

XVII Escuela Giambiagi: Luz y Tecnologías basadas en la Iluminación

1- X-ray Lasers: Extreme brightness at short wavelength

Motivation for the development of X-ray lasers and brief history of the field.

Properties of the EUV and soft X-ray regions of the electromagnetic spectrum

Basic absorption and emission processes

Scattering, diffraction and refraction of electromagnetic radiation

Brief CV

Jorge Rocca is a Distinguished Professor at the Department of Electrical and Computer Engineering and Physics Department, Colorado State University, USA. He served as Director of the NSF Center for Extreme Ultraviolet Science and Technology. He received a diploma in Physics from the University of Rosario in Argentina in 1978 conducting research at CITEFA, and a Ph.D in ECE from Colorado State University in 1983. His research group demonstrated the first gain-saturated table-top soft X-ray laser using a discharge plasma as gain medium, and later extended bright high repetition rate table-top EUV lasers to wavelengths down to 8 nm using laser-created plasmas, achieving full phase coherence. He and his collaborators have demonstrated the use of these lasers in nano-scale imaging, dense plasma diagnostics, nano-scale material studies, and photochemistry. He has published more than 200 peer review journal article on these topics. Prof. Rocca received the Arthur. L. Schawlow Prize in Laser Science from the American Physical Society in 2011, and the Willis E. Lamb Award in Laser Science and Quantum Optics in 2012. He is a Fellow of the American Physical Society, the Optical Society of America, and the Institute of Electrical and Electronic Engineers. He was an IEEE LEOS Distinguished Lecturer for 2006-07, and early in his career he was an NSF Presidential Young Investigator.

2 - Semiconductor LED Materials

This course comprises two talks of about 90 minutes each and is planned for advanced undergraduate or novice graduate students in Natural Science or Engineering. Basic concepts on Semiconductor Physics will be presented, with special emphasis on p-n homo and heterojunctions and luminescence induced by electrical current (electroluminescence) phenomena, with the purpose of providing a general view on properties and technology of active LED materials. Within this context, the history of LED devices will be critically and briefly discussed, starting from their origins as indicators to current LED applications in photonics and lightening.

Brief CV

David Comedi is Director of the NanoProject Group and Professor of Physics at the National University of Tucumán, and Independent Researcher at Argentina's National Research Council (CONICET). He received his BA (1983), MSc (1986) and PhD (1990) degrees in Physics from the Israel Institute of Technology, Technion. Between 1990 and 1993, he carried out postdoctoral work at the Centre for Electrophotonic Materials and Devices, McMaster University, Canada. In 1993, Dr. Comedi was invited by the Physics Institute at the State University of Campinas (Unicamp), Brazil, where he became later Associate Professor. In 2001, he was awarded the "Livre-Docencia" title on the Electronic Structure and Electronic, Optical and Magnetic properties of Condensed Matter by Unicamp. Dr. Comedi's contributions to the fields of semiconductor nanotechnology, ion-solid interactions, ion-beam assisted thin film deposition, doping, defect spectroscopy, electronic structure of non-crystalline and nanostructured semiconductors, luminescence and the structure of semiconductor alloys have been published in 91 papers in leading peer reviewed Journals. He has graduated 3 Master, 2 PhD and several undergraduate students in Physics, and has acted as a reviewer for important scientific journals and as adviser and member of Physics and Scientific committees of national research councils and agencies of Brazil and Argentina.

3- Microscopy

First Class: Tight focusing of light.

Second Class: Confocal microscopy and superresolution.

Third Class: Phase contrast imaging

Brief CV

Colin Sheppard obtained his PhD degree from University of Cambridge. He recently moved to Italian Institute of Technology, Genoa, where he is Senior Scientist in the Nanophysics Department. Previously he has been Professor in the Departments of Bioengineering, Biological Sciences and Diagnostic Radiology at the National University of Singapore, Professor of Physics at the University of Sydney, University Lecturer in Engineering Science at the University of Oxford, and Lecturer in Electrical Engineering at UCL. He has held many visiting positions at different institutions, including EPFL, MIT, Stanford University, Tokyo University and TU-Delft. His research interests include microscopy, including confocal and multiphoton microscopy, phase imaging, image reconstruction, diffraction, scattering, and beam & pulse propagation.

4- Fiber-optic communication systems.

In this short course we will discuss the basics of linear and nonlinear propagation in optical fibers, transmission and reception of data, and components and subsystems of high-capacity fiber-optic communication systems. Finally, we will also present some applications of nonlinear fiber optics outside the area of communication systems.



First class: Basic concepts of fiber optics. Milestones. Transmission windows. Linear and nonlinear propagation impairments.

Second class: Transmitters and receivers. Optical components. Discrete and distributed optical amplification. Wavelength Division Multiplexing (WDM). Design issues of high-capacity optical systems.

Third class: Some applications of nonlinear fiber optics outside the realm of communication systems.

Brief CV

Diego Grosz is an Associate Professor at Instituto Balseiro (IB), Cuyo University, Independent Researcher at the National Council for Science and Technology (CONICET), and head of the Optical Communication Group (IB). He received a Licenciado degree in physics from University of Buenos Aires (1993) and a Doutor em Ciências degree from State University of Campinas (UNICAMP), Brazil (1998). He was a Member of the Technical Staff at Lucent Technologies (1999-2003) where he worked on the design and development of LambdaXtreme, the highest-capacity optical communication system in the world at that time. He has published extensively in the area of fiber-optic communication systems and holds eight patents. He received the Central Bell Labs Teamwork Award (Lucent Technologies, USA, 2002), the "Ernesto E. Galloni" Award from the National Academy of Exact and Natural Sciences (Argentina, 2003), and the Konex Diploma in Science and Technology (Konex Foundation, Argentina, 2013). Contact information: grosz@ib.edu.ar

5- Quantum information with multidimensional quantum systems

Spatial and polarization codification of qudits

Mutually unbiased basis

Tomaography of states and processes

Brief CV

Carlos Saavedra is the Scientific Director of the Center for Optics and Photonics and Professor of Physics Department at Universidad de Concepción, Chile. He received a PhD in Physics from Catholic University of Chile (1992). Between 1997 and 1998, he was an invited researcher at the Institute for Theoretical Physics, University of Innsbruck, Austria. His first research was oriented to the study of radiation-matter interactions in the context of cavity quantum electrodynamics. Later, he has been mainly interested in quantum information, where he has studied problems such as: controlled generation and detection of photons for quantum communication; physical implementation of quantum information protocols. At present, the study

of quantum information from quantum optics is his main research area. Besides, he is working in developing super-resolution techniques for microscopy applications. He has published 72 research articles in leading peer reviewed Journals and several preprints. Between 2012 and 2015, he was a member of the Science Council, National Commission for Scientific and Technological Research, Chile.



XVII Escuela Giambiagi: Luz y Tecnologías basadas en la Iluminación

Método de evaluación: al final del curso los alumnos que opten por presentar la materia para la carrera de doctorado, tendrán que presentar un examen escrito de los temas vistos en la materia.





Universidad de Buenos Aires
Facultad de Ciencias Exactas y Naturales

Referencia Expediente. 505.184/15

Buenos Aires, 24 AGO 2015

VISTO:

la nota presentada por el Dr. Pablo Mininni, Director del Departamento de Física, en la que se eleva información y el programa del curso de posgrado XVII Giambiagi School: Internacional Year of Light an Light Based Technologies, que será dictado por los Dres. Silvia Ledesma, María Gabriela Capuleto, Claudio Lemmi, Hernán Grecco, Miguel Larotonda y Diana Skigin con la colaboración de los Dres. J. J. Roca, C. J. R. Sheppard, D. Grosz, C. Saavedra y D. Comedi entre el 3 y el 7 de agosto de 2015

CONSIDERANDO:

lo actuado en la Comisión de Doctorado

lo actuado en la Comisión de Postgrado,

lo actuado por este cuerpo en Sesión Ordinaria realizada en el día de la fecha,

en uso de las atribuciones que le confiere el Artículo N° 113 del Estatuto Universitario,

**EL CONSEJO DIRECTIVO DE LA FACULTAD DE
CIENCIAS EXACTAS Y NATURALES
RESUELVE**

Artículo 1°: Autorizar el dictado del curso de posgrado XVII Giambiagi School: Internacional Year of Light an Light Based Technologies de 34 hs de duración.

Artículo 2°: Aprobar el programa del curso de posgrado XVII Giambiagi School: Internacional Year of Light an Light Based Technologies obrante a fs 4 a 9 del expediente de la referencia.


Artículo 3°: Aprobar un puntaje máximo de un (1) punto para la Carrera del Doctorado.

Artículo 4°: Comuníquese a la Dirección del Departamento de Física y a la Biblioteca de la FCEN (con fotocopia del programa incluida).

Artículo 5°: Comuníquese a la Dirección de Alumnos y a la Secretaría de Posgrado (sin fotocopia del programa). Cumplido, archívese.

RESOLUCION CD N°
SP GA 31/07/2015

2030


Dr. PABLO J. PAZOS
Secretario Adjunto de Posgrado
FCEyN - UBA


Dr. JUAN CARLOS REBOREDA
DECANO