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| <b>Position</b><br><b>PhD position in Science and Technology of Bio and Nanomaterials</b>    | <b>Deadline for applications</b><br>31/05/2023 |
| <b>Project title</b><br>“ <i>Topological materials for novel (opto)electronic switches</i> ” |  |
| <b>PhD Supervisors</b><br>Domenico De Fazio, Giovanni. A. Salvatore                          |  |
| <b>Location</b><br>Ca' Foscari University of Venice, Venice, Italy                           |  |

## TOPIC IN A NUTSHELL

During the last 7 decades, the miniaturization of silicon CMOS transistors has led to the development of electronic switches with increased speed and reduced power consumption and costs. As a result, electronics is nowadays ubiquitous. However, when these devices are reduced to nanoscale dimensions, they suffer from thermal dissipation phenomena that compromise their performance. To overcome these limitations, new switching mechanisms are necessary. Rather than being based on the transport of electric charge, these switches should focus on unraveling and harnessing quantum phenomena. Researchers are currently investigating "**topological**" materials that could potentially offer access to **transport phenomena without energy dissipation**, even in adverse measurement environments. The combination of electronic and spin properties has made the use of topological devices a great challenge. The focus of this research will be on analyzing **the electronic and optoelectronic properties of atomically thin compounds such as 2D materials with strong spin-orbit coupling, with the goal of integrating them into novel electronic devices**. Some of the research in this project may be performed in collaboration with the CNR-IOM in Trieste, Italy.

## TASKS

Tasks will include but will not be limited to the following:

- Synthesis of nanomaterials with techniques such as micromechanical cleavage, physical and chemical vapor deposition.
- Characterization of their fundamental properties via a variety of microscopy and spectroscopy techniques.
- Nanofabrication of devices through lithography techniques, contact and vacuum deposition and etching.
- Electronic transport and optoelectronic measurement performed on the final device.

The PhD student will also be required to spend a minimum of six months abroad in an institution TBD (possible destinations could be the University of Cambridge (UK), The Institute of Photonic Sciences (Spain) or the Swiss Federal Institute of Technology Lausanne (Switzerland).

## PREREQUISITES

- Good scientific (at least theoretical) background in the field of nanomaterials and characterization techniques.
- Basic experience in the fields of electronics and/or optoelectronics.
- Programming skills.
- Advance knowledge of the English language.

## DEADLINE FOR APPLICATION

- **The deadline for applications is on 31/05/2023.**
- More information on the application procedure can be found at this link: <https://www.unive.it/pag/43333/>

## CONTACTS

For additional information on the topic please do not hesitate to contact:

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