

**FINAL REPORT**

**ANDEAN SPECTROSCOPY SCHOOL  
AND  
INTERNATIONAL SPECTROSCOPY  
CONFERENCE**

**Lima (Perú), May 16-27, 2005**

**ANDEAN SPECTROSCOPY SCHOOL (May 16-20, 2005)**  
**INTERNATIONAL SPECTROSCOPY CONFERENCE**  
**(May 23-27, 2005)**

## **1.- Reference Framework**

Taking into account that the present year has been declared by UNESCO as the World Year of Physics -honouring Albert Einstein, who a hundred years ago (1905) published three scientific articles that had a tremendous impact on humanity's development-, a series of Peruvian institutions dedicated to Science, Technology and Innovation (STI) brought together to implement a number of activities which could exert a positive impact on Peru and the Latin American countries. Puya de Raimondi Association, a French NGO working in the same area, also participated in this initiative.

Given its transversal character, spectroscopy was chosen as the main field focused on thematic areas of national interest such as agroindustry, materials science, archaeology, environment and life sciences. The idea was, firstly, to implement a review and updating stage (School) of the main traditional and emergent spectroscopical techniques and, secondly, to organize a conference and show the recent advances in the mentioned areas.

Thus, **the Andean Spectroscopy School (May 16-20, 2005)** and **the International Spectroscopy Conference (May 23-27, 2005)** came into existence.

## **2.- The Organizers**

The institutions responsible for the organization of both events were: Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica (CONCYTEC), Universidad Nacional de Ingeniería (UNI), Pontificia Universidad Católica del Perú (PUCP), Universidad Nacional Mayor de San Marcos (UNMSM), Instituto Peruano de Energía Nuclear (IPEN), Sociedad Química del Perú (SQP), Sociedad Peruana de Física (SOPERFI) and Asociación Puya de Raimondi

A local committee and an international committee were in charge of organizing these events.

### **2.1 Local Committee**

Jaime Ávalos (CONCYTEC)  
Walter Estrada (IPEN)  
Manfred Horn (UNI)  
Jorge Bravo (SOPERFI)  
Pablo Rivera (UNMSM)  
Guillermo Baldwin (PUCP)  
María Sun Kou (PUCP)  
Mario Ceroni (SQP)

## **2.2 International Committee**

Francois Piuzzi, Laboratorio Francis Perrin, CEA –DSM-DRECAM CNRS Saclay, France  
Robert Baptist CEA Grenoble, Francia  
Yves Barjhoux, THA, Francia

## **2.3 Coordinators for Areas**

Materials science: Dr. Walter Estrada  
Agroindustry: Dra. Maria Rosario Sun Kou  
Archaeology: Arq. Luisa Vetter  
Environment and Sciences of life: Dr. Mario Ceroni

Jaime Ávalos and François Piuzzi were in charge of the general direction and supervision, with the administrative support of :Kathya Orihuela (Coordinator), Beatriz Taboada (Budget), Patricia Gálvez (Budget), José Díaz (Administrative Assistant), Gabriel Bautista (coordination and assembly of laboratories), Carlos Chinchay and Martín Alcedo (Computer Assistants), Jessy Portocarrero and Ginés Marcelo (Support), Armando Mendoza and Roberto Castro, (drivers).

## **3.- The Sponsors**

UNESCO / Comisariato de Energía Atómica Francés, DSM Saclay y Grenoble / University of California Berkeley - USA / Oak Ridge – USA / Centro Nacional de Investigación Científica de Francia, CNRS / Centro Latinoamericano de Física, CLAF / Arizona State University – USA / Sociedad Europea de Física / Sociedad Francesa de Óptica, SFO / Consejo Superior de Investigaciones Científicas, CSIC- España / Organización de Estados Iberoamericanos, OEI - Perú / Instituto Curie, Paris-Francia / Instituto Francés del Petróleo, Lyon- Francia / Instituto de Investigación para el Desarrollo, IRD-Francia y Perú / Ministerio de Relaciones Exteriores de Francia / Embajada de Francia / Universidad de Uppsala, Suecia / Internacional Centre for Theoretical Physics, Trieste- Italia / Air Liquide, Paris- Francia / Asociación Francesa de Industrias de la Óptica y de la Fotónica, AFOP – Paris / Horiba, Jobin & Ybon, Paris- Francia / Imagine Optic, Paris- Francia / Nanotech Electrónica, Madrid- España / Quanta Service, Paris-Francia / Quantel S.A., Paris- Francia / SOITEC S.A., Grenoble, Francia / Universidad Libre de Berlín, Alemania / La Escuela Federal Politécnica de Lausanne, Suiza / Universidad de Dusseldorf, Alemania / Instituto Laue Langevin, ILL-Francia / Instituto de Química de Sustancias Naturales, ICSN-Francia

## **4.- Development of the Events**

By Ministerial Resolution N° 0294-2005-RE of April 15<sup>th</sup>, 2005, the official realization of these events was authorized. The headquarters was the campus of Catholic University of Peru (Av. Universitaria s/n - San Miguel - Lima).

The preparatory work began in August 2004 and the assembly of experiments and equipments was completed ten days before the beginning of the School.

<b>Equipments relations</b>
<b>Equipments in lending (25 days):</b> <ul style="list-style-type: none"><li>➤ Laser Nd-Yag BRIO QUANTEL (100mJ)</li><li>➤ Cabeza Raman Jobin Yvon</li><li>➤ Spectrometer + CCD detector (Horiba &amp; Jobin et Yvon) for LIBS</li><li>➤ AFM –STM Nanotec</li><li>➤ Spectrometer Ocean Optics</li></ul>
<b>New equipments donated to Peru:</b> <ul style="list-style-type: none"><li>➤ 2 numerical oscilloscope -Tektronix</li><li>➤ Laser Yag 25 mW (532 nm) for Raman</li><li>➤ Filter Notch for Raman</li></ul>
<b>Equipments used donated to Peru:</b> <ul style="list-style-type: none"><li>➤ Laser Nd-YAG Minilite (Continuum)</li><li>➤ Laseres He-Ne (3)</li><li>➤ Laser AR+ 20mW Spectra Physics</li><li>➤ Mass Spectrometer</li><li>➤ Glasses, Filter</li><li>➤ Mecanis Sistema for optical move</li><li>➤ Lock in amplifier</li><li>➤ Photoamplifiers PM</li><li>➤ Power Supplies</li><li>➤ Optical fibre</li><li>➤ Photodiodes</li><li>➤ Laser power meter</li><li>➤ Accessory</li></ul>

#### 4.1 Participants

Integral scholarships were granted: 12 for regional participants (Latin America and the Caribbean) and 8 for national participants.

<b>N°</b>	<b>Regional participants</b>	<b>Institutions</b>	<b>City</b>	<b>Country</b>	<b>Days</b>
1	Cecilia Fuertes	Centro Atómico Constituyentes	Buenos Aires	Argentina	15-21
2	Laura Perissinotti	U. Nac. de la Plata	Buenos Aires	Argentina	15-28
3	Abraham Torrico	U. San Simón	Cochabamba	Bolivia	15-28
4	Giovanna Almanza	U. Nac. Mayor de San Andrés	La Paz	Bolivia	15-28
5	Rodrigo Espinoza	U. de Chile	Santiago	Chile	15-21
6	Diana Marulanda	U. Nac. Colombia	Bogotá	Colombia	15-28
7	Maykel González	Inst. Sup. de Tecnologías y Ciencias Aplicadas	La Habana	Cuba	15-28
8	Cristian Santacruz	Escuela Politécnica de Quito	Quito	Ecuador	15-21
9	Rafael Gómez	U. de San Lorenzo	Asunción	Paraguay	15-28
10	Laura Beovide	Museo Nac. de Historia Natural y Antropología. MEyC	Montevideo	Uruguay	15-28
11	Farrah Cañavera	Inst. Venezolano de Investigaciones Científicas	Caracas	Venezuela	15-28
12	Humberto Cabrera	Inst. Venezolano de Investigaciones Científicas	Caracas	Venezuela	15-28

<b>N°</b>	<b>National participants</b>	<b>Institutions</b>	<b>City</b>	<b>Country</b>	<b>Days</b>
1	Elías Pantigoso	UNSA	Arequipa	Perú	15-28
2	Grimaldo García	UNAP	Loreto	Perú	19-28
3	Heidi Rivasplata	UNT	La Libertad	Perú	15-21
4	Jenny Ochoa	UNSA	Arequipa	Perú	15-28
5	Manuel Guevara	UNT	La Libertad	Perú	15-28
6	Patricia Castillo	UNICA	Ica	Perú	17-26
7	Salvador Bendezú	UNCP	Junín	Perú	15-21
8	Víctor Curay	Ins. Nac. de Cultura	Lambayeque	Perú	20-28

41 partial scholarships and 40 applications for free entrance were granted; 20 individuals (7 professionals (\$170) and 13 students (\$70)) canceled their participation.

In general, the daily distribution of the participants was as follows:

#### DISTRIBUTION OF THE PARTICIPANTS IN THE SCHOOL

<b>Day</b> <b>Status</b>	<b>Monday</b> <b>16</b>	<b>Tuesday</b> <b>17</b>	<b>Wednesday</b> <b>18</b>	<b>Thursday</b> <b>19</b>	<b>Friday</b> <b>20</b>
Integral scholarships	16	17	17	17	19
Partial scholarships	35	37	36	38	33
Free entrance	38	26	23	20	40
Individuals	13	14	13	14	14
<b>TOTAL</b>	<b>102</b>	<b>94</b>	<b>89</b>	<b>89</b>	<b>106</b>

#### DISTRIBUTION OF THE PARTICIPANTS IN THE CONFERENCE

<b>Day</b> <b>Status</b>	<b>Monday</b> <b>23</b>	<b>Tuesday</b> <b>24</b>	<b>Wednesday</b> <b>25</b>	<b>Thursday</b> <b>26</b>	<b>Friday</b> <b>27</b>
Integral scholarships	16	16	15	15	15
Partial scholarships	35	34	30	35	33
Free entrance	20	18	14	21	39
Individuals	16	15	14	16	15
<b>TOTAL</b>	<b>87</b>	<b>83</b>	<b>73</b>	<b>87</b>	<b>102</b>

#### 4.2 Lecturers

There were 40 international lecturers and 15 national ones, most of them from Archaeology:

<b>EUROPEANS</b>	
Germany	2
Spain	2
France	15
Sweden	3
Switzerland	1
<b>AMERICANS</b>	
Argentina	2
Brasil	2
Bolivia	1
Cuba	1
Equator	1
Mexico	3
USA	7
<b>TOTAL</b>	<b>40</b>

## LECTURERS DIRECTORY

N°	Last name	First Name	Country	Institutions
1	ACOSTA	Dwight	Mexico	UNAM
2	ALCALDE	Javier	Perú	UNMSM
3	AUBOURG	Philippe	France	Quantel Paris
4	AYALA	Edy	Ecuador	Escuela Politécnica de Quito
5	BACO	Franck	France	IFP-LYON
6	BADENES	Goncal	Spain	ICFO – Institut de Ciències Fotòniques
7	BAPTIST	Robert	France	CEA - Grenoble
8	BARJHOUX	Yves	France	THA Conseil
9	BENAVIDES	Juan Manuel	Peru	
10	BERGER	Pascal	France	CEA- Saclay
11	BOIX	Alicia	Argentina	U. Nacional del Litoral
12	BRAVO	José	Bolivia	Universidad Mayor de San Andrés
13	BUSTAMANTE	Carlos	USA	Universidad de California Berkeley
14	COUSTY	Jacques	France	CEA -Saclay
15	CHAKOUMAKOS	Bryan	USA	Oak Ridge
16	CRAIEVICH	Aldo	Brasil	U. Sao Paulo
17	DE NOVION	Charles	France	LLB - CEA - Saclay
18	ELIAS	Luis	USA	U. de Hawai
19	FERNANCEZ-BACA	Jaime	USA	Oak Ridge
20	FERNÁNDEZ-DIAZ	Maria Teresa	France	LLB - CEA - Saclay
21	GHEZZI	Iván	Peru	PUCP
22	GIL	Adriana	Spain	Nanotec
23	GLASCOCK	Michael	USA	U. Missouri
24	GRANQVIST	Claes-Goran	Sweden	U. Uppsala
25	GUILLEN	Sonia	Peru	Centro Mallqui
26	HERING	Peter	Germany	U. Duesseldorf
27	HESZLER	Peter	Sweden	U. Uppsala
28	ISLA	Johny	Peru	INDEA
29	KAULICKE	Peter	Peru	PUCP
30	MACHORRO	Roberto	Mexico	U. Nacional Autónoma de México
31	MAKOWSKI	Krzysztof	Peru	PUCP
32	MARTIN	Marie Therese	France	ICSN-CNRS
33	MOYA	Ismael	France	CNRS
34	OLIVERA	Paula	Peru	IPEN
35	OLIVERA	Quirino	Peru	Museo Tumbas Reales de Sipán
36	PASSAMANI	E. C.	Brasil	CBPF
37	PETRICK	Susana	Peru	Universidad Nacional de Ingeniería
38	PIUZZI	Francois	France	CEA - Saclay
39	POINTU	Hélène	France	Quantel Paris
40	PONCE	Fernando	USA	U. Arizona

41	PRICE	David	USA	Oak Ridge
42	RUBAYO	Jesús	Cuba	Inst. Sup. de Tecnologías y Ciencias Aplicadas
43	SABOUNGI	Marie Louise	France	U. de Orleans
44	SATO	Roberto	Mexico	Universidad Nacional Autónoma de México
45	SAUVAIN	Michel	France	IRD
46	SCHERMANN	Jean Pierre	France	U. Paris 13
47	SHADY	Ruth	Peru	Proyecto Arqueológico Especial Caral-Supe
48	SOLER	Pierre	Peru	IRD
49	SVANBERG	Sune	Sweden	U. de Lund
50	TORTSCHANOFF	Andreas	Switzerland	Ecole Polytechnique Fédérale de Lausanne
51	UGAZ	Flora	Peru	PUCP
52	ULLA	Maria Alicia	Argentina	U. Nacional del Litoral
53	VEGA-CENTENO	Rafael	Peru	UNMSM
54	VETTER	Luisa	Peru	PUCP
55	WOESTE	Ludger	Germany	U Libre de Berlín

## 5.- General Features

- School facilities: the School used 3 classrooms belonging to Pavilion H (H311, H312 and H313) for theory lessons. In the afternoons, 3 laboratories of the Faculty of Physics were used for experimental practices (AFM, Laser Ablation, RMN, Fluorescence, etc.).
- Welcome cocktail: In the evening of May 16<sup>th</sup>, the Embassy of France offered a welcome cocktail to the lecturers at the Ambassador's residence.
- Tourist trip: On Sunday 22<sup>th</sup>, a visit to the archaeological site of Caral (about 180 km to the north of Lima) took place. It has been established that Caral has an average antiquity of 5000 years and that it harboured one of the first civilizations of the world.
- Conference facilities: Two auditories were used: Auditory of Engineering and Auditory of Physics.
- Conference inauguration: It took place on Monday 23<sup>th</sup> at the Auditory of Law. It began with a magistral conference by Dr. Fernando Ponce (Arizona Satet University - USA). The next participants were:
  - Ing. Marcial Rubio, Vicerrector Académico PUCP.
  - Dr. Juan Manuel Burga Díaz, Rector UNMSM.
  - Ing. Roberto Morales, Rector UNI.
  - Excelentísimo Señor Jean- Paul Angelier, Embajador de Francia.
  - Dr. Benjamín Marticorena, President CONCYTEC.

Finally, Dr. Sune Svanberg (University of Lund - Sweden) was in charge of the second magistral conference.



- Touristic visit and folkloric dinner: On Wednesday 25<sup>th</sup> a tourist visit to the historical center of Lima took place and in the evening the participants enjoyed a dinner accompanied with folkloric dances of different regions of Peru.
- Conference closure: it was held on Friday 27<sup>th</sup> at the Auditory of Engineering with the participation of:
  - Dr. Jaime Avalos, General Coordinator.
  - Dr. François Piuzzi, International Coordinator.
  - Dr. Guillermo Baldwin, representative of PUCP.
  - Dr. Walter Estrada, representative of the IPEN.

\* Remark: The Inauguration and Closure ceremonies were held at the Conference only, not at the School.

## **5.1 Methodology**

### **Andean Spectroscopy School**

The Andean School was developed through theoretical-practical courses during 5 days

#### **Objectives**

The main objectives were:

- To present the new developments in spectroscopical techniques.
- To evaluate the emergent technologies with potential for the Latin American region.
- To provide an interaction environment among the local, regional and international specialists.

The School fulfilled the outlined expectations, both in theoretical lessons and in experimental practices, so that it was necessary to implement additional practical classes.

## Program of the Andean Spectroscopy School

**Session I : Diffraction (X, e y n), Nanosciences y Electronic Microscopy**

**Place: Words and Human Sciences Faculty- Building H, Classroom H312**

Time\Day	Monday	Tuesday	Wednesday	Thursday	Friday
8:00-10:00	Registration 8:00 - 9:00	<b>Spectroscopic methods based on ion interactions with solids</b> <b>P. Berger</b> English	<b>Near field microscopy AFM</b> <b>A. Gil</b> Spanish	<b>High resolution transmission electron microscopy I</b> <b>F. Ponce</b> Spanish	<b>Spectroscopies in Archeology</b> <b>P. Kaulicke</b> <b>R. Vega-Centeno</b> <b>K. Makowski/L. Ghezzi</b> <b>J. Alcalde</b> Spanish
10:00-10:15			Break		
10:15-12:15	<b>Introduction to X ray's scattering and to EXAFS</b> <b>Ch. De Novion</b> English	<b>Inelastic neutron diffraction in condensed matter physics</b> <b>J.Fernandez-Baca</b> Spanish	<b>Near field adaptative optic using localized surface plasmons</b> <b>G. Badenes</b> Spanish	<b>Electron Energy Loss Spectroscopy</b> <b>D. Acosta</b> Spanish	<b>Spectroscopies in Archeology</b> <b>I. Ghezzi</b> <b>F. Ugaz</b> <b>L. Vetter</b> Spanish
12:15-14:00			Lunch		
14:00-16:00	<b>Introduction to Neutron Diffraction</b> <b>J.Fernandez-Baca</b> Spanish	<b>Nano-Sciences: Global Vision</b> <b>J. Fernández -Baca</b> Spanish	<b>Characterization of laser generated nanoparticles</b> <b>P. Heszler</b> English	<b>High resolution transmission electron microscopy II</b> <b>F. Ponce</b> Spanish	<b>Spectroscopic methods for archeologues</b> <b>S. Petrick/</b> <b>P. Olivera</b> Spanish
16:00-16:15			Break		
16:15-18:15	<b>Neutron diffraction and applications</b> <b>M.Fernandez-Diaz</b> Spanish	<b>Near field microscopy STM</b> <b>J. Cousty</b> English	<b>AFM-STM experiments</b> <b>A. Gil and J. Cousty</b> Spanish	<b>AFM-STM experiments</b> <b>A. Gil and J. Cousty</b> Spanish	<b>Spectroscopic methods for archeologues</b> <b>M. Glasscock</b> English

## Session II : Laser Applications, Instrumentation, Signal Processing, Electronic

Place: Words and Human Sciences Faculty- Building H, Classroom H313

Time\Day	Monday	Tuesday	Wednesday	Thursday	Friday
8:00-10:00	Registration 8:00 - 9:00	Applications of IR and Raman Spectroscopy A. Boix Spanish	Raman spectroscopy, instrumentation and applications in detection of pesticides I R. Sato Spanish	Raman spectroscopy, instrumentation and applications in detection of pesticides II R. Sato Spanish	Programable logic Electronics I J. P. Schermann English
10:00-10:15			Break		
10:15-12:15	Raman and IR spectroscopy Basics using Hyperchem software J. P. Schermann English	Laser ablation experiments Spanish	Laser induced fluorescence basics and applications F. PiuZZi Spanish	Laser induced fluorescence :experiments R Coello K. Contreras Spanish	Programable logic Electronics II J. P. Schermann English
12:15-14:00			Lunch		
14:00-16:00	Design and construction of spectrophotometers I R. Machorro Spanish	Tuneable Lasers, Remote Sensing and Femtosecond Lidar L. Woeste English	Laser ablation experiments I R Coello, M. Asmath.,F. PiuZZi Spanish	Signal processing I (theory) J. P. Schermann English	Laser induced fluorescence experiments I F. PiuZZi Spanish
16:00-16:15			Break		
16:15-18:15	Design and construction of spectrophotometers II R. Machorro Spanish	Laser Spectroscopy: from dye laser to femtosecond “teramobile” LIDAR (II) L. Woeste English	Laser ablation experiments II R Coello, M. Asmath. Spanish	Signal processing II (Experiment) J. P. Schermann English	Raman experiments II R. Sato, M. Asmad F. PiuZZi Spanish

**Session III : NMR for natural substances - Mass Spectrometry, Optical Diagnosis, Life sciences**

**Place: Words and Human Sciences Faculty- Building H, Classroom H311**

<b>Time\Day</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
<b>8:00-10:00</b>	Registration 9:00 - 10:00	<b>Introduction to hyperfine interactions, mössbauer spectroscopy and its application in material science studies</b>  <b>E. C. Passamani</b> Spanish	<b>Optical Diagnostics for vegetation monitoring I</b>  <b>I. Moya</b> Spanish	<b>Ultra sensitive trace gas detection for environmental and medical applications</b>  <b>P. Hering</b> English	<b>Time resolved Spectroscopy basics I</b>  <b>A. Tortschanoff</b> English
<b>10:00-10:15</b>			Break		
<b>10:15-12:15</b>	<b>NMR for natural sciences</b>  <b>M. T. Martin</b> French and Spanish	<b>Introduction to hyperfine interactions, mössbauer spectroscopy and its application in material science studies</b>  <b>E. C. Passamani</b> Spanish	<b>Optical Diagnostics for vegetation monitoring II</b>  <b>I. Moya</b> Spanish	<b>Laser Tissue Interaction Laser and Computer assisted surgery</b>  <b>P. Hering</b> English	<b>Time resolved Spectroscopy basics II</b>  <b>A. Tortschanoff</b> English
<b>12:15-14:00</b>			Lunch		
<b>14:00-16:00</b>	<b>NMR for natural substances Experiment I</b> <b>M. T. Martin</b> French and Spanish	<b>NMR for natural sciences applications III</b>  <b>M. T. Martin</b> French and Spanish	<b>Raman and IR spectra simulations using Hyperchem software</b>  <b>J. P. Schermann</b> English	<b>Quasiclastic structure and dynamics in Van der Waals aggregates I</b>  <b>J. Rubayo</b> Spanish	<b>Environmental monitoring using optical and laser techniques.</b>  <b>S. Svanberg</b> English
<b>16:00-16:15</b>			Break		
<b>16:15-18:15</b>	<b>NMR for natural substances Experiment II</b>  <b>M. T. Martin</b> French and Spanish	<b>NMR for natural sciences applications IV</b>  <b>M. T. Martin</b> French and Spanish	<b>Raman and IR spectra simulations using Hyperchem software</b>  <b>J. P. Schermann</b> English	<b>Quasiclastic structure and dynamics in Van der Waals aggregates II</b>  <b>J. Rubayo</b> Spanish	<b>Environmental monitoring using optical and laser techniques</b>  <b>S. Svanberg</b> English

## **International Spectroscopy Conference**

The International Conference acted as a complement of the Andean Spectroscopy School, providing advanced and concrete topics to be adapted to the regional reality. In the mornings there were plenary meetings, whereas the afternoons were dedicated to group works on specific thematic issues.

### **Objectives**

The outlined main objectives were:

- To provide the Latin American researchers and specialists with an updated vision of the traditional and emergent spectroscopical techniques (Electronic Microscopy, Diffraction (X, e, n), AFM/STM, IR/Raman, RMN, Mass Spectrometry, Lasers, Instrumentation / Simulation, Mössbauer Spectrometry and Elementary Analysis), as well as their applications to the selected thematic areas for the region (Agroindustry, Materials Science, Environment and Life Sciences, Archaeology).
- To exhibit the spectroscopical work which is currently being done in the region and in the developed countries.
- To develop a workshop to assess the new technologies which could be especially useful in the region.

## Program of International Conference of spectroscopy

### Mornings (Single Session)

**Place: Laws Faculty Auditorium (\*)**

**Sciences and Engineering Faculty Auditorium**

Time\Day	Monday	Tuesday	Wednesday	Thursday	Friday
<b>8:00-8:30</b>					
<b>8:30-9:30</b>	Registration Laws Faculty Auditorium PUCP(8:30-9:00)	<b>Electrochromic nano-materials and devices: Variable-transmittance foils for membrane architecture</b>  <b>C. Granqvist</b> Spanish	<b>Effect of impurities on the recrystallization of copper</b>  <b>Ch. De Novion</b> English	<b>Advanced research in single molecules with manipulation in biophysics</b>  <b>C. Bustamante</b> English	<b>¿Multidisciplinary, transdisciplinary or interdisciplinary? The sciences and the archaeology</b>  <b>P. Kaulicke</b> Spanish
	Welcome (9:00-9:20)				
	<b>Materials of the 21:</b>				
<b>9:30-10:30</b>	<b>Einstein and the technology del siglo venidero(*)</b>	<b>Free electrons laser (LEL) a project in Peru</b>  <b>L. Elias</b> English	<b>Neutron Scattering Studies of Colossal Magnetoresistance (CMR) Materials</b>  <b>J. Fernandez-Baca</b> Spanish	<b>Some industrial applications of solid-state lasers</b>  <b>H. Pointu (Quantel)</b> English	<b>Real Tombs from SIPAN</b>  <b>W. Alva / Q. Olivera</b> Spanish
	<b>F. Ponce</b> Spanish				
<b>10:30-11:00</b>	<b>INAUGURATION in the Laws Faculty Auditorium PUCP(*)</b>	Break	Break	Break	Break
<b>11:00-12:00</b>	<b>break (11:00-11:30)(*)</b>	<b>Structure and dynamics of disordered materials</b>  <b>D. Price</b> English	<b>Structural Modulation in K2V3O8</b>  <b>B. Chakoumakos</b> English	<b>SAXS/WAXS methods to the characterization of Nanomaterials</b>  <b>A. Craievich</b> Spanish	<b>Caral, the oldest ancient civilization from America</b>  <b>R. Shady</b> Spanish
	<b>Medical diagnostics and treatment using</b>				
<b>12:15-14:00</b>	<b>laser techniques (*) (11:30 - 12:30)</b>	Lunch	Lunch	Lunch	Lunch
	<b>S. Svanberg</b> English				

## Afternoons

### Session I

Place : Sciences and Engineering Faculty Auditorium

Time\Day	Monday	Tuesday	Wednesday	Thursday	Friday
14:00-14:45	Structural determination to NMR M. T. Martin Spanish	Gas sensing with porous nanoparticle films P. Heszler English		Spectroscopy and Nanomaterials R. Baptist Spanish	Advances in the
14:45-15:30	New methods to the characterization of biological molecules M. Sauvain Spanish	Mass spectrometry for the understanding of history, the structure and the dynamics of the Planet earth P. Soler Spanish		Medical applications of lasers in ophthalmology and dermatology P. Aubourg (Quantel) English	application of archaeometric methods to ceramics M. Glascock English
15:30-16:15	Structural determination of glicosilates composites J. Bravo Spanish	Differential Optical Absorption Spectroscopy (DOAS) and the monitoring in real time of the SO <sub>2</sub> emissions of the Tungurahua volcano E. Ayala Spanish	Visit of colonial Lima	IR spectroscopy: Study of the surface using probe molecules M. Ulla Spanish	Mummies and bones: new and old techniques of analysis S. Guillén Spanish
16:15-16:30	break	break	break	break	Continuing S. Guillen
16:30-17:15	Analysis of total sulfur :Speciation of sulfur compounds by hyphenated techniques F. Baco English	Bi-dimentional Acquisition of spectra generated by laser ablation R. Machorro Spanish		Instrumentation to Raman spectroscopy Y. Barjhoux (Horiba Jobin-Yvon) Spanish	break (16:30-16:45) The archaeological project Nasca-Palpa:
17:15-18:00	Passive Teledetection of the Photosynthetic activity I. Moya Spanish	Influence of interfacial roughness on the Fe/Mn/Fe trilayers coupling E. C. Passamani Spanish		Characterization of the molecular structures in solids used in catalysis through Raman spectroscopy A. Boix Spanish	A joint effort of archaeology, archaeometry and photogrammetry J. Isla Spanish

## Session II

Place: Physics Auditorium

Time\Day	Monday	Tuesday	Wednesday	Thursday	Friday
14:00-14:45	<p><b>Enhanced Two-Photon Fluorescence Spectroscopy for Sensing Applications</b></p> <p><b>G. Badenes</b> Spanish</p>	<p><b>Dynamics of liquids</b></p> <p><b>M. Saboungi</b> English</p>		<p><b>Solvation dynamics at the ZrO<sub>2</sub>-water interface</b></p> <p><b>A. Tortschanoff</b> English</p>	
14:45-15:30	<p><b>Femtosecond Spectroscopy and Coherent Control of Molecules and Clusters</b></p> <p><b>L. Woeste</b> English</p>	<p><b>Spectroscopic methods based on ion interactions with solids</b></p> <p><b>P. Berger</b> English</p>		<p><b>Intramolecular interactions in gas phase peptides</b></p> <p><b>F. Piuze</b> Spanish</p>	
15:30-16:15	<p><b>Structural mass-spectrometry</b></p> <p><b>J. P. Shermann</b> English</p>	<p><b>Some applications of electronic microscopy in industrial materials</b></p> <p><b>D. Acosta</b> Spanish</p>	<p><b>Visit of colonial Lima</b></p>	<p><b>Dynamics of structural relaxation upon excitation of an impurity in rare gas solid matrices</b></p> <p><b>J. Rubayo</b> Spanish</p>	
16:15-16:30	break	break	break	break	break
16:45-17:15	<p><b>STM studies of the molecular structure of self-assembled alkane monolayers on gold and graphite surfaces</b></p> <p><b>J. Cousty</b> English</p>	<p><b>Laser tissue interaction with medical applications</b></p> <p><b>P. Hering</b> English</p>		<p><b>Optical spectroscopy to early detection and treatment of cancer</b></p> <p><b>J. Benavides</b> Spanish</p>	
17:15-18:00	<p><b>Microscopes of forces</b></p> <p><b>A. Gil</b> Spanish</p>	<p><b>Analysis of principal composites in Raman spectroscopy</b></p> <p><b>R. Sato</b> Spanish</p>			



The chairmen of the conference were:

- Dr. Jaime Avalos
- Dr. Modesto Montoya
- Dr. Walter Estrada
- Dr. Francois Piuze
- Dr. Roberto Machorro
- Dr. Charles de Novion
- Mg. Guillermo Baldwin
- Dr. Victor Reyna
- Dra. Maria del Rosario Sun
- Dr. Michael Glascock
- Dr. Jesús Rubayo
- Dr. Robert Baptist
- Dr. Mario Ceroni
- Dr. Yves Barjhoux
- Arq. Luisa Vetter

Thousands of flyers regarding the 4 high-priority areas of the event were opportunously distributed.

a) Materials science



b) Environment and Sciences of life



c) Archaeology



d) Agroindustry



5.2 Logistics

1.- Publicity: A series of products were used with diffusion purposes:

Posters: 650 units  
Triptychs: 500 units

The posters and triptychs were distributed all over the region among public and private universities and research institutions.

POSTERS



TRIPTYCHS



- Folders: 150 units
- Booklets: 150 units (5 pages each).
- Diplomas: 200 units
- Photochecks: 200 units (100 participants, 50 exhibitors and 50 organizers)
- Small banners: 3 units
- Main banner: 1 unit
- CD: 150 units
- Welcome cards: 100 units
- Invitation cards: 200 units

## DIPLOMAS



## FOLDERS



## PHOTOCHECK



## WELCOME CARDS INVITATION CARDS



- These products were used along the two events.
- Folders, booklets and photo-checks were distributed in the beginning of the event.
- The small banners were placed at the entrance of each classroom at the School.
- The main banner was used at the inauguration ceremony and at the conference (Auditory of Engineering).
- The welcome cards were distributed among all the lecturers and participants in the beginning of the event.
- The invitation cards were distributed for the inauguration ceremony of Monday 23th.

## 2.- Lodging:

Two hotels were reserved for the lecturers and scholarship fellows.

- Hotel Imperial: 10 lecturers – Calle Colina 391, Miraflores.
- Hostal Señorial: 26 lecturers and 20 fellows - José Gonzales 567, Miraflores.

## 3.- Transport:

- A bus of 50-people-capacity was hired for the transfer of the lecturers and fellows between their hotels and PUCP.

- The transport of the lecturers and fellows from the airport was in charge of two appointed drivers. The first person who arrived was Dr. F. Piuzzi (May 6<sup>th</sup>) for the final coordinations of the event. The other participants were arriving from May 13 to 25. The last arriving person was Dr. A. Craievich.
- The transport to the airport began on May 22<sup>nd</sup> with the departure of Dr. Fernández-Díaz, whereas Dr. F. Piuzzi was the last one to leave the country (June 1<sup>st</sup>).

#### 4.- Others

- The School was provided with an office at Pavilion Z (1st floor), including a Xerox machine, a laptop and a printer. It was also used to storage desk materials and banners.
- The Conference was provided with an office (Graduated room), including a Xerox machine, a laptop and a printer. It was also used to storage desk materials and banners.

## 6.- Academic content and Impact in the Mass Media

### 6.1 Academic content for the School

#### Session I

#### Monday, May 16 2005

08:00 – 10:00 Registration

10:00 – 10:15 break

10:15 – 12:15 Charles De Novion. (CEA / LLB - France)  
Introduction to X ray's scattering and to EXAFS

12:15 – 13:45 lunch

13:45 – 15:45 Jaime Fernández-Baca (Oak Ridge National Laboratory - USA)  
Introduction to Neutron Diffraction

15:45 – 16:00 break

16:00 – 18:00 Maria Teresa Fernandez-Diaz (Instituto Laue - Langevin - France)  
Neutron diffraction and applications

#### Summary

*Se pretende dar a conocer el uso de la difracción de neutrones para el estudio de la estructura cristalográfica y magnética de materiales. Aunque la difracción de rayos X es la técnica más adecuada para la determinación de estructuras, el afinamiento de los parámetros estructurales y térmicos se lleva a cabo de manera más precisa con neutrones debido a las características de la interacción neutrón-materia. Empezando por las expresiones físicas relevantes desde el punto de vista de la difracción, se discutirán los aspectos en que la difracción de neutrones puede aportar información valiosa y en muchos casos única. Se presentarán distintos instrumentos dedicados a este tipo de experimentos explicando sus particularidades. Finalmente se darán ejemplos de la aportación de la difracción de neutrones en problemas concretos y se pondrán de relevancia las diferencias y la complementariedad con la difracción de rayos X.*

**Tuesday, May 17 2005**

08:00 – 10:00 Pascal Berger (CEA / Saclay - France)

Spectroscopic methods based on ion interactions with solids

Summary

1 Introduction

2 Experimental configurations: Ion beam facilities: accelerators, beam lines, chambers and Detection devices and related electronics

3 Ions interactions with matter: Basic physical processes of ion interactions with solids: excitation and ionization processes, elastic collisions and nuclear reactions and energy loss, scattering cross section, straggling

4 Spectroscopic methods

X-Ray emission: PIXE

Features and specific usage

Elastic spectrometry

Kinematics of RBS

How to read a spectrum (step position and energy shift)

Non Rutherford scattering, resonances

Channelling geometry

Case of very light elements, elastic recoil techniques (ERDA, ERCS)

Nuclear reaction spectrometry:

Domain of use (light elements, isotopes)

Kinematics of NRA/PIGE (energy, excited states)

How to read a spectrum (particle groups, signal as a function of cross-sections)

How to choose the right technique?

Elements to be analyzed

Analysed depth and depth resolution

Sensitivity

Mass resolution

Combination of techniques

5 Data processing: Qualitative and quantitative analysis (standards), "hand made" data processing and simulation codes for spectra analysis

6 Irradiation effects: Basic physical processes of irradiation damage

Electronic regime

Ballistic regime

Modification of materials by ion implantation and irradiation

Ion beam assisted nanostructure synthesis

10:00 – 10:15 break

10:15 – 12:15 Fernandez-Baca J. (Oak Ridge - USA)

Inelastic neutron diffraction in condensed matter physics

12:15 – 13:45 lunch

13:45 – 15:45 Baptist R. (CEA / Grenoble - France)

Nanosciences: Global Visión

Summary

Las nanociencias y nanotecnologías están en dos ámbitos de la investigación y el desarrollo íntimamente vinculados y tienen un fuerte impulso desde hace una veintena de años en todo el

mundo. A la escala nanométrica surgen fenómenos nuevos vinculados al gran valor del cociente superficie/ volumen; así mismo el carácter cuántico de los materiales se pone de manifiesto y aparecerán nuevas propiedades físicas y químicas. Estas propiedades se estudian y se aplican a partir de nano-objetos como los nanotubos de carbono, los nanohilos metálicos o semiconductores, los “quantum dots” o los objetos moleculares que presentan tal o cual función bien específica. Las aplicaciones abarcan ámbitos amplios como la nano-electrónica, los materiales compuestos o en los productos de belleza, etc. Los estudios de probables toxicidades, proliferación en el medio ambiente o problemas sociales forman hoy parte integrante de los grandes programas de investigación.

Esta introducción sobre el nanomundo tiene por objeto orientar el interés de los investigadores y estudiantes de la ciencia de los materiales hacia nuevos desafíos que incentiven por un lado el placer por nuevos descubrimientos en nuestros futuros jóvenes científicos y por otro sus repercusiones en el campo económico.

15:45 – 16:00 break

16:00 – 18:00 Jacques Cousty (CEA / Saclay - France)  
Near field microscopy STM

### **Wednesday, May 18 2005**

08:00 – 10:00 Adriana Gil (Nanotec Electrónica S.L. - Spain)  
Near field microscopy AFM

10:00 – 10:15 break

10:15 – 12:15 Goncal Badenes (Institute of Photonics Sciences- Spain)  
Near field adaptative optic using localized surface plasmons

#### Summary

We report and discuss the sub-wavelength patterning of the optical near-field by total internal reflection illumination of arrangements of resonant gold nano-particles. Under appropriate conditions, the in-plane coupling between Localized Surface Plasmon (LSP) fields gives rise to sub-wavelength light spots between the structures that may open up a broad range of potential applications, including sensing, optical manipulation in the nanoscale and enhanced spectroscopy. The feasibility of this concept has been recently demonstrated experimentally.

Measurements performed with an Apertureless Scanning Near-Field Optical Microscope (ASNOM) show a good agreement with theoretical predictions based on the Green dyadic method.

In the context of optical sensing, the interest of plasmonic structures relies on their high sensitivity to very small variations of the dielectric function at the metal surface. A light absorption change can be detected when e.g. a molecular recognition occurs between a bio-receptor molecule attached to the metal sensor and one bio-molecular counterpart. As the active area of plasmonic sensors is defined by the localization of the surface plasmon fields, their sensitivity can be enlarged by increasing the plasmon mode confinement. For this reason, resonant noble metal nanoparticles with dimensions of a few tens of nanometers and sustaining Localized Surface Plasmon (LSP) modes are excellent candidates for increasing both integration and sensitivity compared to conventional extended thin metal films. We have investigated the possibility of exploiting the different regimes of electromagnetic coupling within an array of nanoparticles and propose a configuration that may considerably enhance the sensitivity of LSP sensors.

This short course will include a discussion on the near-field optical microscopy, nanofabrication and spectroscopic techniques necessary for the fabrication, characterization and use of localized surface plasmon-based

12:15 – 13:45 lunch

13:45 – 15:45 Peter Heszler (Uppsala University - Sweden)  
Characterization of laser generated nano-particles

15:45 – 16:00 break

16:00 – 18:00 Adriana Gil and Jacques Cousty  
AFM-STM experiments

### **Thursday, May 19 2005**

08:00 – 10:00 Fernando Ponce (Arizona State University - USA)  
High resolution transmission electron microscopy I

#### Summary

Los avances en la ciencia y tecnología de materiales requieren en muchos casos un control de estructura y propiedades a nivel atómico. Hay varias técnicas que están siendo desarrolladas con este objetivo. Esta presentación mostrará el estado del arte en estas técnicas en el estudio de materiales cristalinos.

1. Observación directa del arreglo atómico en sólidos cristalinos.
2. Observación del arreglo atómico en defectos e interfaces cristalinas.
3. Combinación de espectroscopias con la observación de la microestructura
  - Análisis por dispersión energética de rayos X
  - Espectroscopia de pérdida energética de electrones
  - Catodoluminiscencia
  - Holografía electrónica
  - Difracción electrónica de haz convergente
4. Aplicaciones a semiconductores

10:00 – 10:15 break

10:15 – 12:15 Dwight Acosta (UNAM - México)  
Electron Energy Loss Spectroscopy

#### Summary

- 1) Introducción
  - Descripción Cualitativa
  - Comparación con otras técnicas de caracterización
- 2) Instrumentación
  - Microscopío
  - Espectrómetro
- 3) Teoría
  - Bohr: Choque de partículas
  - Dieléctrica
  - Bethe: Descripción mecánico-cuántica
- 4) Análisis del Espectro
  - Manejo del espectro

Baja energía (Low-Loss)

Alta energía (High-Loss)

5) Análisis de Low Loss y de High loss

LOW LOSS:

Propiedades electrónicas de la muestra

Constantes dieléctricas equivalentes a radiación visible, UV y rayos X

Brecha óptica y su carácter

Densidad del material

Espesor microscópico

HIGH-LOSS:

Análisis elemental

Ionicidad

Coordinación

Número de átomos con un cierto enlace

Coordinación

12:15 – 13:45 lunch

13:45 – 15:45 Fernando Ponce

High resolution transmission electron microscopy II

15:45 – 16:00 break

16:00 – 18:00 Adriana Gil and Jacques Cousty

AFM-STM experiments

**Friday, May 20 2005**

08:00 – 09:00 Peter Kaulicke (PUCP - Perú)

Reflexiones sobre los principios y los problemas de la arqueología en relación con las ciencias naturales y exactas

09:00 – 09:30 Rafael Vega-Centeno (UNMSM - Perú)

Desafíos arqueométricos en la identificación de procedencias de material lítico. las puntas de proyectil de cerro Lampay

Summary

Cerro Lampay es un conjunto arquitectónico del Período Arcaico Tardío (ca. 3000-1500 a.C.), que fue construido alrededor del año 2400 a.C. y abandonado aproximadamente alrededor del año 2200 a.C. Uno de los rasgos más distintivos de este conjunto es que su abandono estuvo precedido por un singular acto de “enterramiento ritual” de la arquitectura. Como parte de este enterramiento, se colocaron diversas “ofrendas póstumas”. Una de ellas consistía en un paquete de tela colocado en un nicho, que contenía ocho puntas de proyectil. Las puntas de proyectil varían en cuanto a forma y, aparentemente, los tipos de piedras empleados para su fabricación. Las características del “acto de enterramiento” plantean la interrogante de si sólo una comunidad o localidad estuvo involucrada en dicho acto, o si es que contó con la participación de poblaciones de otras regiones. Las puntas de proyectil, en tanto ofrendas, pueden ser consideradas como “representativas” del o los grupos humanos que las depositaron. La identificación de variabilidad de procedencia de los materiales líticos empleados podría ayudar a clarificar si es que el enterramiento involucró sólo a grupos locales o a grupos de otras regiones.



09:30 – 10:00 Krzysztof Makowsky (PUCP - Perú)

Análisis composicional de la cerámica de Piura y Lurín: comparación de resultados obtenidos con microsonda electrónica y con LA-ICPMS

10:00 – 10:30 Javier Alcalde (UNMSM - Perú)

El rol de los estudios de pigmentos en el análisis arqueológico de la cerámica

#### Summary

*En el ámbito del registro arqueológico, del dato empírico, uno de los principales componentes es la cerámica, normalmente conformada por corpus que van de decenas a varios miles de fragmentos. Desde la generalización de su uso, alrededor de 1800 a.n.e. en los Andes Centrales, este elemento reducto de vajillas domésticas, útiles de cocina, elementos lúdicos o de prestigio, adorno de habitaciones, ofrenda en tumbas y eventos especiales, constituye, por consecuencia, un elemento altamente indicador de los niveles de complejidad y organización de las sociedades que la produjeron y consumieron.*

*Los arqueólogos manejamos diversos sistemas de clasificación de la cerámica, cuyos resultados nos hablan de funciones y usos; observamos en las finas cerámicas decoradas motivos simples y complejos que nos hablan de niveles artesanales y de personajes cotidianos, héroes y dioses, incluso de expresiones de gran nivel de abstracción geométrica. En el punto del análisis de la producción, los elementos macroscópicos nos permiten generalizaciones que muchas veces carecen de nivel de profundidad en su lectura. Un aspecto de difícil resolución es el tema de los pigmentos. Su sola descripción, aún con un diccionario de colores, es difícil por la variación cromática diferencial producto de la cocción mayoritariamente en horno abierto; la identificación de los pigmentos mediante procedimientos arqueométricos permitirá afinar nuestros conocimientos de la organización de la producción alfarera y las actividades con ella relacionadas.*

10:30 – 10:45 break

10:45 – 11:15 Ivan Ghezzi (PUCP - Perú)

Dendrocronología en chankillo (Casma): resultados preliminares

#### Summary

El autor y sus colaboradores recolectaron muestras de algarrobo en Chankillo (valle de Casma), tanto de árboles en pie como de madera de contextos arqueológicos. Los resultados preliminares muestran el gran potencial de esta técnica para datación e investigación climática en la costa del Perú.

11:15 – 11:45 Flora Ugaz (PUCP - Perú)

Análisis instrumental aplicado al estudio y conservación de textiles antiguos

#### Summary

En esta presentación se revisarán las técnicas usadas en el área andina en la elaboración de los textiles (materias primas, hilado, teñido de fibras, urdido, tejido, hasta el acabado final de las prendas) para de este modo entender los procesos implicados en su producción. Se hará un recuento de las técnicas analíticas usadas en el estudio y conservación de textiles, desde las más simples que se usan en el campo, hasta análisis más detallados que emplean instrumentación sofisticada. Se verán ejemplos del uso de microscopía óptica, microscopía electrónica de barrido, cromatografía, espectroscopía Raman, espectroscopía infrarroja, espectroscopía UV, espectrometría de masa. Otras técnicas que se mencionarán para el estudio de estos materiales incluyen análisis por vía húmeda, fluorescencia de rayos X, datación por Carbono 14. Se verán ejemplos de las técnicas usadas tanto en tejidos arqueológicos como históricos.

11:45 – 12:15 Luisa Vetter (PUCP - Perú)

El uso de las ciencias exactas en la investigación de la metalurgia precolombina

#### Summary

*Las ciencias exactas son utilizadas para la investigación metalúrgica precolombina desde los inicios del siglo XX. Los primeros trabajos se realizaron en base a análisis químicos elementales; más tarde se incorpora la microscopía óptica. Sin embargo, estas investigaciones fueron más bien esporádicas, recién en la década de los setenta investigadores extranjeros dedican mayor énfasis a estas investigaciones incorporando nuevas técnicas. En el Perú, los estudios sobre la metalurgia precolombina comienzan en la década de los sesentas, pero toman mayor impulso en la década de los noventa. Actualmente, el estudio de la metalurgia andina –en nuestro país- adquiere mayor importancia con la introducción de nuevas tecnologías y la posibilidad de utilizar equipos más sofisticados.*

12:15 – 14:15 lunch

14:15 – 15:15 Jaime Fernandez-Baca (Oak Ridge - USA)

Introduction to Neutron Diffraction

#### Summary

La aplicación de algunos métodos de análisis químico o caracterización física para el estudio de piezas arqueológicas ha dado origen a lo que actualmente conocemos como Arqueometría. En los últimos treinta años la inclusión de técnicas analíticas en los estudios arqueológicos se ha intensificado de manera tan dramática que las revistas internacionales especializadas en temas de arqueología publican casi exclusivamente artículos que contienen resultados analíticos.

Esto ha hecho que el arqueólogo moderno tenga que enfrentarse regularmente con un nuevo reto: decidir cuál de las técnicas analíticas ofrecidas puede darle los resultados que requiere, y cómo interpretar los resultados enviados por el laboratorio. La clave para sortear estos obstáculos está en el conocimiento, al menos somero, de los fundamentos de las técnicas analíticas, sus bondades y deficiencias, así como del rol fundamental que juega en todo el proceso de caracterización la calidad de la muestra.

En la tarea de interpretar los resultados obtenidos de las pruebas de laboratorio es igualmente importante que el analista tenga, desde la perspectiva arqueológica, un buen conocimiento del material que estudia. Así, el estudio que se realice tendrá el éxito deseado si se cumplen tres requisitos: buenas muestras, técnicas analíticas adecuadas y resultados interpretados correctamente.

15:15 – 16:15 Paula Olivera (IPEN - Perú)

Aporte de las técnicas de análisis por fluorescencia de rayos X (FRX) y activación neutrónica (AAN) a la arqueología

#### Summary

El Proyecto Arqueológico Nasca-Palpa se encuentra trabajando en los valles de Palpa, en la costa sur del Perú, con la intención de reconstruir la historia cultural de la región y en especial de los creadores de los famosos geoglifos o Líneas de Nasca. En este contexto, con la participación de un numeroso grupo de investigadores nacionales y extranjeros, los métodos arqueológicos están siendo combinados con nuevos métodos y tecnologías de fechado, registro, prospección geofísica y análisis antropológico, con la finalidad de analizar la compleja interacción entre los cambios del medio ambiente y el desarrollo cultural en un medio ambiente desértico. Este trabajo multidisciplinario está produciendo fascinantes resultados y perspectivas acerca de los casi 3,000 años de desarrollo cultural prehispánico (1,500 AC – 1,500 DC) de una región cuya historia cultural es pobremente conocida, en especial en el caso de las culturas Paracas y Nasca. Desde

1997 a la fecha, se han producido un gran número y variedad de datos que pronto serán integrados en un Sistema de Información Geográfica (GIS).

16:15 – 16:30 break

16:30 – 18:00 Michael Glascock (University of Missouri research reactor - USA)  
Archaeometry: bringing together science and archaeology

#### Summary

The relatively young discipline of Archaeometry, which began a little more than five decades ago as the scientific study of archaeological materials, involves the application of various techniques developed in the physical and natural sciences to investigate archaeological problems. Early archaeometric research was dominated by studies that involved dating, studies of ancient technology, and provenance of archaeological materials such as ceramics, stones, and metals. As the field has grown, new applications in biochemistry, soil science, and computer-aided reconstruction have attracted new specialists and encouraged research on organic materials ranging from ancient DNA to phytoliths. Advances in geophysical prospection and geochemistry have also lead to increased representation of those fields to archaeometric research as well. In this presentation, the history of Archaeometry and its development during the past 50 years will be presented as well as predictions regarding its future. Recent applications of archaeometric methods to archaeological problems will also be discussed.

### **Session II**

**Monday, May 16 2005**

08:00 – 10:00 Registration

10:00 – 10:15 break

10:15 – 12:15 Jean P. Schermann (Paris 13 University - France)  
Raman and IR spectroscopy Basics using Hyperchem software

#### Summary

Raman and IR spectroscopy

Vibrations of polyatomic molecules. Influence of solvents

Experimental methods

Calculations and identification of vibrational spectra

This will be performed by the students themselves using very easy to handle softwares

At the end of the lecture, the students will have drawn molecules, optimised their geometries, calculated their vibrational spectra and compared their calculations to experimental data

Applications of Raman spectroscopy

12:15 – 13:45 lunch

13:45 – 15:45 Roberto Machorro (UNAM - Mexico)  
Design and construction of spectrophotometers I

15:45 – 16:00 break

16:00 – 18:00 Roberto Machorro  
Design and construction of spectrophotometers II

**Tuesday, May 17 2005**

08:00 – 10:00 Alicia Boix (UNL - Argentina)  
Applications of IR and Raman Spectroscopy

Summary

El desarrollo del láser como fuente de excitación del efecto Raman, junto al de detectores y sistemas de amplificación cada vez más eficientes, han permitido aplicar la espectroscopía Raman al estudio de numerosos y diversos tipos de problemas. Es así como la espectroscopía Raman se ha usado en química en la determinación de estructuras de la molécula en fase gas, líquida o sólida, para determinar si una especie química ha sido o no adsorbida en la superficie de un catalizador, para determinar cuantitativamente un componente dado en solución, para detectar y determinar la naturaleza de una transición o cambio de fase. Estos son sólo alguno de los ejemplos de una gran variedad de problemas en los cuales la espectroscopía Raman es el método ideal, sin embargo muchas veces es necesario de la combinación con otras técnicas que permitirán reunir la información necesaria para la solución de un problema.

En particular en este seminario se tratarán los fundamentos de la técnica, la instrumentación básica y las aplicaciones a distintos materiales usados como catalizadores, tales como óxidos masivos o soportados en diversos soportes y zeolitas.

10:00 – 10:15 break

10:15 – 12:15 Francois Piuzzi (CEA / Saclay - France)  
Laser ablation experiments

12:15 – 13:45 lunch

13:45 – 15:45 Ludger Woeste (Free University of Berlin - Germany)  
Tuneable Lasers, Remote Sensing and Femtosecond Lidar I

Summary

When powerful femtosecond laser pulses interact with air, extended plasma channels can be formed. Their extraordinary physical properties open fascinating perspectives for the investigation of the atmosphere. The emitted white-light allows – for example – to retrieve information about the atmospheric composition including trace gases. On the other hand, non-linear light emission from the aerosol allows its remote elementary analysis, which so far is not possible by other optical methods. In addition, the phenomenon of radiation-induced nucleation can be used to withdraw information about optical super-saturation, which is also an optically inaccessible parameter so far. The electrical properties of the plasma channels open besides that fascinating perspectives with regard to lightning research. In the presentation the following aspects will be discussed:

Conventional air monitoring methods and their limits  
Principle of the femtosecond LIDAR  
Formation and propagation of plasma channels in air  
Absorption measurements on atmospheric trace gases  
Measurements of the aerosol  
Electrical properties  
Outlook

15:45 – 16:00 break

16:00 – 18:00 Ludger Woeste

Laser Spectroscopy: from dye laser to femtosecond “teramobile” LIDAR (II)

### **Wednesday, May 18 2005**

08:00 – 10:00 Roberto Sato Berrú (CCADET–UNAM, México)

Raman spectroscopy, instrumentation and applications in detection of pesticides I

#### Summary

El problema de la contaminación ambiental es uno de los temas de interés en la actualidad. La contaminación orgánica es la más importante en magnitud, y sus principales fuentes son de origen doméstico, industrial, agrícola y ganadero. Los pesticidas, entre los compuestos orgánicos, representan una gran amenaza al medio ambiente.

Las diferentes clases de pesticidas son analizadas por diversas técnicas como cromatografía de gases, cromatografía líquida de alta eficiencia, entre otras, y cada técnica cuenta con el acoplamiento de algún nuevo sistema para la detección de un determinado conjunto de pesticidas. En dichas técnicas se requiere un tiempo considerable en el análisis de las sustancias. En cambio, la espectroscopia Raman se presenta como una herramienta alternativa para la detección de una gran variedad de pesticidas, los cuales están presentes en diversas matrices, como son vegetales, frutas, agua y otros. Esta técnica presenta varias ventajas sobre algunas de las técnicas clásicas, no necesita grandes volúmenes de solventes y la obtención de los resultados es relativamente rápida. Además, permite caracterizar muchas sustancias, ya sean sólidos, líquidos o gases.

Este trabajo pretenderá abordar los puntos básicos de la espectroscopia Raman, como son los fundamentos básicos de la técnica, instrumentación necesaria para la obtención de un espectro Raman y algunas aplicaciones, una de las cuales consiste en la detección de pesticidas en matrices específicas por Raman; otra de las aplicaciones que es muy interesante en el Raman, es la caracterización de diversas sustancias (solventes orgánicos, nanotubos de carbono, etc), los cuales hablaremos brevemente.

10:00 – 10:15 break

10:15 – 12:15 Francois Piuzzi

Laser Ablation basics I

#### Summary

The fundamental of plasma generation and associated processes will be presented. Then the application to speciation through the detection of the neutral or ionic emission from the elements will be described. Associated instrumentation and experimental procedures as well as experimental problems and artefacts will be reviewed. Finally some specific applications will be described:

- Surface elemental characterisation through mapping
- Application to liquids
- Analysis of clay, volcanic ashes, special concrete
- Remote analysis: Mars exploration
- Pharmaceutical applications
- Geological applications
- Ablation for thin films generation
- Ablation as a vaporisation source

Comparison with other methods

The associated experiments will focus on the fundamentals of this method, by using macro and micro ablation on different surfaces, with detection by CCD or photomultiplier .

12:15 – 13:45 Lunch

13:45 – 15:45 Francois Piuzzi  
Laser Ablation basics II

15:45 – 16:00 break

16:00 – 18:00 Francois Piuzzi  
Laser Ablation basics III

### **Thursday, 19 May 2005**

08:00 – 10:00 Roberto Sato Berrú (CCADET–UNAM, México)  
Raman spectroscopy, instrumentation and applications in detection of pesticides II

10:00 – 10:15 break

10:15 – 12:15 Francois Piuzzi  
Laser induced fluorescence basics and applications

#### Summary

The principles of fluorescence in gases and liquids and its three sources of selectivity, decay time, dispersed emission, absorption, will be described. Then the application of laser induced fluorescence to the determination of the concentration of atomic and molecular species in gases or condensed phase will be described.

A review of the experimental methods and experimental set up will be introduced, together with a description of the different types of detection.

Finally a survey of some of the numerous possible applications of the detection of molecular fluorescence will be attempted:

- combustion
- cytofluorimetry.
- detection of pollutants in soils
- confocal fluorescence microscopy
- two photon induced fluorescence
- remote detection:lidar
- miniaturization of the associated instrumentation

12:15 – 13:45 lunch

13:45 – 15:45 Jean P. Schermann  
Signal processing (theory)

#### Summary

In laser experiments, signals are very often plagued by spurious noises. The different sources of noise will be described The principles of different signal processing methods will be given.

Among signal processing techniques, synchronous detection is very often used for extracting laser signals from noise. The students will acquire the practice by using a synchronous detection coupled to a laser

15:45 – 16:00 break

16:00 – 18:00 Jean P. Schermann  
Signal processing (experiments)

### **Friday, May 20 2005**

08:00 – 10:00 Jean P. Schermann  
Programable Electronics logic I

#### Summary

Very often, experiments require the use of electronics either for digitising and treating the signals or for obtaining precise sequences and counting events. Generally, each of these tasks requires buying expensive instruments. During the lecture, the students will learn how to design and simulate the functioning of new programmable general purpose circuits which do not require prior knowledge of electronics and any soldering or wiring. As an example, the design of a sequencer and a counter will be prepared behind a computer screen and tested at the end of the lecture.

10:00 – 10:15 break

10:15 – 12:15 Jean P. Schermann  
Programable Electronics logic II

12:15 – 13:45 lunch

13:45 – 15:45 Francois Piuzzi  
Laser induced fluorescence experiments I

15:45 – 16:00 break

16:00 – 18:00 Francois Piuzzi  
Laser induced fluorescence experiments II

### **Session III**

### **Monday, May 16 2005**

08:00 – 10:00 Registration

10:00 – 10:15 break

10:15 – 12:15 Marie-Thérèse Martin (ICSN, Francia)  
Structural determination by RMN basics

#### Summary

- Principe élémentaire, spectre 1D et 2D
- Informations obtenues par les différentes expériences

- Spectres COSY
- Spectres NOESY
- Corrélations hétéronucléaires proton-carbone
  - A travers une liaison : spectres XHRCORR, HMQC et HSQC
  - A travers plusieurs liaisons spectre HMBC
    - \* Corrélations dans les cycles benzéniques
    - \* Corrélations des méthyles (exemple d'application dans les terpènes)
    - \* Mise en évidence de molécules symétriques
    - \* Corrélations hétéronucléaires proton-azote
    - \* Démarche pour l'interprétation de spectre.
- Détermination d'une structure par le dépouillement de l'ensemble des spectres de RMN.

12:15 – 13:45 lunch

13:45 – 15:45 Marie-Thérèse Martin  
Structural determination by NMR applications I

15:45 – 16:00 break

16:00 – 18:00 Marie-Thérèse Martin  
Structural determination by NMR applications II

## **Tuesday, May 17 2005**

08:00 – 10:00 Edson C. Passamani (Espírito Santo University- Brasil)  
Introduction to hyperfine interactions, mössbauer spectroscopy and its application in material science studies

### Summary

Introduction to the hyperfine interactions:

- 1) Electric interaction (isomer shift and quadrupolar splitting)
- 2) Magnetic interaction (Nuclear Zeeman interaction)
- 3) Combined interactions (electric + magnetic)

Mössbauer effect (recoilless resonance)

- 1) Free atomic gas
- 2) Natural line width
- 3) Phonon zero

Electronic/set up for Mössbauer spectroscopy

Applications in material science (MAGNETISM).

10:00 – 10:15 break

10:15 – 12:15 Edson C. Passamani  
Introduction to hyperfine interactions, mössbauer spectroscopy and its application in material science studies II

12:15 – 13:45 lunch

13:45 – 15:45 Marie-Thérèse Martin  
Structural determination by RMN applications III



15:45 – 16:00 break

16:00 – 18:00 Marie-Thérèse Martin  
Structural determination by RMN applications IV

### **Wednesdays, May 18 2005**

08:00 – 10:00 Ismael Moya (CNRS - France)  
Optical Diagnostics for vegetation monitoring I

10:00 – 10:15 break

10:15 – 12:15 Ismael Moya  
Optical Diagnostics for vegetation monitoring II

12:15 – 13:45 lunch

13:45 – 15:45 Jean P. Schermann  
Simulaciones de espectros IR y Raman usando el software Hyperchem

15:45 – 16:00 break

16:00 – 18:00 Jean P. Schermann  
Simulaciones de espectros IR y Raman usando el software Hyperchem

### **Thursday , May 19 2005**

08:00 – 10:00 Peter Hering (Dusseldorf University- Germany)  
Laser and computer assisted surgery

#### Summary

The human-machine partnership in a complicated surgery situation is important because it offers the possibility both of significantly improving the efficiency, safety, and cost-effectiveness of existing clinical procedures and of developing new ones that cannot be performed at all otherwise.

Advances in imaging have enabled huge progress in medical interventions. New imaging procedures with digital radiography, virtual endoscopy, spiral CT and interventional MR guarantee better results. We add a new ultra fast holographic method for precise 3D facial reconstruction.

#### 3D Facial Measurement Using Holographic Tomography

A holographic image of a patient taken with a pulsed laser system (pulse duration ~ 35 ns) contains the complete 3D spatial information. Due to the extremely short recording time, it is not affected at all by the movements of the object. The low energy density of the widened laser beam allows recordings of patients with open eyes.

In holographic tomography the real image of the patient's hologram is reconstructed in space by means of a cw-laser. Its volume is sliced into a series of 2D projections which are captured digitally. The 3D surface information of the object is analyzed with high precision and visualized with a computer model with real 3D texture information.

#### Laser ablation in medicine and material processing

Hard tissue interventions are still performed with mechanical instruments, mainly with free hands. A novel laser osteotomy technique allows a non-contact cutting and 3D removal of bone and cartilage tissue without thermal damage and with arbitrary sophisticated cut geometry. It

opens ways to new operation procedures and promises shorter healing periods. An extremely fast and precise PC-controlled beam deflector guides the CO<sub>2</sub> laser beam over the tissue, combined with a computer assisted navigation system. A sealed short pulsed CO<sub>2</sub>-laser system used together with special beam-scanning algorithms enables us to produce very fine cuts (100- $\mu$ m width) as well as deep cuts.

The absence of thermal side effects after osteotomy with caesar's laser has been confirmed in detailed histological studies and animal trials. An additional advantage of the laser treatment is that it does not produce a traumatic vibration and any bone dust or metal abrasion, like in the case of a mechanical saw / milling cutter.

10:00 – 10:15 break

10:15 – 12:15 Peter Hering

*Laser and computer assisted surgery*

12:15 – 13:45 lunch

13:45 – 15:45 Jesús Rubayo (Instituto Superior de Tecnologías y Ciencias Aplicadas - Cuba)  
Quasiclasic structure and dynamics in Van der Waals aggregates I

15:45 – 16:00 break

16:00 – 18:00 Jesus Rubayo

Quasiclasic structure and dynamics in Van der Waals aggregates II

## **Friday, May 20 2005**

08:00 – 10:00 Andreas Tortschanoff (Federal Polytechnic School of Lausanne - Switzerland)  
Time resolved Spectroscopy basics I

### Summary

The investigation of the dynamics of molecules necessitates techniques with high temporal resolution which can only be provided by optical techniques. Processes on the timescale of pico- and femto-seconds can be investigated using ultrashort laser pulses.

This course will give a basic introduction to time resolved spectroscopy. I will shortly explain the generation of short laser pulses and present some fundamental ideas and the basic techniques that are used to investigate ultrafast processes.

Finally I want to discuss results of some current experiments.

10:00 – 10:15 break

10:15 – 12:15 Andreas Tortschanoff

*Time resolved Spectroscopy basics I*

12:15 – 13:45 lunch

13:45 – 15:45 Sune Svanberg (Lund University - Sweden)

Environmental Monitoring using Optical and Laser Techniques

### Summary

*Optical spectroscopy, performed locally or remotely, allows efficient monitoring of the status of the environment. Air pollutants can be measured by long-path absorption techniques or by lidar*

*technology. Several examples from urban, industrial and geophysical pollution monitoring will be given, illuminating the possibilities of differential optical absorption spectroscopy (doas), diode laser spectroscopy, IR gas correlation imaging and differential absorption lidar (dial). Laser-induced fluorescence provides interesting possibilities to study water quality, vegetation and historical building status. Experience from a variety of laboratory and field experiments will be shared.*

15:45 – 16:00 break

16:00 – 18:00 Sune Svanberg

Environmental Monitoring using Optical and Laser Techniques

## **Laboratory Practices**

The school laboratory practices were held in the Physics Laboratories of the PUCP

- AFM/ STM Spectroscopy, by A. Gil, J Cousty and J. Diaz
- Laser Ablation – LIBS, by F. Piuzzi, K. Contreras
- Laser Induced Fluorescence (LIF) by K. Contreras, R. Coello
- Simulations using Software Hiperchem, by J.P. Schermann
- Programable Logic Electronic, by J.P. Schermann and J. Villanueva
- Raman Spectroscopy, by R. Sato, M Asmad
- Optical characterization of vegetation, by I. Moya
- NMR Application and class demonstrative, by M.T. Martin and H. Maruenda
- Signals Processing, by J.P Schermann

## **6.2 Academic content for the Conference**

### **Monday, May 23 2005**

08:30 – 09:00 Registration

09:00 – 09:20 Welcome: Dr. Jaime Avalos y el Dr. Francois Piuzzi

09:20 – 10:30 Ponce F. (Arizona State University - USA)

Materials of the century XXI: Einstein and the technology of the future century

#### Summary

*Hace ya un siglo que Albert Einstein tuvo un año muy creativo. Sus ideas que fueron publicadas en 1905 han influenciado considerable al mundo actual. En esta charla se revisará la naturaleza de esas ideas y el impacto que han tenido en la ciencia y tecnología del siglo XX, cubriendo la evolución de la física del estado sólido desde el descubrimiento del efecto*

*fotoeléctrico, a través del desarrollo de la mecánica cuántica, los semiconductores, la microelectrónica y la opto electrónica. El estado actual de la ciencia de materiales será cubierto en la disponibilidad de tiempo, como las nuevas rutas en la nanoelectrónica, la biofísica, la iluminación por estado sólido, y nuevos procesos fotovoltaicos. Finalmente, se describirá los desafíos que vemos para el siglo venidero, cómo ir más allá de la ley de Moore, el uso del spin para procesar información (la spíntrónica), etc., todos éstos están dentro del marco científico desarrollado por Einstein hace un siglo.*

10:30 – 11:00 Inaguration

11:00 – 11:30 break

11:30 – 12:30 Sune Svanberg (Lund University - Sweden)  
Medical diagnostics and treatment using laser techniques

#### Summary

Laser-induced fluorescence, Raman and elastic scattering spectroscopy provide new possibilities for medical diagnostics, both in point monitoring as well as in imaging. Early malignant tumours can be detected utilizing the natural fluorescence from endogenous chromophores, and the specific fluorescence from tumour-seeking agents. Cardiovascular disorders can also be studied by fluorescence and Raman techniques, possibly guiding laser-ablation therapy of atherosclerotic vessels. Optical mammography employing gated-viewing techniques may provide a means for early tumour detection without employing ionizing radiation. Recently, it has become possible to monitor gas in situ in body cavities, and a new technique for sinusitis diagnostics will be discussed.

Using laser radiation in combination with tumour-seeking agents, it is possible to eradicate malignant tumours using photodynamic therapy. Experience from skin tumour treatment, and from emerging applications of interstitial treatment of deep-lying lesions under spectroscopic control, will be shared.

12:30 – 14:00 lunch

### **Tuesday, May 24 2005**

08:30 – 09:30 Luis Elias (U. de Hawai- USA)  
Free electrons laser (LEL) a project in Perú

09:30 – 10:30 Claes G. Granqvist (Uppsala University - Sweden)  
Electrochromic nano-materials and devices: Variable-transmittance foils for membrane architecture

#### Summary

Electrochromic materials have a nano structure and are able to change their properties reversibly and persistently by insertion/extraction of electric charge. These materials can be integrated in durable multilayer devices backed by glass or flexible polyester foil. Such devices have many applications in emerging technology. For example, they can be used in intelligent glass façades for buildings (“smart windows”), whose throughput of visible light and solar energy can be changed so that indoor comfort and energy efficiency can be achieved simultaneously. Other applications where transparency control is of concern include eyewear such as ski goggles and visors for motorcycle helmets. Alternative device designs incorporating reflecting or scattering layers find uses in variable-reflectance mirrors—such as “anti-dazzlig” rear view mirrors for

automotive uses—and in non-emissive display devices. Variable-thermal-emittance devices represent still another option.

The first part of this talk summarizes recent work—mainly from the speaker's laboratory—on the basic electrochromic properties of nano structured thin films based on W oxide and Ni oxide prepared by sputter deposition. Here the focus is on the fundamental properties underlying the variable optical properties, which provide a foundation for assessing the obtainable optical modulation range as well as the long-term durability. The investigations use a wide range of physical and chemical techniques.

The second part then reports on progress on the development of durable electrochromic foils capable of operating in a wide temperature range. These foils include films of W oxide and Ni oxide joined by a polymer electrolyte capable of H<sup>+</sup> and Li<sup>+</sup> conduction and positioned between transparent and electrically conducting films on polyester. Important features of the presentation include methods for boosting the bleached-state transmittance, and manufacturing aspects for sheet and roll-to-roll manufacturing.

Potential applications to membrane architecture are emphasised and a number of concrete examples of buildings are presented, ranging from visionary work by Buckminster Fuller in the 1950s to the Eden Project of the 2000s, and beyond.

10:30 – 11:00 break

11:00 – 12:00 David Price (Oak Ridge National Laboratory - USA)  
Structure and dynamics of disordered materials

#### Summary

I will review progress in the field of the structure and dynamics of disordered condensed matter, encompassing materials where at least one component lacks either rotational or translational long-range order. Systems in thermodynamic equilibrium as well as those where some aspect of the disorder is frozen into a glassy state will be discussed. Some relevant experimental methods will be reviewed, followed by examples of recent applications of these techniques to study the various aspects of structural and dynamical disorder. I will also review current status and future plans for neutron scattering research at the HFIR research reactor at ORNL, with special emphasis on disordered materials. HFIR is in the process of a major upgrade that includes a liquid hydrogen cold source, guide hall, and a suite of cold neutron scattering instruments planned for operation in Spring 2006.

12:00 – 14:00 lunch

### **Wednesday, May 25 2005**

08:30 – 09:30 Charles De Novion (CEA / LLB - France)  
Effect of impurities on the recrystallization of copper

#### Summary

Copper wires for electrical applications are manufactured by a continuous melting, casting and hot-rolling process, followed by cold wire-drawing to the diameter required by the application. The wire-drawing process is followed by annealing at  $\approx 260^\circ\text{C}$  to restore the mechanical properties and the flexibility of the wires. The mechanical quality of the wires after annealing is very sensitive to small amounts (a few ppm) of residual impurity elements, in particular sulfur and lead: indeed, the recrystallization temperature increases with impurity content.

The aim of the present study was to understand the effect of impurities (S and Pb) on the microstructure and crystallographic texture of the wire-drawn materials, and on the recrystallization mechanism. Samples of different compositions were studied by three

complementary techniques: neutron diffraction (determination of the orientation distribution of grains relatively to the wire axis), transmission electron microscopy and electron backscattering diffraction, after different steps of the manufacturing process, i.e. before and after wire-drawing, and during the recrystallization anneal.

This allowed measuring the elastic stored energy (ESE) in the grains, as a function of their crystallographic orientation. It was found that the ESE increases with impurity content, and is larger in grains with  $\langle 111 \rangle$  crystalline direction parallel to the wire axis.

A recrystallization mechanism is proposed: preferred restoration of nuclei close to a grain boundary in grains with  $\langle 100 \rangle$  // wire axis, coalescence of these dislocation-free nuclei, and propagation in the neighbor grain of higher ESE. A twinning process, leading to a Pausaing-up of the texture, complicates this mechanism.

The recrystallization mechanisms are similar in all the studied materials, but the kinetics is slowed-down when the impurity content increases; this is attributed to trapping of dislocations and/or grain boundaries by the impurities.

The implications of this work for the industrial process are briefly discussed, and new experiments are proposed to check the above model.

09:30 – 10:30 Jaime Fernández-Baca (Oak Ridge - USA)

Neutron Scattering Studies of Colossal Magnetoresistance (CMR) Materials

#### Summary

Elastic and inelastic neutron scattering has been utilized to study microscopic spin interactions in ferromagnetic  $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$  (LCMO) as a function of the hole-doping  $x$  (0.2, 0.25 and 0.30); and in ferromagnetic  $\text{Pr}_{0.70}\text{Ca}_{0.3}\text{MnO}_3$  (PCMO) as a function of external magnetic field. The evolution of the magnetic coupling in these systems as they undergo a metal-to-insulator transition is both surprising and inconsistent with existing models for these materials such as Heisenberg ferromagnetism, double-exchange or modified double-exchange. These results will be discussed in this talk.

10:30 – 11:00 break

11:00 – 12:00 Brian Chakoumakos (Oak Ridge - USA)

Structural Modulation in  $\text{K}_2\text{V}_3\text{O}_8$

#### Summary

The title compound has the fresnoite-type structure, which is of interest because of unusual low temperature magnetic properties.  $\text{K}_2\text{V}_3\text{O}_8$  is a two-dimensional  $S = 1/2$  antiferromagnet ( $T_N \sim 4\text{K}$ ) that exhibits field-induced spin reorientation [1] and enhancement of heat transport [2]. At 110K infrared, permittivity, and heat capacity measurements [3] indicate a structural distortion occurs, which may involve a change in the coordination geometry of the magnetic  $\text{V}^{+4}$  ion. The temperature dependence of the crystal structure of  $\text{K}_2\text{V}_3\text{O}_8$  has been studied by neutron powder, single-crystal X-ray, and electron diffraction. From room temperature to 110K, the structure is that of the fresnoite-type,  $P4bm$ , with no superstructure modulation. Below 110K, the structure becomes modulated with a wave vector  $1/3a + 1/3b + 1/2c$ . The supercell reflections are clearly evident in X-ray diffraction patterns recorded by a CCD. Refinement of the subcell below the phase transition identifies which atoms are involved in rigid unit mode vibrations by the anomalous temperature dependence of their displacement parameters. Freezing-out of one or more of the rigid unit modes can account for modulation below 110K.

12:00 – 14:00 lunch

### **Thursday, May 26 2005**

08:30 – 09:30 Carlos Bustamante (University of California Berkeley - USA)  
Advanced research in single molecules with manipulation in biophysics

09:30 – 10:30 Helene Pointu (Quantel - France)  
Some industrial applications of solid-state lasers

#### Summary

Beyond well-known welding, cutting or drilling, new applications are now arising in industry. *Based on techniques, coming out from research laboratories, spectroscopy, ablation, plasma creation, these are now used for control, measure, surface treatment, cleaning.* These new fields are presented, seen from a laser manufacturer point of view.

10:30 – 11:00 break

11:00 – 12:00 Aldo F. Craievich (University of Sao Paulo - Brazil)  
SAXS/WAXS methods to the characterization of Nanomaterials

#### Summary

Serán descritos los métodos experimentales de difracción de rayos X (XRD) y de difusión de rayos X a pequeños ángulos (SAXS), aplicados conjuntamente al estudio de nanoclusters metálicos inmersos en matrices vítreas. Estos nanomateriales son preparados a partir de vidrios precursores dopados y sobresaturados mediante la técnica de “splat-cooling”. Será mostrado como el uso combinado de las técnicas XRD/SAXS y de un haz de rayos X intenso, producido por una fuente de radiación sincrotrónica, permiten la determinación precisa de la estructura de los nanomateriales estudiados y el análisis de sus transiciones de fase en función de la temperatura. La naturaleza cuantitativa de los estudios de SAXS, realizados in situ, posibilita la caracterización de los mecanismos de agregación de los elementos dopantes. Serán presentadas varias aplicaciones de SAXS al estudio de los mecanismos de formación de nanogotas (líquidas) de Bi y de nanocristales de Ag inmersos en vidrios de borato-sodio. Finalmente, serán reportados resultados recientes de la aplicación combinada de XRD y SAXS en estudios de transiciones de fase sólido-líquido y líquido-sólido de nanoclusters esféricos de Bi en función del radio de los mismos. Todos los estudios experimentales de XRD/SAXS fueron realizados en el Laboratorio Nacional de Luz Síncrotron (LNLS), Campinas, Brasil.

12:00 – 14:00 lunch

### **Friday, May 27 2005**

08:30 – 09:30 Peter Kaulicke (PUCP – Perú)  
¿Multidisciplinariedad, transdisciplinariedad o interdisciplinariedad? Las ciencias y la arqueología

09:30 – 10:30 Quirino Olivera (Mueso Tumbas Reales de Sipan - Perú)  
Real Tombs from SIPAN

#### Summary

Sipán, Investigación Científica e Impacto Social, trata de comentar acerca de las investigaciones científicas realizadas en el complejo arqueológico de Sipán, ubicado en la costa norte del Perú.

Desde el año 1,987 en que se descubre la Tumba del Señor de Sipán, el equipo de arqueólogos dirigidos por Walter Alva, han logrado investigar 16 tumbas, pertenecientes a diversos personajes de la elite gobernante Mochica.

La Cultura Moche o Mochica a la cual pertenecen los contextos funerarios de Sipán, se desarrolla entre los siglos I y VI d. C., en la angosta franja de la costa norte del Perú, a unos 550 Kms. entre Huarney en el sur y Piura en el norte. Los Mochicas destacaron extraordinariamente como agricultores, artistas, pescadores, expertos metalurgistas y guerreros.

Sipán es ahora el más claro testimonio de cuanto puede aportar la cultura y especialmente la arqueología al sistema productivo de un país, en los momentos mas difíciles en que vivía el Perú y era inelegible como destino turístico debido al terrorismo, el mal del cólera, el narcotráfico, Sipán se presentaba ante el mundo como el descubrimiento arqueológico mas importante de los últimos tiempos, comparable solo a la Gran Tumba de Tutankamón y la tumba Xian en China. La noticia cubrió extensas páginas de la National Geographic y del New York Times.

Gracias a los estudios científicos realizados en Sipán, con métodos y técnicas especializadas hoy podemos establecer el vínculo genético y de parentesco entre personajes sepultados hace 1,700 años. Hoy en día Sipán, para la nación peruana es símbolo de admiración y orgullo, es identidad, es modelo de investigación y de gestión cultural, es el singular valor agregado que posee nuestra oferta turística, pero además es también la oportunidad que tiene la gente para generar economía y desarrollo, por eso actualmente existen universidades, institutos, colegios, hoteles, agencias de viaje, restaurantes, dulcerías, y organizaciones sociales, que llevan el nombre de Sipán como símbolo de éxito.

10:30 – 11:00 break

11:00 – 12:00 Ruth Shady (Proyecto Especial Arqueológico Caral-Supe - Perú)  
Caral, the oldest ancient civilization from America

#### Summary

Por su notable antigüedad, de 5000 años, y su gran complejidad arquitectónica, la ciudad de Caral viene recibiendo un tratamiento muy especial. La aproximación científica al conocimiento de la organización social, de las expresiones materiales de la ciencia, tecnología y arte, así como de la ideología de la población que construyó y habitó este asentamiento urbano se realiza bajo la concepción de un sistema social, constituido por subsistemas internamente articulados entre sí, con su respectiva trayectoria histórica y en relación con las circunstancias de su medio ambiente geográfico y social. Se pretende explicar así el proceso de formación de la civilización más antigua de América, de sus modos de vida y cultura y sus cambios a través del tiempo.

Con esta perspectiva teórica, las actividades de investigación arqueológica y de conservación de los monumentos en la ciudad de Caral son realizadas por un equipo multidisciplinario, de modo coordinado, con el apoyo adicional de otros profesionales cuando se requieren de análisis especializados. Se ejecutan, asimismo, ensayos experimentales sobre los materiales en referencia a los trabajos de consolidación y restauración, en consideración a la singularidad del sitio. En todas las acciones se tiene en cuenta el pleno respeto por los contextos y la autenticidad de los monumentos.

En relación con la realidad del país, se ha incluido el criterio de integración del sitio con el entorno, en tres ámbitos, de la cuenca, del área compartida y de la zona de influencia.

Con este marco, el Proyecto Caral pone en valor el patrimonio cultural bajo procedimientos científicos y fomenta el desarrollo económico de la sociedad actual.

12:00 – 14:00 lunch



## Afternoon Sessions

### Session I

#### Monday, May 23 2005

14:00 – 14:45 Maria T. Martin (ICSN - France)

New methods to the characterization of biological molecules

#### Summary

Estudio de los equilibrios conformacionales por variación de solvente o de temperatura. Utilización de acoplamiento 1J protón-carbono en HMBC.

La Resonancia Magnética Nuclear ofrece múltiples posibilidades para determinar la estructura de moléculas de síntesis ó de origen natural. Pero, ¿cómo escoger entre la gran variedad de secuencias de impulsión proporcionadas por las industrias de espectrómetros ó entre las reportadas diariamente en la literatura? De hecho el factor determinante en el análisis es la pureza de la muestra, y algunas secuencias básicas bien optimizadas y explotadas son suficientes. Los equilibrios conformacionales que se manifiestan corrientemente en nitrocompuestos pueden ser determinados mediante experimentos NOESY (Nuclear Overhauser Enhancement Spectroscopy) en fase. Estos equilibrios son sensibles a las variaciones de solvente y temperatura. Veremos algunos casos concretos estudiados por RMN por especialistas químicos del Instituto de Química de Sustancias Naturales.

Aunque el uso corriente de los espectros HMBC (Heteronuclear Multiple Bond Correlation) es para determinar las correlaciones entre protones y carbonos separados por varios enlaces (2J y 3J usualmente), el acoplamiento 1J que puede también ser determinado, constituye un aporte suplementario a la determinación estructural. En efecto, esta magnitud es característica de funciones presentes en la molécula. Cuando el químico posee solo una pequeña cantidad de muestra tales informaciones espectrales adquieren carácter crucial. Daremos ejemplos de tiocompuestos, compuestos nitrogenados y epoxidados.

14:45 – 15:30 Michael Sauvain (IRD - Francia)

Nuevos métodos para la caracterización de moléculas biológicas: Aportes de la química estructural a la diversidad molecular de las sustancias naturales antiparasitarias

#### Summary

La búsqueda de terapias alternativas contra parásitos necesita nuevos motivos químicos capaces de superar las resistencias de los fármacos a los medicamentos. Para adaptarse al medio ambiente, los vegetales y animales producen numerosos metabolitos secundarios. Estas sustancias naturales son estructuras de gran diversidad que la imaginación y las herramientas del químico orgánico de síntesis no han todavía superado. Esta biodiversidad química esta sustentada por una biodiversidad biológica en vía de desaparición. Los productos naturales deben ser trabajados con los herramientas los mas finos de espectrometría permitiendo acelerar el proceso de descubrimiento y ganar la carrera de la buena salud y del desarrollo sostenible. En el caso de las parasitosis, es conveniente nombrar los éxitos de la quinina o de la artemisinina no solamente como cura efectiva de la malaria, una de las enfermedades infecciosas las mas graves, pero también como patrón para nuevas estructuras de origen sintética mas activas y biodisponibles. La presentación muestrará la gran variedad de estructuras químicas de origen natural caracterizadas estos últimos años interviniendo en el proceso de destrucción de los parásitos del ser humano.

15:30 – 16:15 José Bravo (San Andrés Major University - Bolivia)  
Structural determination of glicosilates composites

#### Summary

Se expondrá in extenso un ejemplo de elucidación estructural de moléculas glicosiladas. El ejemplo escogido es una saponina esteroideal. Dicho ejemplo podrá ser complementado si fuera necesario con detalles de la elucidación estructural de un benzoato de bencilo glucosilado. Dicha exposición es parte del texto de próxima aparición “A Textbook for a Practical Approach to Structural Elucidation of Natural Products” del cual J. Bravo es co-autor. El objetivo de dicho ejemplo es mostrar un método de aplicación general para determinación estructural de glicósidos. El mencionado texto estará dirigido principalmente a estudiantes debutantes en la ciencia de la determinación estructural de productos naturales, pudiendo éstos estar embarcados en programas de estudio de maestría o doctorado. Siendo un texto introductorio, el objetivo del mismo es presentar la ciencia de la elucidación estructural a través de ejemplos “fully discussed”, proveyendo sets completos de espectros y su análisis correspondiente. El temario de la exposición es el siguiente:

Strategy to board the spectral analysis of Glycoside 3

A. The aglycone structure of glycoside 3

A.1. The planar structure of the aglycone of glycoside 3

A.2. The stereochemical structure of the aglycone of glycoside 3

B. The sugar side chain structure of glycoside 3

NMR data of the sugar 1 of the sugar side chain of glycoside 3

NMR data of the sugar 2 of the sugar side chain of glycoside 3

NMR data of the sugar side chain of Acetylated glycoside 3

C. Connecting aglycone and sugar side chain the global structure of glycoside 3

D. Contribution of mass spectroscopy analyses to the establishment of the structure of glycoside 3

NMR data of glycoside 3

16:15 – 16:30 break

16:30 – 17:15 Franck Baco (Institut Français du Pétrole - France)

Analysis of total sulfur :Speciation of sulfur compounds by hyphenated techniques

#### Summary

Under environmental pressures to reduce sulfur levels in automotive fuels, new lower levels were set by European Commission. In Europe, since the 1st January 2000, maximum sulfur level in gasoline is 0.0150 % (w/w) and 0.0350 % (w/w) for diesel. In 2005, they will be both 0.0050 % (w/w). What will be the next specifications after ? 0.0010 % (w/w) or less ?.

Which techniques could be used to measure total sulfur at these different levels of concentration with a good level of precision (WDXRF, EDXRF, UVF, ...) ? Which normalized methods could be used ? This paper describes the state of the art for the analysis of sulfur in petroleum products and what kinds of techniques and normalized methods could be used (Result of the last Round Robin test organized in Europe by CEN TC19 working group 27).

On-line analysis of sulfur becomes more and more important to follow the quality of products and to control hydrodesulfurization process (gasoline and diesel). This paper presents results about on-line analysis by UV Fluorescence : Comparison with normalized methods (WDXRF, laboratory UVF), instrument stability, ... Other techniques to follow sulfur directly in line will be also presented (GC, EDXRF, WDXRF).

In order to reduce the level of sulfur in petroleum product for the future specifications, IFP/AXENS has been working for many years to develop hydrodesulfurization process (Prime

G+, Prime D) and catalysts. In the same way, analytical methods have been developed to understand the mechanisms involved in the removal of sulfur during the treatment.

This paper presents hyphenated techniques in gas chromatography able to analyze sulfur in petroleum products (GC-AED, SCD, PFPD, GC-ICP-MS) like gasoline and diesel (analysis of the feeds and hydrotreated products). New technique like GCxGC could be used for a better characterization of sulfur compounds in petroleum products

17:15 – 18:00 Ismael Moya (CNRS - France)

Passive Teledetection of the Photosynthetic activity

#### Summary

En varias publicaciones recientes se ha discutido sobre la posibilidad de extraer la emisión de fluorescencia de la Chl a partir de medidas de reflectividad, usando el principio de Discriminación de las Líneas de Fraunhofer (FLD del inglés Fraunhofer Line Discrimination). En 1998 la cuestión se reconsideró por medio del proyecto FLEX “Fluorescence Explorer” propuesto a la ESA (Agencia espacial Europea). El método FLD compara la profundidad de una banda de absorción en la irradiancia solar con la profundidad de la banda en la radiancia del objeto. En este contexto, un nuevo Detector Pasivo de Fluorescencia Multiespectral (PMFD), aplicado a las bandas de absorción del oxígeno atmosférico, ha sido desarrollado en el LURE (Laboratorio para la Utilización de la Radiación Electromagnética). El objetivo de este artículo es presentar las primeras aplicaciones de este instrumento, para evaluar el potencial del método FLD para realizar medidas a distintos niveles de integración, de la hoja a la cubierta vegetal. También se pretende resaltar las limitaciones actuales y los pasos preparatorios necesarios hacia una misión espacial.

### **Tuesday, May 24 2005**

14:00 – 14:45 Peter Heszler (Uppsala University - Sweden)

Gas sensing with porous nanoparticle films

14:45 – 15:30 Pierr Soler (IRD - France)

Mass spectrometry for the understanding of history, the structure and the dynamics of the Planet earth

15:30 – 16:15 Edy Ayala (Polytechnic School of Quito - Equator)

Differential Optical Absorption Spectroscopy (DOAS) and the monitoring in real time of the SO<sub>2</sub> emissions of the Tungurahua volcano

#### Summary

Se describe el desarrollo de un sistema para monitoreo de la emisión de SO<sub>2</sub> de volcanes basado en espectroscopia de absorción óptica diferencial (DOAS), la cual es más accesible y representa una mejor instrumentación que la técnica antiguamente utilizada llamada COSPEC (Correlated Spectrometer). El costo del sistema DOAS (2 fijos y uno móvil) representa un tercio del precio de un COSPEC nuevo. Gracias a varias instituciones Internacionales y Nacionales el Departamento de Geofísica de la Escuela Politécnica Nacional ha ensamblado un sistema de monitoreo remoto y automático de emisión de SO<sub>2</sub> en el Volcán Tungurahua. El sistema consiste de dos estaciones fijas en Tandem. Los datos se transmiten en tiempo real a la estación Guadalupe donde son procesados y correlacionados a la actividad sísmica del volcán. Las medidas en COSPEC son difíciles de obtener por problemas logísticos y dependiente de las condiciones climáticas, el sistema DOAS es mucho más exitoso puesto que permite obtener mediciones continuas sin importar las condiciones climáticas o alternativamente puede operar en

condiciones climáticas escogidas mediante su encendido remoto. Esto permite un monitoreo mucho más completo de las emisiones de SO<sub>2</sub>.

16:15 – 16:30 break

16:30 – 17:15 Roberto Machorro (UNAM - México)

Bidimensional Acquisition of spectra generated by laser ablation

#### Summary

El estudio de plasmas es de suma importancia, tanto por la física fundamental involucrada como por sus potenciales implicaciones tecnológicas. En este trabajo discutimos la aplicación de la espectroscopía de campo al estudio de la emisión de luz de plasmas. Nuestro interés es doble, analizar plasmas generados por ablación láser, utilizado para crecer capas delgadas, y determinar los mejores parámetros de depósito. Por otro lado, estudiar plasmas astrofísicos, para entender la fuente emisora y su morfología. A largo plazo esperamos establecer las condiciones que permitan reproducir eventos astrofísicos con plasmas de laboratorio.

Este proyecto tiene trabajo previo, el cual ha servido de fundamento y experiencia para obtener mapas de densidad y temperatura electrónica (Refs. 1 y 2). Es un esfuerzo de grupo, donde participan especialistas en diferentes áreas (Ref. 3).

Presentamos los avances a la fecha de un espectrógrafo de campo, que tiene un campo de alta calidad de 5x5 cm, dispersión seleccionable, y como detector un CCD intensificado. Para más detalles técnicos pueden consultarse en la referencia 4.

17:15 – 18:00 Edson C. Passamani (Espírito Santo University- Brasil)

Influence of interfacial roughness on the Fe/Mn/Fe trilayers coupling

#### Summary

Fe/Mn superstructures have recently attracted considerable attention based on the rich variety of magnetic properties found in their magnetic phase diagram<sup>1</sup> as well as due to the possibility of formation of metastable body centered tetragonal Mn (bct-Mn) phase using MBE technique.<sup>1-3</sup> One of the most interesting questions to be answered in magnetism of Fe/Mn superstructures is hole of the interface roughness on the interlayer coupling mechanism between magnetic layers, which is not yet completely understood. Based on that, a series of epitaxial Fe(5-20nm)/Mn(0.5-2.5nm)/Fe(5nm) films were MBE-grown either directly on MgO <001> or on top of a Ag buffer layer (100nm) with the aim to produce the body centered tetragonal Mn phase as well as to investigate the magnetic coupling between the two Fe layers and the influence of the interfacial roughness on the magnetic coupling that has been found in the Fe/Mn/Fe sandwiches. It was observed that the body centered tetragonal Mn phase is formed up to a Mn thickness of 2.5 nm, when the Mn layer is directly deposited onto thick Fe films ( $\geq 20$ nm thick) or when the first Fe layer is grown on a Ag buffer layer. Mössbauer results indicate the presence of two magnetic iron components, associated with Fe atoms far from the interface regions and Fe atoms close to the Mn interfaces. The two interfaces (Mn on Fe and Fe on Mn) are found to be different from one another. The observed non-collinear magnetic coupling observed in Fe/Mn/Fe trilayers is attributed to the interface roughness effect, as indicated by Mössbauer data.

**Wednesday, May 25 2005**

14:00 – 18:00 Visit of Colonial Lima

**Thursday, May 26 2005**

14:00 – 14:45 Robert Baptist (CEA / Grenoble - France)  
Spectroscopy and Nanomaterials

Summary

Los nanomateriales, debido a su tamaño reducido (al menos en una de sus dimensiones), presentan propiedades cuánticas específicas. Por una parte, las bandas de energía pueden « desaparecer » en favor de los niveles de energía y por otra parte, cuando una de las dimensiones se reduce a un orden de magnitud correspondiente a la longitud de onda de los electrones, el confinamiento de estas cargas en los pozos de potencial así creados modifica las propiedades espectroscópicas de los materiales. Presentaremos algunos casos donde el tamaño 1D, 2D, 3D influye directamente en las propiedades ópticas, térmicas o de transporte electrónico en los nanomateriales y nanoestructuras; trataremos de poner de relieve la contribución fundamental de las técnicas espectroscópicas para la caracterización de los nano-objetos.

14:45 – 15:30 Phillippe Aubourg (Quantel París - France)  
Medical applications of lasers in ophthalmology and dermatology

Summary

Ophthalmology and Dermatology are, today, the 2 largest medical markets for lasers. The first one, because it makes sense to use optics to treat the eye, one of the nicest existing optical system. The second one, because the interaction between skin and light has a lot of different interactions in therapy and aesthetic.

The different interactions involved in these domains are reviewed, and some examples of commercial systems are presented.

15:30 – 16:15 Maria A. Ulla (UNL - Argentina)  
IR spectroscopy: Study of the surface using probe molecules

Summary

La existencia de la superficie en un cristal produce una discontinuidad abrupta en la red cristalina. En consecuencia, ocurre un incremento de la energía superficial debido a la coordinación no saturada de los constituyentes superficiales del cristal.

La adsorción de un compuesto sobre dicha superficie puede disminuir la energía del sistema por un aumento de la coordinación de los átomos superficiales. La naturaleza de las interacciones entre las especies adsorbidas y la superficie varían desde interacciones tipo van der Waals: Fisisorción a del tipo enlace químico: Quimisorción. Estas interacciones superficiales causan modificaciones en las propiedades de las molécula. Por esto, la interpretación de dichas modificaciones conducen a un mejor entendimiento de las características de la superficie.

Una variedad de técnicas de basada en espectroscopía proporcionan información sobre la identificación y caracterización de grupos funcionales superficiales. Sin embargo, la mas ampliamente usada es la Espectroscopia Vibracional debido a la información detallada que provee sobre la estructura molecular. Específicamente, se debe mencionar la Espectroscopia IR por su relativa simplicidad uso y la vasta aplicabilidad a distintas superficies.

La información que se obtiene de los espectros IR es referida a los cambios en la frecuencia de vibración de las moléculas debido a la adsorción como también la presencia de nuevas vibraciones como consecuencia de la formación de nuevas especies superficiales. A partir de esto es posible describir la estructura molecular de la especie adsorbida y en forma indirecta a través del análisis adsorbato-adsorbente, caracterizar el sitio superficial de adsorción.

Dentro de este marco, se consideraran las moléculas sondas de CO y NO, sus interacciones con diferentes superficies: metales y óxidos, las modificaciones en la vibraciones esperadas y el

análisis de diferentes espectros. Se ampliara en forma mas general esta información a las moléculas de CO<sub>2</sub> y NO<sub>2</sub>.

16:15 – 16:30 break

16:30 – 17:15 Yves Barjhoux (Horiba Jobin-Yvon)

Instrumentation to Raman spectroscopy

17:15 – 18:00 Alicia Boix (UNL - Argentina)

Characterization of the molecular structures in solids used in catalysis through Raman spectroscopy

#### Summary

La espectroscopía Raman encuentra aplicación en un elevado número de disciplinas como son, Ciencia de Materiales, Bioquímica y Medicina; Química estructural, y Ciencias de la tierra, etc. En particular para el estudio de sólidos usados como catalizadores, la espectroscopía Raman junto a otras técnicas espectroscópicas son herramientas potentes que proporcionan información fundamental acerca de las estructuras de óxidos metálicos masivos y soportados, óxidos mixtos y zeolitas. La mayor ventajas que ofrece esta técnica son i) que permite detectar fases de óxidos superficiales amorfos que son inactivas a XRD así como también nanofases cristalinas, ii) la posibilidad de recoger información en diferentes atmósferas tratando la muestra in situ. Más recientemente se ha desarrollado la metodología operando, que consiste en la combinación de estudios in situ de reacción con la medida simultánea de actividad/ selectividad en una celda-reactor apropiada.

### **Friday, May 27 2005**

14:00 – 15:15 Michael Glascock (Missouri University Research Reactor - USA)

Advances in the application of archaeometric methods to ceramics

#### Summary

Ceramic objects were probably the first synthetic materials to be created by humans. Although it is impossible to trace precisely the beginnings of human use of clays and other earthen materials to produce ceramic objects (e.g., pottery, bricks, and figurines), it is very likely that the first ceramics were produced approximately 10,000 and 30,000 years ago. As we know today, archaeologists have discovered ceramic materials at almost every archaeological site any where in the world either by surface surveys or by excavation.

During the past 50 years, archaeometrists have developed a wide range of analytical techniques for characterizing ceramic materials. Methods for determining the dates of manufacture, investigation of provenance, studying glazes, and identifying cooking residues are being applied ever more frequently. The application of these archaeometric methods to investigations of ceramic materials will be discussed. Examples of ceramic studies from around the world and some of the important archaeological information being learned from these studies will be presented.

15:15 – 16:30 Sonia Guillen (Mallqui center- The Bioanthropology Foundation – Perú)

Mummies and bones: new and old techniques of analysis

#### Summary

La conservación y el estudio de restos provenientes de contextos arqueológicos han sido los principales objetivos del trabajo del Centro Mallqui en Ilo a partir de 1993. Con el correr de los años este trabajo se ha ampliado a otras regiones del Perú. Este esfuerzo ha involucrado el

trabajo con técnicos y especialistas peruanos y extranjeros. Si bien en algunas áreas se ha logrado hacer uso de técnicas muy sofisticadas e innovadoras, en otros casos ha sido necesario recurrir a soluciones creativas y con equipos que de otro lado podrían ser considerados obsoletos. Esta presentación revisa las técnicas utilizadas tanto en el registro de materiales, conservación, así como trabajo en el campo y en el laboratorio. Estos datos se complementan con la presentación de un video de la serie “The Mummy road show” en el cual los arqueólogos y radiógrafos procuran utilizar la endoscopía para evaluar tumbas aún cubiertas.

16:30 – 16:45 break

16:45 – 18:00 Johny Isla (Instituto Andino de Estudios Arqueológicos - Perú)

The archaeological project Nasca-Palpa: a joint effort of archaeology, archaeometry and photogrammetry

#### Summary

El Proyecto Arqueológico Nasca-Palpa se encuentra trabajando en los valles de Palpa, en la costa sur del Perú, con la intención de reconstruir la historia cultural de la región y en especial de los creadores de los famosos geoglifos o Líneas de Nasca. En este contexto, con la participación de un numeroso grupo de investigadores nacionales y extranjeros, los métodos arqueológicos están siendo combinados con nuevos métodos y tecnologías de fechado, registro, prospección geofísica y análisis antropológico, con la finalidad de analizar la compleja interacción entre los cambios del medio ambiente y el desarrollo cultural en un medio ambiente desértico. Este trabajo multidisciplinario está produciendo fascinantes resultados y perspectivas acerca de los casi 3,000 años de desarrollo cultural prehispánico (1,500 AC – 1,500 DC) de una región cuya historia cultural es pobremente conocida, en especial en el caso de las culturas Paracas y Nasca. Desde 1997 a la fecha, se han producido un gran número y variedad de datos que pronto serán integrados en un Sistema de Información Geográfica (GIS).

#### Session II

#### **Monday, May 23 2005**

14:00 – 14:45 Goncal Badenes (Institute of Photonics Sciences - Spain)

Enhanced Two-Photon Fluorescence Spectroscopy for Sensing Applications

#### Summary

An ultra-sensitive method for Two-Photon Fluorescence (TPF) excitation using resonant Grating Waveguide Structures (GWS) will be presented and discussed. In its basic configuration, a GWS consists of a substrate, a waveguide layer and an additional grating layer. When illuminated with laser light under resonant conditions, the GWS reflects all light and leads to very high local surface intensities. This field enhancement can be exploited for two-photon fluorescence spectroscopy, without the need for a highly intense, focused laser light. The enhanced two-photon fluorescence signal obtained from a drop of tetramethylrhodamine (TMR) on the top of high-finesse resonant polymeric GWS is described and discussed.

14:45 – 15:30 Ludger Woeste (Free University of Berlin - Germany)

Femtosecond Spectroscopy and Coherent Control of Molecules and Clusters

#### Summary

The advent of tunable ultra-short laser sources has opened fascinating perspectives for obtaining an insight into elementary intra-molecular processes like bond-shaking, Pausaing and making, which can now be monitored on a real-time basis by means of pump&probe-spectroscopy.

Moreover, the observed photo-induced dynamical processes can even directly be influenced by employing shaped light pulses. The sought optimum pulse forms can be obtained by using adequate light modulators which are integrated into a self-learning feedback loop. This way the optimum phase and amplitude of the applied laser field are found for driving the photo-induced dynamical process into the desired direction. They contain significant information about both, the irradiated photo-dynamical system and the chosen reactive pathway.

Among the experiments, which were successfully performed so far, the control of very elementary photo-chemical reactions was achieved. Among them are competing unimolecular decay- and fragmentation processes, isomerization reactions or isotope-selective dissociations and ionizations. Most of these experiments were performed on rather simple molecules in the gas phase; but also first encouraging results on more complex systems like bio-molecules inside a condensed environment were already reported in the literature. Again here the way from simple to complex systems is nontrivial, because a rapidly growing amount of internal degrees of freedom and an increasing interaction with the environment (IVR) must carefully be taken into account. In this regard, metal clusters in the gas phase present an excellent model system, because they allow, simply by changing their size, progressively first to increase and then to control the number of active and passive modes, and hence the reactive pathway.

Here we will present the results of a series of fragmentation and ionization control experiments, performed on various alkali dimer and trimer systems until organo-metallic compounds like  $\text{MnCpCO}_3$ . Various optimization and pulse cleaning schemes will be presented, and the resulting optimum pulse shapes will be discussed and compared with results from theory. In those experiments, the reactive pathway always led across an electronically excited intermediate target. Future experiments will also concentrate on the possibility of control schemes in the electronic ground state using charge reversal spectroscopy schemes. Further, we will discuss experimental approaches which follow the goal of obtaining controlled photo-associations. This should finally allow even to control replacement reactions, molecular switches, or domain growth.

15:30 – 16:15 Jean P. Schermann (Paris 13 University - France)

Structural mass-spectroscopy of biomolecules without chromophores

#### Summary

Two techniques are widely used by biochemists and biologists for characterizing biomolecules. The first one is mass-spectrometry which allows to determine sequences and the second is infrared spectroscopy which provides structural information. While mass-spectrometry is concerned by isolated molecular systems, infrared spectroscopy (IR) has, until recent years, mostly been used in condensed phase. It is now possible to combine mass-spectrometry and infrared spectroscopy in the same experimental set-up. One widely used technique is IR/REMPI (Resonant Multiphoton Ionisation) which requires the presence of a visible/UV chromophore in the studied system. We will present two techniques which do not require the presence of such chromophores. The first one relies on a unique ionization process which produces anions with the same structure as their neutral precursors and the second one uses the multiple absorption of infrared photons issued from a free electron laser. We will present applications to model systems of peptides and to real peptides involved in drug design.

16:15 – 16:30 break

16:30 – 17:15 Jacques Cousty (CEA / Saclay - France)

STM studies of the molecular structure of self-assembled alkane monolayers on gold and graphite surfaces.



### Summary

Scanning tunneling microscopy (STM) has become a major tool to study molecular structure and dynamic properties of self assembled monolayers formed on conducting substrates. A unique advantage of this technique is the possibility to study local order and defects in the periodic molecular arrangement. To illustrate the possibility of STM for investigating organic monolayers, I will present several examples of alkane packing, which depends on the nature of the substrate, the alkane length and temperature.

At room temperature, a close packed arrangement of long alkanes lying flat on the surface form the interface between a solution of these alkanes in a solvent and the basal plane of graphite. With C<sub>17</sub>H<sub>36</sub> as a solvent for a longer alkane (C<sub>36</sub>H<sub>74</sub>), the monolayer formed on graphite can be described as a partially demixed solid solution of these two alkanes. STM images show the presence of two molecules of solvent adsorbed in a vacancy of the close packed arrangement of C<sub>36</sub>H<sub>74</sub>. Furthermore, a series of images obtained on the same area provides evidence of molecular exchange between the monolayer and the solution.

For Au (111) surface covered by an alkane solution, the molecular structure of the monolayer depends on the alkane length. For long alkanes (number of carbon higher than 24), self-assembled monolayers are observed as for graphite surface. But, for C<sub>10</sub>H<sub>22</sub>, C<sub>12</sub>H<sub>26</sub>, C<sub>14</sub>H<sub>30</sub> and C<sub>16</sub>H<sub>34</sub> molecules, self-organized monolayers are surprisingly imaged at room temperature. The formation of self-assembled monolayer of alkanes is reentrant with the molecule length. This reentrance finds its origin in the misfit between the CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub> period compared to the interatomic distance along <110> direction of Au (111) surface. Another consequence of this misfit is the periodic variation of the relative arrangement of neighboring molecules in the close packed monolayers. Finally, the transition between two-dimensional phases observed on C<sub>16</sub>H<sub>34</sub> monolayer will be described.

17:15 – 18:00 Adriana Gil (Nanotec Electrónica S.L. - Spain)  
Microscopes of forces

### **Tuesdays, May 24 2005**

14:00 – 14:45 Maria L. Saboungi (U. Orleans - France)  
Dynamics of liquids

### Summary

Inelastic scattering experiments provide information about the dynamics of liquids on the atomic scale. In classical liquids, atomic motions are best understood in terms of particle configurations. Collective vibrational motions take place whenever atoms within a configuration oscillate for times longer than their characteristic periods, leading to dynamic structure factors that show well defined peaks at finite frequencies. In contrast, stochastic motions such as those involved in long-range mass diffusion can be thought of as taking place once the configurations become unstable, leading to local rearrangements that restore local equilibrium. These give rise to quasielastic scattering centered at zero frequency. In the case of x-ray scattering or neutron scattering with mainly coherently scattering isotopes, the quasielastic scattering contains information about the dynamic correlations between a diffusing particle and its neighbors.

In this talk I will discuss these phenomena in relation to results of inelastic neutron and x-ray scattering measurements and computer simulations on liquid metals, molten salts, molecular liquids, polymer and polymer electrolyte melts and aqueous solutions.

14:45 – 15:30 Pascal Berger (CEA / Saclay - France)  
High temperature oxidation of mechanically loaded metals: use of oxygen-18 nuclear microanalysis to study oxygen transport

### Summary

The high temperature growth of oxides on mechanically loaded metallic surfaces is not well understood yet. The knowledge of in one hand the growth of oxides on static surfaces and on the other hand of the mechanical behavior of the metal/oxide system, does not give account of the synergetic effects between the load and the oxidation process.

The formation of cracks on the oxide scales, their healing and the role of the load on the oxygen diffusion processes have been studied on pure nickel, zirconium and iron samples loaded in creep. The use of oxygen-18 to study the oxygen transport and the determination of its local diffusion profiles by means of the nuclear reaction  $^{18}\text{O}(p,\alpha)^{15}\text{N}$  evidence a sharp influence of the load.

In the case of nickel, the application of the load induces an increase of the oxygen diffusion coefficients in the oxide until two orders of magnitude (typically from around 10-15 cm<sup>2</sup>.s<sup>-1</sup> to around 10-13 cm<sup>2</sup>.s<sup>-1</sup> in NiO thermally grown on nickel monocrystals). However, this enhancement decreases with the increase of the load. In the case of zirconium, oxidation depends on generated defects, originating both from growth stress and applied load. The case of iron is the most complex because of the existence of several oxides. The interest of its study is to understand the conditions to keep adherence of oxide scales.

15:30 – 16:15 Dwight Acosta (UNAM - México)

Some applications of electronic microscopy in industrial materials

16:15 – 16:30 break

16:30 – 17:15 Peter Hering (Dusseldorf University- Germany)

Laser tissue interaction with medical applications

### Summary

The knowledge of laser-tissue interaction is crucial for all applications in laser medicine.

Thus the optical properties of tissue like absorption-, scattering- and anisotropy coefficient during treatment is has known and often to be controlled on line.

A new method with photon density waves for Laser Interstitial Tumour Therapy (LITT) with online control for tumour coagulation, control of other physiological parameters like oxygen saturation in blood and blood flux will be shown. Mathematical methods like Monte Carlo simulation for this application will be given.

The well known laser cornea reshaping method will be critically analysed.

17:15 – 18:00 Roberto Sato Berrú (CCADET–UNAM, México)

Analysis of principal composites in Raman spectroscopy

## **Wednesday, May 25 2005**

14:00 – 18:00 Visit of colonial Lima

## **Thursday, May 26 2005**

14:00 – 14:45 Andreas Tortschanoff (Federal Polytechnic School of Lausanne - Switzerland)

Solvation dynamics at the ZrO<sub>2</sub>-water interface

### Summary

Due to the special importance of Ti in biomedical applications there is great interest in the investigation of the structure and dynamics of water close to Me(IV)-oxide surfaces. It is expected that at interfaces, water exhibits a very different structure, as the bulk network of

hydrogen bonds is interrupted. Dyes attached to the surface of ZrO<sub>2</sub> nanoparticles in colloidal solution can be used as probes for the ultrafast rearrangement of the surrounding water molecules upon excitation of the dyes. Polar solvation dynamics in water typically occurs on a sub-picosecond time scale and is non-exponential.

We performed ultrafast fluorescence up-conversion and, more recently, transient absorption and photon echo techniques, to carry out a comparative study of solvation dynamics around dyes in bulk and interfacial water.

Our results, using both Coumarin and Eosine as dyes, reproduce the typical time scales and non-exponential behavior of the solvation process in water, and show subtle differences between bulk and interface.

These results are compared with molecular dynamics simulations, which show that the interface region is limited to not more than one or two water layers, while the dye molecule extends over ~10 Å, such that most of it is immersed bulk-like water. On the other hand, contributions from intramolecular relaxation processes and possible changes of the dielectric constant of water in the vicinity of the interface make the interpretation less straightforward.

14:45 – 15:30 Francois Piuzzi (CEA / Saclay - France)

Intramolecular interactions in gas phase peptides

15:30 – 16:15 Jesús Rubayo (ISCNT - Cuba)

Dynamics of structural relaxation upon excitation of an impurity in rare gas solid matrices

#### Summary

Extensive configurational rearrangement following absorption of light are operative in a large class of many-body systems such as biological molecules, condensed phase chemical media and in solids such as insulators and semiconductors. Pure and doped rare gas media have long been recognized as model systems for describing and understanding the basic principles behind configurational rearrangements.. Their simple structural properties and the good knowledge of their physical and thermodynamic properties make them more easily amenable to modelization. Molecular-dynamics simulations of structural relaxation in electronically excited NO-doped solid neon, argon, krypton and xenon are presented. The NO is excited to its lowest Rydberg state, inducing a rearrangement of the surrounding medium in the form of a bubble, due to repulsion between the Rydberg electron and the closed-shells surrounding species. The simulations were carried out using the thermal harmonic quantum correction in order to account for quantum effects. The first shell response is characterized by a collective oscillatory response, which point to coherent dynamics and confirm for the neon matrix, the experimentally observed slower dynamics than in solid argon and krypton. Furthermore, the medium response is characterized by a collective oscillatory behavior of the shells around impurity. The results show a behaviour characterized by an impulsive expansion of the cage radius at short time (250 ps), followed by multimodal oscillations over several picoseconds. This time evolution of the average cage radius reveals an impulsive cage expansion followed by a cage contraction in about 500 ps. The system then undergoes oscillations around an average cage radius 10 % larger than the ground state cage radius. The results indicate the inertial character of the response propagation throughout the surrounding medium and high degree of nuclear vibrational coherence at short time.

16:15 – 16:30 break

16:30 – 17:15 Juan M. Benavides (Perú)

Optical spectroscopy to early detection and treatment of cancer

#### Summary

La detección clínica de precánceres se basa primordialmente en detección visual de tejidos sospechosos seguida por biopsias y reexaminación microscópica. Sin embargo muchas áreas visualmente identificadas como sospechosas no siempre corresponden con áreas clínicamente significativas. La espectroscopía de fluorescencia y reflectancia tienen el potencial de identificar cambios tempranos de carácter neoplásico de manera poco invasiva, in vivo y en tiempo real. Nuevos métodos ópticos pueden ayudar a detectar y diagnosticar cánceres de origen en el epitelio. Ciertos tejidos emiten autofluorescencia cuando son expuestos a luz. Asimismo, algunos tejidos reflejan espectros de luz que dependen primordialmente de su arquitectura y morfología. Varios precánceres se caracterizan por el incremento del tamaño nuclear y el de la razón nuclear/ citoplásmica. Diferencias en autofluorescencia y reflectancia (sensibles a cambios químicos y estructurales respectivamente) entre tejidos normales y anormales pueden ser observadas y cuantificadas con el fin de detectar y diagnosticar precánceres. Presentaremos una perspectiva general de la interacción entre la luz y tejidos y su uso para detectar y diagnosticar cambios precancerígenos en tejidos humanos. Adicionalmente, presentaremos avances de distintos grupos científicos especializados en varias modalidades ópticas de detección in vivo tales como: espectroscopía de reflectancia y de fluorescencia, detección por medio de imágenes fluorescentes, microscopía confocal de reflectancia y fluorescencia, entre otras.

La terapia fotodinámica (PDT por sus siglas en inglés) es un tratamiento anticancerígeno que consiste en la administración (local, sistémica o tópica) de un medicamento no tóxico conocido como fotosensibilizador a un paciente quien porta una lesión (por lo general cáncer), seguido de iluminación de luz sobre la lesión. El fotosensibilizador es activado por la luz y en presencia de oxígeno, crea especies citotóxicas e induce muerte celular.

Presentaremos conceptos básicos de la PDT y describiremos nuestros estudios de PDT para combatir el cáncer de próstata y el esófago de Barrett con fotosensibilizadores como el derivado de benzoporfirina (BPD) y la protoporfirina IX (PPIX) respectivamente. Adicionalmente, discutiremos algunos métodos ópticos para monitorear la dosis de PDT depositada (con equipos espectroscópicos en base a fibras ópticas) y el uso de un microscopio de fluorescencia para estudiar la difusión y localización de los fotosensibilizadores in vivo en modelos animales, con el fin de optimizar los actuales tratamientos de PDT.

### **6.3 Impact in the Media**

The impact in the media began with interviews in radio station and reviews in newspapers and magazines

#### **RADIOS**

##### **Radio Filarmonía**

Programa Meridiano

Jueves 12 de mayo: Interviews to Dr. Jaime Ávalos and Dr. Francois PiuZZi

Jueves 19 de mayo: Interviews to Arq. Luisa Vetter and Dr. Peter Kaulicke

##### **Radio Santa Rosa**

Jueves 19 de mayo: Interviews to Dr. Jaime Ávalos and Dr. Yves Barjhoux

#### **NEWSPAPERS AND MAGAZINES**

##### **El Comercio**

Monday, May 16th: Article by Tomas Unger “Energy emission and absorption”. The International Spectroscopy Conference is mentioned in this article.

##### **Caretas**

Thursday, May 26th: Article on Dr. Fernando Ponce. The International Spectroscopy Conference and the participation of Dr. Sune Svanberg, President of the Committee for the Nobel Prize in Physics, are mentioned..

##### **El Dominical – El Comercio’s suplement**

Sunday, May: 29th: “Light and matter”, an interview with Dr. Sune Svanberg, President of the Committee for the Nobel Prize in Physics.

##### **Revista de la Sociedad Química del Perú (ISSN 1810-634X)**

Vol. 71, Nº 1, january- march 2005

#### **TV**

##### **Canal N**

Sunday, May 15th. “Sin rodeos”, a program of Instituto de Defensa Legal (IDL), hosted by Hans Landolt. The Peruvian Society of Physics (SOPERFI) refered to the World Year of Physics; Dr. Benjamín Marticorena, current President of CONCYTEC, was one of the interviewed scientists. This segment lasted ten minutes time and reported about the Spectroscopy events

##### **Canal N**

Newsreel “De 6 a 9”. A ten-minutes interview with Dr. Ismael Moya, a CNRS researcher (France).

##### **RTP - Canal 7**

Newsreel “Confirmado”. Inauguration of International Spectroscopy Conference and interview to Dr. Sune Svanberg, President of the Committee for the Nobel Prize in Physics.

## **WEB**

### **Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica - Perú**

<http://www.concytec.gob.pe/espectroscopia/main.htm>

### **Educa Red - Perú**

<http://www.educared.edu.pe/docentes/eventos.asp>

### **Universia - Perú**

[http://www.universia.edu.pe/portada/actualidad/noticia\\_actualidad.jsp?noticia=43468](http://www.universia.edu.pe/portada/actualidad/noticia_actualidad.jsp?noticia=43468)

### **Universidad Nacional Mayor de San Marcos - Perú**

<http://www.unmsm.edu.pe/eventos/>

### **Universidad Nacional de Ingeniería - Perú**

[http://amaru.uni.edu.pe/sitio/novedades/ver\\_noticia.php?id=384](http://amaru.uni.edu.pe/sitio/novedades/ver_noticia.php?id=384)

### **Consejo Superior de Investigaciones – UNMSM - Perú**

<http://csi.unmsm.edu.pe/avisos.htm>

### **Cholonautas - Perú**

[http://www.cholonautas.edu.pe/agenda\\_n.php](http://www.cholonautas.edu.pe/agenda_n.php)

### **Ministerio de Relaciones Exteriores - Perú**

<http://www.rree.gob.pe/portal/NotaPlaneamiento.nsf/0/92aea6c1baa1848d05256fe7005b07b4?OpenDocument>

### **Año Mundial de la Física - España**

[http://www.fisica2005.org/view/cm\\_view\\_tevento.asp?id=219](http://www.fisica2005.org/view/cm_view_tevento.asp?id=219)

### **Física y Sociedad - España**

<http://www.fisicaysociedad.es/view/default.asp?cat=495&id=205>

### **Universidad Mayor de San Simón - Bolivia**

[http://www.fisica2005.org/view/cm\\_view\\_tevento.asp?id=219](http://www.fisica2005.org/view/cm_view_tevento.asp?id=219)

### **DINACYT - Boletín 256 - Año 2005 - Uruguay**

<http://www.dinacyt.gub.uy/Boletin%20256.html>

### **World Transhumanist Association - Gaceta Latinoamericana Transhumanista**

<http://transhumanism.org/index.php/WTA/more/gaceta-latinoamericana-transhumanista-21-de-marzo-2005/>

**Association Puya de Raimondi**

<http://fpiuzzi.club.fr/news.htm>

**Interdivisional group of Physics for development**

<http://igpd-eps.epfl.ch/index.htm>

**Optics valley**

<http://www.opticsvalley.org/pages/mode-8/rubrique-18/index.html#art978>

**Centro Latinoamericano de Física**

<http://www.cbpf.br/~claf/>

## 7. Financial and Economical Aspects

The general budget was of \$49,085.58 :

Item	Budget	Detail	Característica
Travel	\$11,824.55	855.12	Europeans lectures
		\$4,570.22	Regionals lectures
			Regional scholarships
		\$6,027.95	
		\$371.26	National scholarships
Tax	\$603.40	\$603.40	Regional scholarships
Lodging	\$14,852.00	\$5,142.00	Europeans lectures - Imperial
		\$5,930.00	Europeans and regional lectures - Señorial
			Regional scholarships
		\$1,370.00	National scholarships
Transport (bus)	\$1,776.22	\$1,776.22	
Food			
L-V	\$2,040.62	\$2,040.62	
Others Food	\$1,824.00	\$1,824.00	
Coffe Break	\$1,723.08	\$1,723.08	
Welcome cocktail	\$615.38	\$615.38	
Forms	\$1,529.61	\$1,529.61	
Copies	\$273.21	\$273.21	
Office`s materials	\$335.02	\$335.02	
Messenger	\$129.79	\$129.79	
Banner	\$378.46	\$378.46	
Photos	\$58.47	\$58.47	
Auditorium	\$238.00	\$238.00	
Lima Tour	\$350.00	\$350.00	
Caral Tour	\$969.23	\$969.23	
Folkloric dinner	\$1,579.30	\$1,579.30	
Insurance **	\$2,946.73	\$2,946.73	
Movil Phone **	\$775.08	\$775.08	
Marquee	\$335.38	\$335.38	
Presents	\$300.03	\$300.03	



Traslacion	\$208.91	\$208.91	
Assistant men	\$886.17	\$886.17	
Small box	\$1,115.38	\$1,115.38	
Others	\$1,077.57	\$1,077.57	
Tax ITF	\$340.00	\$340.00	
<b>Total</b>	<b>\$49,085.58</b>	<b>\$49,085.58</b>	

\*\* These services don't cancelled now, because we don't have the final amount.