

QUSR 3







### CiOUS

## **CiQUS** Lecture



# Wednesday, October 23, 2024

4:30 PM - CiQUS Seminar Room

Dr. Alexandros Sarantopoulos Peter Grünberg Institute

#### Abstract

Memristive devices have been considered as very promising candidates for energy-efficient networks and neuromorphic computing architectures, due to their capabilities for analog programming and large dynamic range in resistive states. In this talk, I will present the latest advancements and obtained knowledge on the working principles of gradually switching SrTiO3-based memristive devices, and how this knowledge can be transferred to more technologically relevant systems. Direct experimental evidence of the redox processes via in-operando spectroscopy and microscopy yield quantitative results which combined with simulation modelling offer the opportunity for more accurate and predictive models for memristive devices. The understanding of the underlying mechanisms of resistive switching at the microscopic level from experiments and modelling allows for a more rational design of material stacks, tailoring their properties according to the desired application. Possible routes of tuning the operation mode of memristive devices from long term to short term memory will be discussed, focusing on how to improve the switching kinetics via thermal management of the device structure, and how the trade-offs among the relevant properties can be evaluated to obtain the most efficient design for different applications.

### Biosketch

Dr. Alexandros Sarantopoulos received his B.Sc. in Physics from the University of Patras, Greece, his M.Sc. in Applied Physics from the University Complutense of Madrid, Spain, and his Ph.D. in Materials' Science from the University of Santiago de Compostela, Spain. Since 2019, Dr. Alexandros Sarantopoulos is a postdoctoral researcher at the Peter Grünberg Institute (PGI-7) in Forschungszentrum Jülich, in the group of Prof. Dr. R. Dittmann. His expertise is on the fabrication and characterization of complex oxide thin films. His research interests focus on resistive switching, thermal transport, and the implementation of thermal management in memristive devices for performance enhancement.