short-, mid- and long-term perspectives of memristors for digital computing”*
- 16:30 **Motto Ros Paolo** (Politecnico di Torino, Italy)  
*“From sample-based to event-based bio-inspired systems: opportunities and challenges”*
- 16:40 **Julius Georgiou** (University of Cyprus, Nicosia, Cyprus)  
*“Nano heaters, Homeostasis and Memristors”*
- 16:50 **Mattia Frasca** (Università di Catania, Italy)  
*“Experimental Evidence of Chaos from Memristors”*
- 17:00 **Martin Klimo** (University of Zilina, Slovakia)  
*“Fuzzy logic with memristive circuits”*

**17:00 – 17:30 Round Table discussion**

**Chair:** Fernando Corinto, Maciej Ogorzalek, Sandro Carrara

**17:30 – 17:40**  
**Closing Remarks**

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