



**IEEE Photonics Society (Formerly IEEE Lasers and Electro-Optics Society)  
French Chapter/Chapitre Français  
Seminar announcement/Annonce de séminaire**

**Title/Titre: Time Domain Traveling Wave analysis of the multimode dynamics of Quantum Dot Fabry-Perot Lasers**

**Speaker/Orateur:** **Professeur Mariangela Gioannini**  
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**Date :** Wednesday March 18, 2015 at 2:00 pm/Mercredi 18 Mars 2015 à 14h00.

**Location/Lieu:** TELECOM ParisTech  
Ecole Nationale Supérieure des Télécommunications, CNRS/LTCI  
46 rue Barrault, 75634 Paris Cedex 13  
Room/Pièce: Amphi B312

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**Abstract/Résumé:**

In this talk I will discuss how a Time Domain Travelling Wave approach can be used to simulate the rich multimode dynamics of Quantum Dot Fabry-Perot Lasers. After presenting a short review of the many experimental results concerning the generation of mode locked pulses from single section QWell, QDash and QD devices, I will present the numerical model we have developed for studying the dynamics of QD lasers. This study is intended as a first step toward the understanding of this self-mode locking regime, often experimentally found in QD and QDash single section lasers. The Time Domain Travelling Wave approach we implemented includes the electron and hole carrier dynamics in the various QD confined states, the inhomogeneous broadening of the complex gain spectrum, the polarization dynamics and the effect of the carrier-photon interaction in the cavity. The role of the various non-linear interaction mechanisms on the broadening of optical spectrum of the QD laser will be presented and the main parameters responsible for the phase locking between the longitudinal modes will be discussed. We show that in some cases it is possible obtaining pulses after simulating the propagation of the laser output field in a dispersive medium. Many of the obtained simulation results are in good agreement with the experiments reported in the literature.

**Biographie/Biography**

Mariangela Gioannini was born in Italy in 1973; she received the Laurea Degree in Electronic Engineering in 1998 and the PhD in Electronic and Communication Engineering in 2002 both from Politecnico di Torino, Italy. She is Assistant Professor at the Department of Electronics and Communication of Politecnico di Torino where she is also Adjunct Professor of a course of Applied Electronics. She has been working on modeling and design of widely tunable DBR lasers (in collaboration with Agilent Technologies), multi-section self-pulsating lasers and mode-locked lasers. The current research activity is focused on the development of simulation tools for QDash and QDot based devices including superluminescent light emitting diodes, lasers, SOAs and solar cells. She has been visiting scientist at the University of Bristol (UK) and the Heinrich-Hertz-Institut in Berlin.

**For more information, please feel free to contact/Pour tout renseignement complémentaire, merci de contacter :**

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