



# PhD in INGEGNERIA ELETTRICA / ELECTRICAL ENGINEERING - 39th cycle

**PNRR 118 TDA Research Field: DIGITAL METHODOLOGIES FOR THE REAL-TIME  
MONITORING AND CONTROL OF POWER SYSTEM SECURITY**

**Monthly net income of PhDscholarship (max 36 months)**

**€ 1400.0**

In case of a change of the welfare rates during the three-year period, the amount could be modified.

## Context of the research activity

**Motivation and objectives of the research  
in this field**

The research has the goal of applying digital techniques to improve the monitoring and control of power system security.

This goal is in agreement with the general and particular goals of DM 118 as it tends to the promotion of research activities strictly related to the goals of PNRR. The activities within this PhD program are related to Mission 2 “Green revolution and ecologic transition”, dealing with large infrastructures (the transmission grid) and to the renewable integration (Mission M2C2).

**Methods and techniques that will be  
developed and used to carry out the  
research**

Relevant methods and techniques are derived from the data-driven engineering tools developed in the last years by mathematicians, based on the reduction techniques like Singular Value Decomposition, Dynamic Mode Decomposition and similar methods. Some tools are already available at the Italian Transmission System Operator (Terna SpA) Control centre, and they are assumed to be further developed to include more accurate evaluations and control actions on electromechanical modes of oscillations, as well as new physical phenomena affecting the power system security and quality of supply.

**Educational objectives**

The goal is to provide knowledge in a twofold approach: from the mathematical and control point of view, it will be



|                                          |                                                                                                                                                                                                                                                              |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          | important to study new methods that can be suitable for elaboration of the data streaming from Phase Measurement Units. From the technical point of view, the Candidate will be able to learn how power system real time operation is currently carried out. |
| <b>Job opportunities</b>                 | The PhD can take advantage of the experience gained to apply for any position in the R&D departments of transmission or distribution system operators. Also consulting companies and EMS producers will be interested in such expertise.                     |
| <b>Composition of the research group</b> | 2 Full Professors<br>3 Associated Professors<br>1 Assistant Professors<br>8 PhD Students                                                                                                                                                                     |
| <b>Name of the research directors</b>    | Alberto Berizzi                                                                                                                                                                                                                                              |

#### Contacts

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#### Additional support - Financial aid per PhD student per year (gross amount)

|                                                                       |    |
|-----------------------------------------------------------------------|----|
| <b>Housing - Foreign Students</b>                                     | -- |
| <b>Housing - Out-of-town residents (more than 80Km out of Milano)</b> | -- |

#### Scholarship Increase for a period abroad

|                            |         |
|----------------------------|---------|
| <b>Amount monthly</b>      | 700.0 € |
| <b>By number of months</b> | 6       |

#### National Operational Program for Research and Innovation

|                                                                                                             |                          |
|-------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Company where the candidate will attend the stage (name and brief description)</b>                       | Terna Rete Italia SpA    |
| <b>By number of months at the company</b>                                                                   | 6                        |
| <b>Institution or company where the candidate will spend the period abroad (name and brief description)</b> | University of Washington |
| <b>By number of months abroad</b>                                                                           | 6                        |

**Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information**

**Increase in the scholarship for stays abroad: euro 700 per month, for up to 6 months. *Educational activities:*** Financial aid per PhD student is available for purchase of study



books and material, funding for participation in courses, summer schools, workshops and conferences, instrumentations and computer, etc. This amount is equal to 10% of the annual gross amount, for 3 years.

**Teaching assistantship:** Availability of funding in recognition of supporting teaching activities by the PhD student. There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

**Computer availability:** individual use.

**Desk availability:** individual use.