



PhD in FISICA / PHYSICS - 37th cycle

THEMATIC Research Field: HIGH-FREQUENCY RECTIFIERS FOR ENERGY HARVESTING APPLICATION

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	Photovoltaics is surely an effective technology yet quite limited in the efficiency, with commercial photovoltaic panels around 17%-20%. Here, we aim at the experimental validation of innovative concepts going beyond photovoltaics, where an optical antenna and a rectifiers are merged together to form a rectifier. This innovative technology is expected to achieve efficiencies well above nowadays photovoltaic solutions and, at the same time, extend the wavelength operation range from the visible towards the IR.
Methods and techniques that will be developed and used to carry out the research	The activity will rely on the Nanofabrication Facility and on a full opto-electronic setup specifically designed for studying optical rectifiers both located at the Italian Institute of Technology.
Educational objectives	i) Understanding the fundamentals of nanofabrication; ii) developing a full independence in building and managing an opto-electronic setup; iii) building a strong knowledge in the fields of optical antennas and metal-insulator-metal diodes.
Job opportunities	i) Research (universities, research centres); ii) high-tech companies; iii) Space sector.
Composition of the research group	1 Full Professors 1 Associated Professors 4 Assistant Professors 3 PhD Students



Name of the research directors	Francesco Scotognella, Remo Proietti Zaccaria
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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	564.01 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
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Educational activities per year :

1st year: 0
2nd year: 1534 euros per student
3rd year: 1534 euros per student.
or 1022 euros per student for each year.

Teaching assistantship:

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 and Desk availability: shared use

Other information about composition of the group:

Prof. Remo Proietti Zaccaria is head of the DELTA lab and coordinates the Space Center for Interdisciplinary and Innovative Technology (SPACEiit, www.iit.it/web/spaceiit) at the Italian Institute of Technology. The main aim of the DELTA lab is to identify and validate breaking through technologies in the energy field. The validation process goes from modeling to device fabrication and its characterization. Prof. Francesco Scotognella's research activity is focused



on: i) spectroscopy of nanomaterials (quantum dots, carbon nanotubes, graphene quantum dots); fabrication and characterization of photonic structures. Since 2019, FS is the coordinator of the ERC CoG project PAIDEIA (<http://www.paideia-h2020.eu/>) in which plasmon-induced hot electron extraction-based infrared solar cells are developed.