

IFGW Winter School: “Synchrotron light and its applications in materials science”

Escola de Inverno do IFGW: “Luz Síncrotron e Suas Aplicações em Ciência dos Materiais ”

15-26 de Julho de 2013, Instituto de Física “Gleb Wataghin”, UNICAMP, Campinas-SP

Chairman: Prof. Dr. Antonio Rubens Britto de Castro (Departamento de Física da Matéria Condensada, IFGW, UNICAMP and LNLS - CNPEM)

Subjects:

- 1 – (**Machine Physics**): Production of Synchrotron Light: electron beam dynamics, properties of synchrotron radiation from IR to X-rays, insertion devices, top-up injection and other operational aspects. This item connects smoothly with “XFEL”, see below, and all other applications.
 - 2 – (**XFEL**): Free-Electron-Lasers (FEL) and ultra-short X-ray pulses: fundamental physics and novel scientific applications.
 - 3 – (**PES**): Photo-Electron Spectroscopy. Basic ideas, complementarity with photon spectroscopies, instrumentation needed. Aqueous solutions seen by electron spectroscopy: unexpected results
 - 4 – (**VUV**): VUV spectroscopy; X-ray absorption, angle-resolved absorption, magnetic circular dichroism. Photo-emission, “regular” and resonant, angle-resolved, spin-resolved
 - 5 – (**XAS**): Fundamentals and applications of X-ray Absorption Spectroscopy (XAS) to materials science
 - 6 – (**XRD**): X-ray diffraction and protein crystallography (XRD): Basics of X-ray Diffraction using synchrotron radiation; resonant diffraction and experimental results in nanoscience; recent applications using synchrotron light: nanodiffraction,, microscopy and phase recovery; protein crystallography and the MAD method.
 - 7 – (**SAXS**): Small Angle X-ray Scattering and structural studies of non-crystalline systems (SAXS): principles of the technique for diluted systems, Guinier and Porod’s Laws, distance distribution functions. Concentrated systems, radial distribution function and interaction potentials. Self-organizing systems (micelles, liposomes, liquid crystals), polymers, proteins in solution.
- Sirius, the high brilliance new Brazilian storage ring: I** – Machine design and performance parameters (plenary talk)
- Sirius, the high brilliance new Brazilian storage ring: II** – Instrumentation and applications (plenary talk)

Invited Speakers:

Rosangela Itri (USP) (SAXS), Liu Lin (LNLS, Campinas) (Sirius I), Harry Westfahl (LNLS, Campinas) (Sirius II), Miguel Abbate (UFPr) (VUV), Gustavo Azevedo (UFGRS) (XAS), Rogerio Paniago (UFMG) (XRD), John Byrd (Center of Beam Physics, LBL, US) (Machine Physics), Fernando Sannibale (Advanced Light Source, LBL, US) (Machine Physics), Arnaldo Naves de Britto (IFGW-UNICAMP) (PES), Richard Landers (IFGW-UNICAMP) (PES), Abner de Siervo (IFGW-UNICAMP) (PES), Daniel Ratner (SLAC Stanford US)(X-ray FEL fundamental physics), David Fritz (SLAC Stanford US) (X-ray FEL Science&Applications). Attendance of all speakers already confirmed.

PLENARY TALKS

- 15/7 - Rickson Mesquita (IFGW/UNICAMP) - "Métodos de Neuroimagem para investigação do funcionamento cerebral"
 16/7 - Liu Lin (LNLS): "Sirius, the high brilliance new Brazilian storage ring: I – Machine design and performance parameters"
 17/7 - Steve Cundiff (JILA - Universidade do Colorado, Boulder, EUA), "Optical multidimensional coherent spectroscopy"
 18/7 - Gustavo Wiederhecker (IFGW/UNICAMP) - "Optomecânica de Microcavidades: Um Parquinho de Brinquedos Clássicos e Quânticos."
 19/7 - David Chinellato (IFGW/UNICAMP) - "A Física Experimental de Altas Energias no LHC e o Quark-Gluon Plasma"
 22/7 - Harry Westfahl Jr. (LNLS) - "Sirius, the high brilliance new Brazilian storage ring: II – Instrumentation and applications"
 23/7 - Jan Thomsen (Niels Bohr Institute, Copenhagen, Dinamarca) - "Optical atomic clocks and their applications"
 25/7 - Veronique Dupuis (Université de Lyon, França) - "Clusters synthesis and deposition under UHV, characterization from TEM, X-ray spectroscopy and magnetic measurements"

Schedule for the 1st week

	Mon 15/07	Tue 16/07	Wed 17/07	Thu 18/07	Fri 19/07
8:30 – 9:00 hs	Registration	Class – Machine Physics	Class – Machine Physics	Class – Machine Physics	Class – XFEL, fundamental physics
9:00 – 10:00 hs	Welcome, overview of IFGW				
10:00 – 10:45 hs	BREAK	BREAK/POSTERS	BREAK	BREAK	BREAK
10:45 – 12:15 hs	Class – VUV	Class – Machine Physics	Class – Machine Physics	Class – Machine Physics	Class – XFEL, fundamental physics
12:15 – 13:45 hs	Lunch	Lunch	Lunch	Lunch	Lunch
13:45 – 15:15 hs	Class – VUV	Class – XAS	Class – XAS	Class – XAS	Class – PES
15:15 – 16:00 hs	BREAK	BREAK/POSTERS	BREAK	BREAK	BREAK
16:00 – 17:30 hs	Plenary talk	Plenary talk	Sirius I	Plenary talk	Plenary talk

Saturday 20/07 11:00 – 12:00 Visit to LNLS, the Brazilian Synchrotron Light Source; LNLS will serve snacks and refreshments after the visit.

Schedule for the 2nd week

	Mon 22/07	Tue 23/07	Wed 24/07	Thu 25/07	Fri 26/07
<i>8:30 – 10:00 hs</i>	Class – SAXS	Class – SAXS	Class – XRD	Class – XFEL, science	Class – PES
<i>10:00 – 10:45 hs</i>	BREAK	BREAK	BREAK	BREAK	BREAK
<i>10:45 – 12:15 hs</i>	Class – SAXS	Class – SAXS	Class – XRD	Class – XFEL, science	Class – PES
<i>12:15 – 13:45 hs</i>	Lunch	Lunch	Lunch	Lunch	Lunch
<i>13:45 – 15:15 hs</i>	Class – SAXS	Class – SAXS	Class – XRD	Exam I	Class – XFEL, science
<i>15:15 – 16:00 hs</i>	BREAK	BREAK	BREAK	BREAK	BREAK
<i>16:00 – 17:30 hs</i>	Plenary talk	Sirius II	Class – XRD	Plenary talk	Exam II