



PhD in INGEGNERIA ELETTRICA / ELECTRICAL ENGINEERING - 38th cycle

**PARTENARIATO PNRR Research Field: NEW PROCEDURES FOR THE ANALYSIS OF
ELECTROMAGNETIC COMPATIBILITY AND COEXISTENCE OF MODERN COMMUNICATION
TECHNOLOGIES IN VEHICLES AND VEHICULAR NETWORK**

Monthly net income of PhDscholarship (max 36 months)

€ 1195.5

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 evaluation of electromagnetic compatibility(EMC) performance of electronic components and communications/infotainment systems installed on board the latest generation of electric vehicles represents a great challenge for electrical/electronics designers. In fact, if assessment of EMC of the individual components was enough in the past, installation of an increasing number of electrical and electronic devices in a volume of limited size, such as an electricvehicle, has recently led to significant issues in terms of data coexistence with the high-frequency noise generated by power electronics devices. Hence, the analysis of the overall electromagnetic (EM) environment is of paramount importance in order to understand the dominant coupling phenomena, mitigate their effects, and develop guidelines for EMC-oriented design.

Aim of this research is therefore to develop advanced modelling and tailored testing approaches to support the design of electronics and electromechanical components of the latest and future generation of electric or hybrid vehicles. The research activity will address both design and experimental verification, with the aim of providing OEMs with practical indications on how to optimize their solutions.

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

The research is aimed at the development of modelling



research	<p>approaches (both through circuit and electromagnetic simulation) and novel measurement procedures for the analysis of the electromagnetic environment in modern automotive systems, with the final objective to assure coexistence of modern communication technologies with the electromagnetic noise generated by onboard electrical drives. Methods and techniques include electromagnetic, multiphysics, circuit modeling [with emphasis on multiconductor transmission line (MTL) theory], statistical techniques for EMC, measurement theory and techniques for EMC (EMC testing), modeling and simulation. Besides automotive, also other transportation sectors characterized by the coexistence of power electronics devices and ICT systems might benefit from the developed models and techniques, including possible applications also for power systems (e.g., V2G).</p>
Educational objectives	<p>The aim is to form highly qualified PhD candidates in Electromagnetic Compatibility, with the ability to face complex EMC/EM problems in modern automotive/transportation systems.</p>
Job opportunities	<p>Successful fulfilment of the research programs associated with this Scholarship will provide PhD candidates with the qualifications required to seek employment in diversified industry and university sectors in the EE field, such as Automotive/Transportation as well Renewable Energy.</p>
Composition of the research group	<p>2 Full Professors 4 Associated Professors 1 Assistant Professors 5 PhD Students</p>
Name of the research directors	<p>Prof. Flavia Grassi</p>

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--



Housing - Out-of-town residents (more than 80Km out of Milano)	--
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Scholarship Increase for a period abroad	
Amount monthly	597.77 €
By number of months	6

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

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.

Accommodation in Politecnico's Residences (<http://www.residenze.polimi.it>) is available for PhD candidates; special rates will be applied to selected out-of-town candidates (detailed info in the call for application).

Research period abroad: Our candidates are strongly encouraged to spend a research period abroad, joining high-level, research groups in the specific PhD research topic, selected in agreement with the Supervisor. An increase in the scholarship will be applied for periods up to 6 months.