

**Ph.D. in Information Technology:
Ambrogio and Giacci Final Dissertations**

DEIB Conference Room

February 18th, 2016

2.00 pm

First Ph.D. presentation and discussion:

Stefano AMBROGIO – XXVIII Cycle

“Modeling of Reliability and Neuromorphic Application of Resistive Switching Devices”

Supervisor: Prof. **Daniele Ielmini**

Abstract:

The thesis studies resistive switching and conductive bridge devices for memory and neuromorphic applications. It focuses on physical mechanisms of resistive switching and reliability issues, in particular device variability, random telegraph noise and noise issues at both single cell and array levels, cycling endurance and degradation. All these aspects are physically modeled, allowing for a deeper understanding of the device behavior. Finally, the thesis provides novel computing approaches by employing the resistive switching device as a synapse for hardware neuromorphic networks for pattern learning and recognition.

Second Ph.D. presentation and discussion:

Federico GIACCI – XXVIII Cycle

“MEMS Gyroscopes Based on Piezoresistive Sense: a Theoretical and Experimental Analysis”

Supervisor: Prof. **Antonio Longoni** and Prof. **Giacomo Langfelder**

Abstract:

This work demonstrates for the first time the operation of miniaturized 3-axis MEMS gyroscopes based on nano-gauge (NEMS) readout. After describing the innovative device design, the focus is set on the development of board-level and integrated-circuit electronics for the system optimization and operation. This includes a flexible interface, formed by an amplitude-controlled drive oscillator and a low-noise piezoresistive sensing interface. Accurate and automated measurement setups have been developed for the operative characterization of the devices. Theoretical and experimental analyses of the performances of these new gyroscopes, compared to traditional capacitive ones, reveal high linearity response, immunity to environmental vibrations and lower achievable noise levels, down to Earth rotation rate measurement capabilities (gyrocompassing).