Call for application for research scholarships

for post-graduate international candidates

RESEARCH PROJECT N. 41

Title

Multiscale & multiphysics modeling of optoelectronic devices

Scientific responsible

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Short description of the research activity (max 250 words)

The operation of all semiconductor optoelectronic devices (such as light-emitting diodes, lasers, photodetectors and optical modulators) results from the interaction of carrier transport (modeled either in a semiclassical framework or with a full quantum approach) and optical phenomena (described by electromagnetic field theory). For such reason, optoelectronic computer-aided design cannot neglect either aspect, and requires the development of self-consistent multiphysics simulators.

The goal of the project is to introduce the candidate to the research activity currently devoted to the development of such a comprehensive numerical simulator within the Microwaves and Optoelectronics Group of the Department of Electronics and Telecommunications. This activity is backed by cooperations with both theoretical/modeling groups contributing to the code development (e.g., the Computational Electronics group led by Prof. Enrico Bellotti at Boston University, U.S.A, and the Applied Electromagnetics group at CNR-IEIIT, Italy), to experimental groups providing essential validation (Università di Padova, Chalmers University of Technology) and with industrial companies (Cisco Photonics, AIM Infrarot Module, Huawei, etc.).

Specific requirements (experiences, skills)

Basic knowledge of semiconductor physics, applied electromagnetics, and operating principles of electronic/optoelectronic devices. Coding skills in a Matlab-like environment and/or in a programming language suitable for numerical analysis (Fortran, C/C++, Python…)

Website of the research group (if any)

http://www.det.polito.it/research/key_activities/optoelectronics_and_microwave_photonics_high_speed_optical_modulators_ir_and_uv_detectors_leds

Keywords (min 3, max 6)

Simulation, Optoelectronics, Multiphysics, Light-Emitting Diodes, Vertical-Cavity Surface-Emitting Lasers, Photodetectors

Research Area (max 1)

Electronics, Control and Telecommunication Engineering