



PhD in INGEGNERIA ELETTRICA / ELECTRICAL ENGINEERING - 39th cycle

**THEMATIC Research Field: EMC INNOVATIVE FILTER DESIGN TO COPE WITH STRINGENT
HV SAFETY REQUIREMENTS IN VEHICLE ELECTRIFICATION**

Monthly net income of PhDscholarship (max 36 months)
€ 1750.0
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	<p>In automotive high voltage (HV) electrification, the Megatrends are high voltage, high switching frequency and fast switching speeds. These trends pose new challenges, since a combination of Electromagnetic Compatibility (EMC) and HV-safety requirements needs to be assured.</p> <p>In particular, owing to the higher operation voltage, effective design of passive/active common mode filters has to cope with possible safety issues arising due to the higher energy stored in filter capacitors connected to the car chassis (i.e., the so-called Cy capacitors).</p> <p>The objective of the research is to develop innovative common mode filter concepts able to assure satisfactory EMC performance without compromising safety requirements. To this end, the aim is to reduce to the minimum the use of Cy capacitors. Challenges are the thermal stress in filter components, especially when connected to the AC side as well as the broad band functionality of such concepts. To this aim, innovative filter concepts and strategies will be investigated. The research is developed partly in Politecnico di Milano and partly in Valeo, Germany GmbH, Frauenaucher Str. 85, 91056 Erlangen, Germany.</p>
Methods and techniques that will be developed and used to carry out the research	<p>The research is aimed at the development of novel EMI filter concepts optimized for the automotive sector.</p> <p>Methods and techniques include electromagnetic, multiphysics, and circuit modelling and simulation,</p>



	<p>multiphysics, and circuit modelling and simulation, measurement theory and techniques for EMC (EMC testing).</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 program associated with this Scholarship will provide the PhD candidate with the qualifications required to seek employment in universities and Automotive/Transportation industries (R&D).</p>
Composition of the research group	<p>2 Full Professors 2 Associated Professors 2 Assistant Professors 7 PhD Students</p>
Name of the research directors	<p>Flavia Grassi, Sergio Amedeo Pignari</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)	--

Scholarship Increase for a period abroad	
Amount monthly	875.0 €
By number of months	6

<p>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</p>
<p>Educational activities:</p>



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... The amount is 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.