

## CV

**Alejandro M. YACOMOTTI**

(Updated November 2013)

## I. General Information

**Last Name:** YACOMOTTI (scientific); GIACOMOTTI (administration: on ID)

**First Name:** Alejandro M.

**Affiliation address:** Laboratoire de Photonique et de Nanostructures, Route de Nozay 91460 MARCOUSSIS, France.

**Phone:** (33) 01 69 63 61 97 (office); (33) 09 53 58 63 10 (home).

**E-mail:** Alejandro.Giacomotti@lpn.cnrs.fr

**Place and date of birth:** Buenos Aires, Argentina; 11/21/1972

**Nationality:** Argentine.

**Marital status:** married.

## II. University degrees

- **PhD in Physics, Universidad de Buenos Aires, December 2002.** Title of the thesis: “Optical Excitable Systems”. Supervisor: Gabriel Mindlin. Mark: “Sobresaliente” (maximum). Affiliation laboratories:
  - Laboratory of Optics and Lasers, Universidad de las Islas Baleares, Palma de Mallorca, Spain (January- August 2000). Supervisor: Jorge Tredicce.
  - Laboratory of Optics and Lasers, Intitut Non-Linéaire de Nice, Nice, France (July 2001-July 2002). Supervisor: Jorge Tredicce.
  - Complex Systems Group, Physics Department, Universidad de Buenos Aires, Argentina. Supervisor: Gabriel Mindlin.
- **Licenciado en Ciencias Físicas (Masters Equivalent),** Universidad de Buenos Aires, Argentina, August 1998 (Average mark: 9.78 over 10).

## III. Professional experience

### Research Experience after the PhD thesis

1. **Postdoctorate at the Laboratory of Plasma Physics and Technology,** Ecole Polytechnique, (January 2003-February 2004). «Dynamics of density fluctuations in turbulent flows »
2. **Postdoctorate at PHOTONIQ group, Laboratory of Photonics and Nanostructures –LPN–** (Mars 2004-August 2006). « Nonlinear Dyanmics in 2D Photonic Crystals »
3. **Associate Professor (Maître de conférences), Université de Rennes 1** (September 2006-October 2006).
4. **Researcher (Chargé de Recherche CNRS 2<sup>ème</sup> classe), LPN** (since November 2006, tenured in November 2007).

## Teaching Experience

1. **Supervision of S. Haddadi's (2011-) and M. Brunstein's thesis (2008-2011).**
2. **Co-supervision of Mlle. Moreau's postdoctorate (2008-2010).**
3. **Supervision of Mlle. Sanchez's residence (2010).**
4. **Teaching Assistant at ENSTA (Paris), *Introduction to Statistical Physics* (2011 - 2013).** Hours = 16 per year.
5. **Teaching Assistant at the Physics Department of the Universidad de Buenos Aires, 1999-2002 (*ayudante de 1a clase*).** Hours= 288. Courses: Waves and Optics (*Fisica 2*), Waves and Optics Laboratory (*Laboratorio 2*), Quantum Physics Laboratory (*Laboratorio 5*).
6. **Teaching Assistant at the Physics Department of the Universidad de Buenos Aires, 1997-1999 (*ayudante de 2a clase*).** Hours= 288 in Thermodynamics and Introduction to Quantum Physics (*Fisica 4*).
7. **Teaching Assistant at the *Ciclo Basico Comun* of the Universidad de Buenos Aires, 1994-1997.** Hours: 800 in Math.

## IV. Research contributions

My field of research is nonlinear dynamics in complex photonic systems. My work is currently devoted to the study of nonlinear optical properties of micro and nano-photonics devices. I have developed strong skills in the realization and analysis of nonlinear dynamical phenomena and ultrafast dynamics in complex scenarios, from lasers (semiconductor, solid state) and photonic crystals [1-5], to the dynamics of turbulent flows. My research has mainly focused on fundamental aspects of the nonlinear interaction between light and matter in micro-and nano optical resonators.

My research project at LPN –where I started as a CNRS researcher in 2006 – aims to develop networks of coupled nonlinear nano-cavities in bistable or excitable regimes for the spatio-temporal control of nonlinear optical structures. The main originality relies on a bio-inspired approach to control light, namely the use neuron-like dynamical responses of optical cavities known as “excitable pulses”. The results we obtained in 2006 showed for the first time excitability in a band edge Photonic Crystal micro-resonator, opening a new avenue to study nonlinear dynamics in nanophotonics on the basis of neuron-like responses of active micro and nano-optical resonators [1-3]. Such phenomena have interesting potential applications in all-optical signal processing such as the realization of all-optical delay lines.

In order to enlarge the domain of applications from telecommunications to bio-nanotechnology, I started a new research project in 2007 aiming to use photonic crystals transparent in the visible range for the excitation/detection of fluorescent molecules. These studies started in collaboration with the Quantum Electronics Laboratory (LEC), Universidad de Buenos Aires (Argentina), and join today two other laboratories: the group of macromolecular complexes in living cells of the Institut Jacques Monod and the Laboratory for Fluorescence Dynamics, Department of Biomedical Engineering (University of California, Irvine). The design, fabrication and optical characterization of the devices are realized at the LPN, while partners of LEC, the IJM and the University of California are involved in various experimental studies to use these samples for biomolecular applications. As a proof of principle of using photonic crystals as a substrates for fluorescence microscopy, we recently demonstrated the spatial confinement and the enhancement of the fluorescence of molecules in aqueous solution deposited on a two-dimensional photonic crystal [L. Estrada *et al.*, *Opt. Express*, **18** 3693 (2010)].

- **Papers in peer reviewed international journals=32.**
- **Oral presentations in international conferences=38 (13/38 invited).**
- **Selection of five most representative papers in the last 10 years:**
  1. P. Grinberg, K. Bencheikh, M. Brunstein, A. M. Yacomotti, Y. Dumeige, I. Sagnes, F. Raineri, L. Bigot, and J.A. Levenson, *Nanocavity linewidth narrowing and group delay enhancement by slow light propagation and nonlinear effects*, Phys. Rev. Lett. **109**, 113903 (2012).
  2. M. Brunstein, A. M. Yacomotti, I. Sagnes, F. Raineri, L. Bigot, and J. A. Levenson, *Excitability and self-pulsing in a photonic crystal nanocavity*, Phys. Rev. A **85**, 031803(R) (2012).
  3. A. M. Yacomotti, P. Monnier, F. Raineri, B. Ben Bakir, C. Seassal, R. Raj, and J. A. Levenson, *Fast Thermo-Optical Excitability in a Two-Dimensional Photonic Crystal*, Phys. Rev. Lett. **97**, 143904 (2006).
  4. A. M. Yacomotti, F. Raineri, G. Vecchi, P. Monnier, R. Raj, A. Levenson, B. Ben Bakir, C. Seassal, X. Letartre, P. Viktorovitch, L. Di Cioccio, and J.-M. Fedeli, *All optical bistable band-edge Bloch modes in a two-dimensional photonic crystal*, Appl. Phys. Lett. **88**, 231107 (2006).
  5. A. M. Yacomotti, F. Raineri, C. Cojocar, R. Raj and A. Levenson, *Non-adiabatic dynamics of the electromagnetic field and charge carriers in two-dimensional photonic crystals*, Phys. Rev. Lett. **96**, 093901 (2006).

## V. Collective responsibilities and research management

- **Reviewer for international journals (12):** Optics Express (7), The European Physical Journal (2), Journal of Luminescence –Elsevier– (1), Optics Communications –Elsevier– (1), Journal of the Optical Society of America A (1).
- **Reviewer for national journals (1):** Comptes Rendus Physique, Académie des sciences, numéro spécial: Slow-light: Fascinating physics or potential applications? (1).
- **Conference organization (1):** Member of the organization committee of “Photonic Crystal Materials and Devices” section in SPIE Europe 08, 7–11 April 2008 (Strasbourg).
- **Participation in evaluation committees (3):**
  - Member of the jury for the associate teaching position MCF 557, Université Paris 11 (2010).
  - Member of the jury for the associate teaching position MCF 010, Ecole Centrale de Lyon (2010).
  - Member of the jury, PhD thesis of N. Marsal, Université de Metz et Supélec, Metz (2010).
- **Participation in jury of thesis (3):** M. Tuconi, Institut Non-Linéaire de Nice (2013), O. Sanchez, Universidad de Sevilla, Séville, Espagne (2011); N. Marsal, Université de Metz et Supélec, Metz (2010).
- **Funding (national contracts) during 2009-2013 (5):**
  - Program ANR Blanc (2012). Applicant: B. Kibler, Project: OptiRoc. Partners: ICB (Dijon), Femto-ST (Besancon), PhLAM (Lille), INLN (Nice).
  - Program *ANR Blanc* (2010). Applicant: K. Bencheikh. Project: CALIN. Partners: Lab. Charles Fabry (Institut d’Optique), Institut Langevin, Laboratoire FOTON (Lannion).

- Program *ANR Blanc* (2010). Applicant: A. Fischer et A. Boudrioua (Equipe LUMEN, Laboratoire de physique des lasers LPL, Université de Villetaneuse). Project: OLED. Partners: LPN, LPICM (Ecole Polytechnique).
- Investing Funding 2010 CNANO Ile-de-France. Project: ConPhocal. Applicant: A. Giacomotti. Partners: Groupe de Complexes Moléculaires en Cellules Vivantes, Institut Jacques Monod.
- Investing Funding 2009 CNANO Ile-de-France. Project: LUMINCP. Applicant: K. Bencheik. Partners: Lab. Charles Fabry (Institut d'Optique), Institut Langevin.
- **Funding (international contracts) during 2009-2013 (2):**
  - Convention of Exchange Project CNRS-CONICET –Argentine– (2009-2010). Project N°: 2282. Applicant: A. Giacomotti. Partners: Laboratory of Quantum Electronics, LEC-UBA (Argentina).
  - Small or medium-scale focused research project –STREP– (2008-2011). Project: HISTORIC (N°: 223876).

## VI. Language skills

- English. TOEFL (Test of English as a Foreign Language), score: 260 Computer Adaptive (equivalent to 620 paper-based).
- French (understand/speak/read).
- Spanish (native).