

# THE WORKSHOPS

**DIPC facilitates the exchange of information and establishment of new creative research collaborations between attending scientists.**

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## COMELCAN MEETING AND WORKSHOP ON TRANSPORT IN NANOTUBES

JUNE 3-7, 2002

Program Committee

*Prof. P. M. Echenique* (Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain)

*Prof. A. Rubio* (Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain)

**The aim of this workshop** is to review the recent advances in the physics of carbon nanotubes, addressing the applications in electron-mechanical devices and nanoelectronics. We address new features and techniques related to the electronic transport through these one-dimensional structures: superconductivity, electron-correlations, quantum coherence, ballistic and coulomb blockade effects, etc. The workshop is complemented with an internal meeting of the COMELCAN research training network as well as a young researchers meeting.

### CONTRIBUTIONS

<i>V. Krstic</i>	<b>Ballistic and electron-correlated transport and other electrical transport phenomena in carbon nanotubes</b>
<i>S. Guéron</i>	<b>Superconductivity in carbon nanotubes</b>
<i>T. Nussbaumer</i>	<b>Superconductor-(NT) Quantum Dot-Superconductor or SNS junctions</b>
<i>M. Grioni</i>	<b>Fermi liquid versus Luttinger liquid in 1D systems: what do we learn from photoemission?</b>
<i>S. Roche</i>	<b>Quantum transport in carbon nanotube based systems</b>
<i>O. Chauvet</i>	<b>Transport properties on SWNT/PMMA</b>
<i>S. Purcell</i>	<b>Current-induced heating of carbon nanotubes during field emission: experiment and modelisation</b>

### PARTICIPANTS

H. Amara	LEM-ONERA Paris, France
R. Arenal de la Concha	LEM-ONERA Paris, France
J.-M. Benoit	Max-Planck-Institut für Festkörperforschung, Germany
S. Benrezzak	Materials Ireland Polymer Research Centre, Ireland
P. Bernier	Université Montpellier II, France
W. Blau	Trinity College, Dublin, Ireland
M. Castignolles	Université Montpellier II, France

J. C. Charlier .....Université Catholique de Louvain, PCPM, Belgium  
O. Chauvet .....Institut de Materiaux Jean Rouxel Nantes, France  
J. Coleman .....Trinity College, Dublin, Ireland  
U. Detlaff .....Max-Planck-Institut für Festkoerperforschung, Germany  
F. Ducastel .....LEM-ONERA Paris, France  
P. Fournet .....Materials Ireland Polymer Research Centre, Ireland  
J.-P. Gaspard .....Université de Liège, Belgium  
M. Glerup .....Université Montpellier II, France  
M. Grioni .....Ecole Polytechnique Fédérale de Lausanne, Switzerland  
S. Gueron .....Université de Paris Sud Orsay, France  
M. Kaempgen .....Max-Planck-Institut für Festkoerperforschung, Germany  
V. Krstic .....Max-Planck-Institut für Festkoerperforschung, Germany  
S. Latil .....Université Catholique de Louvain, Belgium  
S. Lefrant .....Université de Nantes, France  
A. Loiseau .....LEM-ONERA Paris, France  
Th. Nussbaumer .....Uni Basel, Switzerland  
J. Muszynski .....Institut de Materiaux Jean Rouxel Nantes, France  
M. Panhuis .....Trinity College Dublin, Ireland  
S. Purcell .....Université Claude Bernard, Lyon, France  
S. Roche .....CEA Grenoble, France  
X. Roquefelte .....Université de Nantes, France  
S. Roth .....Max-Planck-Institut für Festkoerperforschung, Germany  
M. Schmit .....Max-Planck-Institut für Festkoerperforschung, Germany  
J. Steinmetz .....Université Montpellier II, France  
D. Varsano .....Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
L. Wirtz .....Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain

## TOWARDS ATOMIC SCALE- AND TIME-RESOLUTION AT INTERFACES

JULY 1-5, 2002

Program committee

*Prof. P. M. Echenique* (Universidad del País Vasco/Euskal Herriko Unibertsitatea, Spain)

*Prof. A. Rubio* (Universidad del País Vasco/Euskal Herriko Unibertsitatea, Spain)

Chairmen

*Prof. Th. Fauster* (Universität Erlangen-Nürnberg, Germany)

*Prof. R. Berndt* (Christian-Albrechts-Universität zu Kiel, Germany)

*Prof. U. Höfer* (Philipps-Universität Marburg, Germany)

*Prof. S. Hufner* (Universität des Saarlandes, Saarbrücken, Germany)

*Prof. M. Wolf* (Freie Universität Berlin, Germany)

*Prof. W. D. Schneider* (Université de Lausanne, Switzerland)

*Prof. W. Zinth* (Ludwig-Maximilians-Universität, München, Germany)

*Prof. T. Heinz* (University of Columbia, USA)

International advisory committee

*Prof. R. Berndt* (Universität zu Kiel, Germany)

*Prof. E. Chulkov* (Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain)

*Prof. Th. Fauster* (Universität Erlangen, Germany)

*Prof. A. Goldmann* (Universität Kassel, Germany)

*Prof. U. Höfer* (Philipps-Universität Marburg, Germany)

*Prof. M. Wolf* (FU Berlin, Germany)

*Prof. W. Zinth* (LMU München, Germany)

**The aim of this workshop** is to bring together researchers with backgrounds in theory and experiments in order to assess the present state of our understanding of ultrafast phenomena and atomic control at interfaces in condensed matter, surface science, chemistry, and biology. The idea is to contrast both theoretical and experimental studies to gain insight and establish new links and future collaborations.

## CONTRIBUTIONS

### July 1

- K. Kern*                    **Scanning tunneling microscopy as local probe of electron density and dynamics**
- R. Berndt*                **Probing Electron Dynamics with STM**
- K.-H. Rieder*            **The scanning tunneling microscope as operative tool: Physics and chemistry with single atoms and molecules"**
- Z.W. Gortel*             **The core level clock in free molecules and in adsorbates**
- W. Wurth*                **Ultrafast charge transfer processes at adsorbates investigated using the core level clock**
- D. Menzel*              **Selective bond breaking in adsorbates by core excitations**
- W. Zinth*                **Femtosecond Processes in Primary Photosynthesis: Reactions Optimized for Highest Efficiency**

### July 2

- K. Morgenstern*        **Electron-induced manipulation of water on surfaces: From hexamer formation to dissociation**
- K. Reuter*                **Surface knowledge from ultra-high vacuum to technically-relevant conditions: the example of catalytic CO oxidation**
- A. González Ureña*    **Laser induced charge - transfer processes at adsorbate/metal interfaces**
- M. Wolf*                 **Femtochemistry and ultrafast electron dynamics at adsorbate/metal interfaces**
- M. Bonn*                **Surface dynamics studied with femtosecond vibrational spectroscopy**
- K. Al-Shamery*         **Photoinduced processes at nanoparticulate systems**

### July 3

- G. Dujardin*            **Atomic-scale control of electronic and dynamical processes on semiconductor and insulator surfaces**
- F. Flores*                **Inelastic mean free path for electrons : Ballistic Electron Emission Microscopy**
- W.-D. Schneider*     **Scanning tunneling spectroscopy and microscopy of ultrathin dielectric films**
- U. Höfer*                **Five-wave mixing investigation of electron dynamics at silicon surfaces**
- W. Pfeiffer*             **Ultrafast transport phenomena in metal-insulator-metal contacts**
- H. Petek*                **Ultrafast relaxation of electrons in metals in space, time, frequency domains**
- T. Heinz*                **Combining femtosecond lasers with Scanning Tunneling Microscopy**
- A. Castro*                **Optical Properties of nanostructures: a first-principle approach**

*cont'd*

**July 4**

<i>M. Weinel (Th. Fauster)</i>	<b>Femtosecond dynamics of electrons at surfaces</b>
<i>J.-P. Gauyacq</i>	<b>Effects of adsorbates on image states at metal surfaces</b>
<i>H. Dürr</i>	<b>Probing nanomagnetism on the femtosecond time scale</b>
<i>S. Hufner</i>	<b>Surface state width on noble metal (111) surfaces</b>
<i>M. Persson</i>	<b>Theory of single molecule vibrational spectroscopy and microscopy</b>
<i>T. Frauenheim</i>	<b>Towards theoretical understanding of nanoscale materials functioning and biomolecular processing</b>
<i>E. Chulkov</i>	<b>Momentum Resolved Electron and Phonon Contribution to the Quasiparticle Decay at Metal Surfaces</b>
<i>A. Eiguren</i>	<b>Electron phonon contribution to the lifetime of surface states</b>

**PARTICIPANTS**

K. Al-Shamery	..... Carl v. Ossietzky Universität Oldenburg, Germany
R. Berndt	..... Christian-Albrechts-Universität zu Kiel, Germany
M. Bonn	..... Leiden Institute of Chemistry, The Netherlands
A.G. Borisov	..... Université Paris-Sud, France
R. Diez Muino	..... Donostia International Physics Center, Spain
G. Dujardin	..... Université Paris Sud, France
H. A. Dürr	..... BESSY, Berlin, Germany
W. Eberhardt	..... BESSY, Berlin, Germany
T. Fauster	..... Universität Erlangen-Nürnberg, Germany
F. Flores	..... Universidad Autónoma de Madrid, Spain
A. Foehlich	..... Universität Hamburg, Germany
T. Frauenheim	..... Universität Paderborn, Germany
H. Freund	..... Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany
J.P. Gauyacq	..... Université Paris-Sud, France
A. González Ureña	..... Universidad Complutense de Madrid, Spain
Z. W. Gortel	..... University of Alberta, Edmonton, Canada
T. Heinz	..... University of Columbia, USA
T. Hertel	..... Fritz-Haber-Institut, Berlin, Germany
U. Höfer	..... Philipps-Universität Marburg, Germany
S. Hufner	..... Universität des Saarlandes, Saarbrücken, Germany
J. E. Inglesfield	..... Cardiff University, UK
K. Kern	..... Max-Planck-Institut für Festkörperforschung, Stuttgart, Germany
D. Menzel	..... Techn. Universität München, Germany



*Professors Angel Rubio and Pedro Echenique*

G. Moos	Fritz-Haber-Institut, Berlin, Germany
K. Morgenstern	Freie Universität Berlin, Germany
A. Mugarza	Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain
E. Ortega	Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain
M. Persson	University of California, Irvine, USA
H. Petek	University of Pittsburgh, USA
W. Pfeiffer	Universität Würzburg, Germany
G. Raseev	Université Paris-Sud, France
K. Reuter	Fritz-Haber-Institut der Max-Planck-Gesellschaft, Germany
D. Riedel	Université Paris-Sud, France
K.-H. Rieder	Freie Universität Berlin, Germany
A. Rivacoba	Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain
S. Roke	Leiden University, The Netherlands
W.-D. Schneider	Université de Lausanne, Switzerland
F. Silly	Université de Lausanne, Switzerland
E. Tchulkov	Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain
M. Weinelt	Universität Erlangen-Nürnberg, Germany
M. Weinelt	Universität Erlangen-Nürnberg, Germany
F. Willig	Hahn-Meitner-Institut, Berlin, Germany
M. Wolf	Freie Universität Berlin, Germany
W. Wurth	Universität Hamburg, Germany
V. P. Zhukov	Donostia International Physics Center, Spain
W. Zinth	Ludwig-Maximilians-Universität, München, Germany

# REUNIÓN NACIONAL DE USUARIOS DE TÉCNICAS DE NEUTRONES

OCTOBER 3-4, 2002

Organizers

*Donostia International Physics Center*

*Sociedad Española de Técnicas Neutrónicas*

*“Unidad Física de Materiales”, Consejo Superior de Investigaciones Científicas*

*Departamento de Física de Materiales (UPV/EHU)*

Program committee

*Prof. J. Colmenero* (Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain)

*Prof. A. Alegría* (Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain)

*Prof. J.C. Gomez Sal* (Universidad de Cantabria, Spain)

*Dr. A. Arbe* (“Unidad Física de Materiales”, CSIC, Spain)

*Dr. J. Blanco* (Universidad de Oviedo, Spain)

*Dr. J. Campo* (ICMA-CSIC, Spain)

Chairman

*Prof. J. Colmenero* (Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain)

**The main goal was the interchange of ideas**, results and expertise among the Spanish neutron scattering users. On the other hand, with this conference – that is intended to be held each year or each two years – we tried to start a series of regular meetings within the Spanish neutron users community. The essence of this kind of conferences is the same as that of other similar meetings that take place periodically in other European countries, organized by the corresponding national associations included in the ENSA (“European Neutron Scattering Association”).

## CONTRIBUTIONS

*J. Luzón*

**Study of the spin density distribution in the molecular magnet O<sub>2</sub>N<sub>2</sub>C<sub>6</sub>F<sub>4</sub>CN<sub>2</sub>SSN by means of polarized neutron diffraction**

*J.M. de Teresa*

**Magnetic clusters in manganites probed with small-angle neutron diffraction**

*A. Señas*

**Pressure effects on TbM<sub>1-x</sub>Cu<sub>x</sub> (M=Pt and Ni) compounds**

*A. Arbe*

**Crossover from Gaussian to Non-Gaussian Behavior in the  $\alpha$ -Relaxation of Polyisoprene**

*C. Cabrillo*

**Microscopic collective excitations in quantum and metallic liquids**

*A. Moreno*

**Methyl group dynamics in the disorder: from rotational tunneling to classical jump**

*G. Cuello*

**Neutron diffraction in liquid and amorphous systems**

*P. Monceau*

**Scientific activities at the Laboratoire Leon Brillouin (LLB) (Saclay, France)**

*Ch. Vettier*

**Fluctuations in Solids : neutrons provide a global view**

*R. Cywinski*

**Muon Beam Research in Condensed Matter Science: Achievements and Prospects**

*C. Frontera*

**Bismut effect on Manganites: a new mechanism for the charge order**

*D. Richter*

**Neutrons in Soft-Condensed Matter Science**

*M.A. González*

**Quasielastic neutron scattering in liquids with hydrogen bonds**

*P. Gorria*

**Study of crystallization kinetics and metastable phase segregation with neutron thermo-diffraction**

*M.A. Castro*

**Alkanes adsorption on graphite surface**

*F. Mezei*

**The ESS Revolution in Neutron Scattering Research Opportunities**

*J. Hernandez*

**Incommensurate Magnetic Structures in R<sub>2</sub>BaCoO<sub>5</sub> Oxides (R=Rare Earth)**

*K. Clausen*

**ESS - the European project to maintain World leadership**

*S. García*

**Hydrogen bonds formation and structural stabilization in laminar and tridimensional phosphates**

*J.J. Blanco*

**Magnetic structure of the phases Sr<sub>2</sub>FeRe<sub>1-x</sub>B<sub>x</sub>O<sub>6</sub> (B= Nb, Ta; x=0,0.1)**

*J.A. Alonso*

**Charge desproportion in the perovskites Rn<sub>1</sub>O<sub>3</sub>**

*cont'd*



*The participants on the grounds of Miramar Palace in San Sebastian*

## **PARTICIPANTS**

F. Aguado ..... Universidad de Cantabria, Spain  
M. D. Alba ..... Centro Investigaciones Científicas "Isla de la Cartuja", Spain  
A. Alegría ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J. A. Alonso ..... Instituto de Ciencia de Materiales de Madrid, CSIC, Spain  
F. Álvarez ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
A. Arbe ..... Centro Mixto CSIC-UPV/EHU "Unidad Física de Materiales", Spain  
S. Arrese ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J.M. Barandiaran ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
F. J. Bermejo ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J. J. Blanco ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J.A. Blanco ..... Universidad de Oviedo, Spain  
C. Cabrillo ..... Instituto de Estructura de la Materia, CSIC, Spain  
J. Campo ..... ICMA-CSIC, Spain  
J. J. Carvajal ..... Universitat Rovira i Virgili, Tarragona, Spain  
M. M. Castellote ..... Instituto de Ciencias de la Construcción, Spain  
M. A. Castro ..... Centro Investigaciones Científicas "Isla de la Cartuja", Spain  
K. Clausen ..... ESS Project Jülich, Germany  
J. Colmenero ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
G. Cuello ..... Institut Laue Languevin, Grenoble, France  
R. Cywinski ..... University of Leeds, UK  
V. M. De la Prida ..... Universidad de Oviedo, Spain  
M. Del Rosal ..... Universidad de Cantabria, Spain  
J. J. Del Val ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
F. S. Delgado ..... Universidad de La Laguna, Spain  
J.M. De Teresa ..... Universidad de Zaragoza, CSIC, Spain  
A. Escudero ..... Centro Investigaciones Científicas "Isla de la Cartuja", Spain  
T. Ezquerro ..... Instituto de Estructura de la Materia, CSIC, Spain  
A. F. Braña ..... Universidad Politécnica de Madrid, Spain  
A. Fernández ..... Universidad de Almería, Spain  
L. Fernández ..... Universidad de Cantabria, Spain  
M<sup>a</sup> L. Fernández ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
R. Fernández ..... Instituto de Estructura de la Materia, CSIC, Spain  
D. Fernández ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J. Fernández ..... Universidad de Oviedo, Spain

*cont'd*

C. Frontera ..... ICMB-CSIC, Spain  
 R. García ..... Universidad de Cantabria, Spain  
 S. García ..... Universidad de Oviedo, Spain  
 A. García ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 J. L. García, ..... ICMB-CSIC, Spain  
 M<sup>a</sup> A. Gomez, ..... Universidad de Malaga, Spain  
 J. C. Gómez, ..... Universidad de Cantabria, Spain  
 M. A. González, ..... Institute Laue Langevin, Grenoble, France  
 P. Gorría, ..... Universidad de Oviedo, Spain  
 J. Gutierrez, ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 J. Hernández ..... Berlin Neutron Scattering Center; Hahn-Meitner Institut, Germany  
 I. Iradi ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 M. Jiménez ..... Institute Laue Langevin, Grenoble, France  
 S. Kilcoyne ..... University of Leeds, UK  
 M. T. Lisbona ..... ICMA-Universidad de Zaragoza, Spain  
 A. Llobet ..... Los Alamos National Laboratory, USA  
 E. J. López ..... Universidad Complutense de Madrid, Spain  
 D. López ..... ICTP-CSIC, Spain  
 C. Lorthoir ..... Donostia International Physics Center, Spain  
 J. Luzón ..... Institute Laue Langevin, Grenoble, France  
 C. Magén ..... Universidad de Zaragoza-CSIC, Spain  
 N. Marcano ..... Universidad de Cantabria, Spain  
 D. Martín ..... Institute Laue Langevin, Grenoble, France  
 A. Maira ..... Instituto de Estructura de la Materia, CSIC, Spain  
 D. Martínez ..... Universidad de Oviedo, Spain  
 J. L. Martínez ..... Ministerio de Ciencia y Tecnología, Madrid, Spain  
 J. L. Mesa ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 F. Mezei ..... Hans Meiner Institute, Germany  
 O. Mitxelena ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 C. Mijangos ..... ICTP-CSIC, Spain  
 P. Monceau ..... Laboratoire Leon Brillouin, Paris, France  
 C. Mondelli ..... Institute Laue Langevin, Grenoble, France  
 E. Morán ..... Universidad Complutense de Madrid, Spain  
 L. Morellón ..... Universidad de Zaragoza-CSIC, Spain  
 A. Moreno ..... Université de Montpellier, France

M. Naranjo ..... Centro Investigaciones Científicas "Isla de la Cartuja" , Spain  
 A. Narros ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 F. Palacio ..... Universidad de Zaragoza-CSIC, Spain  
 J. Pasán ..... Universidad de La Laguna, Spain  
 A. C. Perdigón ..... Centro Investigaciones Científicas "Isla de la Cartuja" , Spain  
 I. Pérez de Landazabal ..... Universidad Pública de Navarra, Spain  
 J. L. Pizarro ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 F. Plazaola ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 I. Quintana ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 V. Recarte ..... Universidad Pública de Navarra, Spain  
 D. Richter ..... IFF-FZ Jülich, Germany  
 L. Rocco ..... Universidad de Zaragoza, Spain  
 J. Rodríguez ..... Laboratoire Leon Brillouin, France  
 J. Rodríguez ..... Universidad de Cantabria, Spain  
 T. Rojo ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 C. Ruiz ..... Universidad de La Laguna, Spain  
 J. Sacristán ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 R. Sáez-Puche ..... Universidad Complutense de Madrid, Spain  
 M. A. Sainz ..... Instituto de cerámica y vidrio, CSIC, Madrid, Spain  
 J. J. Saiz ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 A. Señas ..... Universidad de Cantabria, Spain  
 S. Serena ..... Instituto de cerámica y vidrio, CSIC, Madrid, Spain  
 D. Serrate ..... Universidad de Zaragoza-CSIC, Spain  
 T. Soler ..... ICMA-Universidad de Zaragoza, Spain  
 X. Turrillas ..... Instituto de Ciencias de la Construcción E. Torroja - CSIC, Spain  
 R. Valiente ..... Universidad de Cantabria, Spain  
 Ch. Vettier ..... Institute Laue Langevin, Grenoble, France

MARCH 5-7, 2003

Chairmen

*Prof. J. M. Lluch* (Universitat Autònoma de Barcelona, Spain)

*Prof. L. A. Eriksson* (Uppsala Universitet, Sweden)

*Prof. J. Andres* (Universitat Jaume I, Spain)

*Prof. J. M. Ugalde* (Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain)

**Computers and computational methods** have come to play an increasingly important role in natural sciences. In the area of biochemistry, theoretical modeling is for example used to understand the details governing why certain compounds or chemicals are toxic and others are not, how DNA is effected by UV-radiation, or how to design new and more efficient drugs.

During March 5 - 7, the Donostia International Physics Center (DIPC), along with the theoretical chemistry groups of The University of Uppsala and of the UPV/EHU, which are very active in these areas, organized a symposium on theoretical biochemistry/biophysics. The symposium brought together some 50 participants from Europe and North America, including many leading researchers in the field.

Among the many topics covered at the symposium were recent developments of the theoretical toolbox used by the researchers, as well as applications thereof to develop new antitumor drugs, to explain the toxicity of aluminium, or the intriguing fact that lobsters turn red upon cooking.

#### **C O N T R I B U T I O N S**

*R. J. Boyd*

**Towards the development of theoretical models for biological catalysis**

*A. Largo*

**Synthetic routes for interstellar organic and prebiotic molecules**

*J. M. Mercero*

**Aluminum interactions with aminoacid side chains in a protein model environment**

*B. Durbeej*

**Some applications of time-dependent density functional methods to biochemical systems**

*J. Villa*

**Ion channels: through the hole and over the mountain**

*A. González-Lafont*

**On the location of stationary points in enzymatic catalysis: mandelate racemase as an example**

*J. I. Mujika*

**Theoretical study of the cleavage of the peptidic bond**

*R. Stole*

**Ligand binding and conformational changes in DNA gyrase B**

*V. Moliner*

**Theoretical insights in enzyme catalysis**

*N. Russo*

**A DFT investigation of some biomolecular systems**

*U. Ugalde*

**Microbial autoinducers: molecular structure and biological function**

*E. San Sebastian*

**Molecular modelization of antimetastatic drugs and drug targets**

*A. Zubia*

**Antimetastatic drugs: an example of synthesis based on theoretical design**

*X. Lopez*

**QM and QM/MM studies on phosphate diester hydrolysis reactions**

*F. Himó*

**DFT studies of radical enzymes**

*A. Rubio*

**Optical properties of biomolecules within TDDFT: excited state electron ion dynamics**

*M. Duran*

**A new vision of aromaticity through the electron-pair density**

*J. Llano*

**Thermochemistry of electron, proton, and proton-coupled electron transfer reactions in solution**

*D. York*

**Computational methods for RNA catalysis**

*cont'd*

## PARTICIPANTS

E. Aldaba ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J. Andrés ..... Universitat Jaume I, Spain  
I. Alkorta ..... Instituto de Química Médica-CSIC, Spain  
A. Arrieta ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
M. Barbany ..... IMIM / Universitat Pompeu Fabra, Spain  
R. J. Boyd ..... Dalhousie University, Canada  
N. Dölker ..... Universitat Autònoma de Barcelona, Spain  
M. Duran ..... Universitat de Girona, Spain  
B. Durbeej ..... Uppsala Universitet, Sweden  
L. A. Eriksson ..... Uppsala Universitet, Sweden  
E. Erkizia ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
M. Eyerbe ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
S. Ferrer ..... Universidad de Valencia, Spain  
A. Gonzalez-Lafont ..... Universitat Autònoma de Barcelona, Spain  
H. Gutierrez de Terran ..... IMIM / Universitat Pompeu Fabra, Spain  
F. Himo ..... Royal Institute of Technology, Sweden  
A. Largo ..... Universidad de Valladolid, Spain  
J. Llano ..... Uppsala Universitet, Sweden  
B. Lecea ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J. M. Lluch ..... Universitat Autònoma de Barcelona, Spain  
X. López ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J. M. Matxain ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
T. Marino ..... Università della Calabria, Italy  
J. M. Mercero ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
V. Moliner ..... Universitat Jaume I, Spain  
J. I. Mujika ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
K. Nivesanond ..... Universiteit Antwerpen, Belgium  
M. A. Peña ..... Universidade de Santiago de Compostela, Spain  
J. Poater ..... Universitat de Girona, Spain  
X. Prat-Resina ..... Universitat Autònoma de Barcelona, Spain  
J. Raber ..... Uppsala Universitet, Sweden  
M. Roca ..... Universitat Jaume I, Spain  
J. M. Rodrigo ..... Noray Bioinformatics, S.L.  
A. Rubio ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
N. Russo ..... Università della Calabria, Italy

E. San Sebastián ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
I. Silanes ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
R. Stote ..... Université Louis Pasteur, France  
I. Tejero ..... Universitat Autònoma de Barcelona, Spain  
J. M. Ugalde ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
U. Ugalde ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J. Villa ..... IMIM / Universitat Pompeu Fabra, Spain  
D. York ..... University of Minnesota, USA  
C. Zhu ..... Uppsala Universitet, Sweden  
A. Zubia ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain

# PHYSICS MEETS BIOLOGY: SCATTERING AND COMPUTER SIMULATIONS

JUNE 25-28, 2003

Chairmen

*Prof. J. Colmenero* (Universidad del País Vasco/Euskal Herriko Unibertsitatea, Spain)

*Prof. D. Richter* (IFF Jülich, Germany)

**The idea is to put together** a reduced number of experts coming from different but related areas - scattering and computer simulation - in order to explore new routes, ideas and synergies for the future of this field.

## CONTRIBUTIONS

*D. Richter* **Neutron scattering in soft condensed matter**

*J. Colmenero* **Doing MD simulation in polymers as a neutron scattering practitioner**

### SELF ASSEMBLY

*A.R. Khokhlov* **Biomimetic sequence design and evolution of sequences in copolymers**

*A. Semenov* **Hierarchical structure, fibrils and globules in heteropolymer systems**

### PROTEIN DYNAMICS

*F. Parak* **The dynamics of proteins with characteristic times from femtoseconds to microseconds**

### PROTEIN DYNAMICS - NEUTRON SCATTERING AND MODELLING

*J. Smith* **Protein dynamics and hydration: Scattering meets computer simulation**

*M.C. Belissent-Funel* **Internal motions in proteins: a combined neutron scattering molecular modelling approach**

### THE INFLUENCE OF SOLVENTS

*D. Tobias* **Hydration effects**

*A. Sokolov* **Influence of solvents on the dynamics of proteins and DNA**

### PROTEIN FOLDING

*T. McLeish* **Protein folding down to (hyper-)gutter?**

*A. Grosberg* **Title to be announced**

### MEMBRANES

*G. Gompper* **Budding of crystalline domains in fluid membranes**

*D. Roux* **DNA in multilamellar vesicles – a new vector for drug delivery**

**MEMBRANES AND MOLECULAR MACHINES**

*E. Goñi*                    **Cell membranes: a few questions for physicists**

*P. Timmins*             **The role of troponin in the regulation of vertebrate muscles**

*Round table discussion*

**Future perspectives of a joined neutron scattering and simulation approach**

**PARTICIPANTS**

- E. Aldaba ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
F. Alvarez ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
A. Arbe ..... UFM-CSIC, Spain  
S. Arrese-Igor ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
T. Auth ..... IFF, Jülich, Germany  
T. Becker ..... Universität Heidelberg, Germany  
M.C. Bellisent-Funel ..... Laboratoire Léon Brillouin (CEA-CNRS), France  
R. Biehl ..... IFF, Jülich, Germany  
A. Chertovich ..... Moscow State University, Russia  
A. Cabo ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J. Colmenero ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
D. Fernandez ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
G. Gompper ..... IFF, Jülich, Germany  
F. Goñi ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
A. Grosberg ..... University of Minnesota, USA  
I. Iradi ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
A.R. Khokhlov ..... Moscow State University, Russia  
T. Mcleish ..... University of Leeds, UK  
O. Mitxelena ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
M. Monkenbusch ..... IFF, Jülich, Germany  
A. Narros ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
P.D. Olmsted ..... University of Leeds, UK  
F. Parak ..... TU-München, Germany  
M. Rheinstädter ..... ILL, Grenoble, France  
D. Richter ..... IFF, Jülich, Germany  
D. Roux ..... Centre de recherche Paul Pascal, CNRS, France  
J. Sacristán ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
M. Schmidt ..... TU-München, Germany  
A. Semenov ..... Moscow State University, Russia  
J. Smith ..... Universität Heidelberg, Germany  
A. Sokolov ..... University of Akron, USA  
B. Stidder ..... University of Bath, UK and ILL Grenoble, France  
M. Tarek ..... Université Henri Poincaré, Nancy, France  
E. Telletxea ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
P. Timmins ..... ILL Grenoble, France  
D. Tobias ..... University of California, USA  
A. Wischnewski ..... IFF, Jülich, Germany

## OPTICAL PROPERTIES OF COMPLEX MATERIALS OVER DIFFERENT LENGTH SCALES

JULY 7-11, 2003

Co-chairmen

*Prof. P. M. Echenique* (Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain)

*Dr. F. J. Garcia de Abajo* (UFM-CSIC, Spain)

International Advisory Committee

*Prof. C. Afonso* (Instituto de Óptica "Daza Valdés", CSIC, Madrid, Spain)

*Prof. A. Dereux* (Université de Bourgogne, Dijon, France)

*Prof. T. Ebbesen* (Université Louis Pasteur, Strasbourg, France)

*Prof. T. Heinz* (Columbia University, New York, USA)

*Prof. F. Meseguer* (Unidad Asociada CSIC-UPV, Valencia, Spain)

*Prof. A. Modinos* (National Technical University of Athens, Greece)

*Prof. J. Pendry* (Imperial College, London, UK)

**The aim of this workshop** is to bring together researchers with backgrounds in theory and experiments in order to assess the present state of our understanding of small particles as building blocks of meta-materials with engineered optical properties. This will cover the interaction of light with both photonic crystals and non-periodic structures at different wavelength scales ranging from the far infrared to the visible, as well as the theoretical and experimental techniques that are needed to investigate them. The main purpose is to combine knowledge about small particle characterization and complex systems of particles to gain insight and establish new links and future collaborations.

This workshop is of special interest to researchers conducting theoretical or experimental studies on:

Effective media and meta-materials

Optics from the nanometer to the millimeter scale

Collective excitations and plasmons

Photonic crystals

Electron diffraction: bridging the gap between electron and radiation waves

Electron microscopy

## CONTRIBUTIONS

<i>T. Ebbesen</i>	<b>Diffraction control and enhanced transmission through sub-wavelength apertures in metal films</b>
<i>L. Martín Moreno</i>	<b>Extraordinary optical properties of nanostructured metals</b>
<i>J. Prikkulis</i>	<b>Light scattering by small holes in thin metal films</b>
<i>M. Sorolla</i>	<b>Electromagnetic band gaps in planar microwave technology</b>
<i>N.I. Zheludev</i>	<b>Fundamental symmetries of light's interaction with planar chiral nanostructures</b>
<i>M. Nieto-Vesperinas</i>	<b>Electromagnetic forces in the near field</b>
<i>T. Heinz</i>	<b>Surface nonlinear optics of nanostructures</b>
<i>E. Ozbay</i>	<b>Physics and applications of 2D and 3D photonic crystals</b>
<i>S. Tretyakov</i>	<b>Physical means to store and amplify evanescent modes</b>
<i>J. B. Pendry</i>	<b>Designing lenses for the near field</b>
<i>R. Marqués</i>	<b>Amplification of evanescent waves and subwavelength focusing in feasible simple physical systems</b>
<i>V. M. Shalaev</i>	<b>Plasmonic nanoantennas for guiding light and sensing molecules</b>
<i>S. Coyle</i>	<b>Chameleon metals-metallic meshes from self-assembled colloids</b>
<i>H. Benisty</i>	<b>Planar photonic crystal: the example of InP-based photonics and the relevant length scales in actual applications</b>
<i>A. Modinos</i>	<b>Photonic band gaps and disorder effects</b>
<i>B. Barnes</i>	<b>Surface plasmon length scales</b>
<i>F. Meseguer</i>	<b>New architectures in opal structures</b>
<i>N. Zabala</i>	<b>Electron energy loss analysis of nanoporous alumina films</b>
<i>N. Yamamoto</i>	<b>Light emission from nano-structures induced by high-energy electron beams</b>
<i>A. Howie</i>	<b>Where is spatially resolved spectroscopy going?</b>
<i>C. Genet</i>	<b>The Casimir force: theory-experiment comparison</b>
<i>A. Dereux</i>	<b>Oxides and metal nanostructures for controlling optical processes at the subwavelength scale</b>
<i>C. N. Afonso</i>	<b>Optical properties of nanostructured metal nanocomposites</b>
<i>M. Käll</i>	<b>Optical properties and applications of gold and silver nanoparticles</b>
<i>J. Aizpurua</i>	<b>Simulating nanoscale optical microscopy and spectroscopy</b>
<i>L. Blanco</i>	<b>Spontaneous emission in the presence of nanostructured materials</b>
<i>D. Wiersma</i>	<b>Complex dielectric systems with external control: from photonic crystal switching to tunable random Laser action</b>
<i>A. Postigo</i>	<b>Photonics crystals in active media: design and fabrication at the IMM</b>
<i>L. Guidoni</i>	<b>Femtosecond dynamics of light transmission through sub-wavelength hole arrays in metallic films</b>

*cont'd*

## **PARTICIPANTS**

E. Aldaba	Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain
C. N. Afonso	CSIC, Madrid, Spain
J. Aizpurua	National Institute of Standards and Technology, USA
B. Barnes	University of Exeter, UK
B. Benistry	Institut d'Optique d'Orsay, France
L. Blanco	Donostia International Physics Center, Spain
I. Bulu	Bilkent University, Turkey
S. Coyle	University of Southampton, UK
A. Dereux	Université de Bourgogne, France
T. Ebbesen	Université Louis Pasteur, France
F. Falcone	Universidad Pública de Navarra, Spain
F.J. García de Abajo	UFM-CSIC, Spain
C. Genet	Leiden University, The Netherlands
J. Gómez Rivas	Institute for Semiconductor electronics, Germany
L. Guidoni	Institut de Physique et Chimie des Matériaux de Strasbourg, France
T. Heinz	Columbia University, USA
A. Howie	University of Cambridge, UK
F. Intonti	European Laboratory for Non-linear Spectroscopy, Italy
M. Käll	Chalmers University of Technology, Sweden
N.G. Khlebtsov	Russian Academy of Sciences, Russia
L. Martín Moreno	Universidad de Zaragoza, Spain
R. Marqués	Universidad de Sevilla, Spain
F. Meseguer	CSIC, Spain
A. Modinos	National Technical University of Athens, Greece
M. Nieto-Vesperinas	CSIC, Spain
E. Ozbay	Bilkent University, Turkey
J. B. Pendry	Imperial College London, UK
A. Pinchuk	I Physikalisches Institut der RWTH, Germany
A. Postigo	CSIC, Spain
E. Prati	Materials and Devices for Microelectronics Laboratory, Italy
J. Prikulis	Chalmers University of Technology, Sweden

R. Quidant ..... Institut de Ciències Fotòniques, Spain  
J. Romeu ..... Universitat Politècnica de Catalunya, Spain  
Ricardo Sapienza ..... European Laboratory for Non-linear Spectroscopy, Italy  
A. Sentenac ..... Institut Fresnel, France  
V. M. Shalaev ..... Purdue University, Indiana, USA  
M. Sorolla ..... Universidad Pública de Navarra, Spain  
S. Tretyakov ..... Helsinki University of Technology, Finland  
N.M. Ushakov ..... Institute of RadioEng & Electronics, Russia  
D. Wiersma ..... Università degli Studi di Firenze, LENS, Italy  
N. Yamamoto ..... Tokio Institute of Technology, Japan  
N. Zabala ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
N.I. Zheludev ..... University of Southampton, UK

# DONOSTIA ENCOUNTERS ON PARTICLE-SOLID INTERACTIONS

## MODIFICATIONS FOLLOWING DIFFERENT INTERACTION PROCESSES AT SURFACES

SEPTEMBER 8-13, 2003

Chairman

*Prof. A. Howie* (University of Cambridge, UK)

Organizers

*Prof. P. M. Echenique* (Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain)

*Prof. A. Arnau* (Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain)

**The 5th Donostia Encounters** on Particle-Solid Interactions was centered around the topic "Modifications following different interaction processes at surfaces". It was sponsored by the Donostia International Physics Center (DIPC). The chairman of the Conference, Prof. Archie Howie selected the following topics: photon and electron beam damage, charging effects in electron beam irradiation, environmental scanning electron microscopy, ion beam lithography and dry etching, computer simulation of condensed matter processes, ion and molecule scattering at surfaces and ion beam analysis.

### C O N T R I B U T I O N S

#### MANIPULATION IN THE ATOMIC SCALE

*N. Tolk*

**Desorption and damage studies at semiconductor surfaces and interfaces using intense, tunable, ultrafast lasers**

*J.I. Pascual*

**Mode-selective manipulation of the cleavage of a single molecular bond**

#### PHOTOCHEMISTRY AND LOW ENERGY ELECTRONS

*D. Menzel*

**Photochemistry in adsorbates: Coupling-induced modifications, quenching, and selectivity**

*P. Rowntree*

**Interaction of low energy electrons with soft molecular systems**

#### ION BEAM ANALYSIS

*P. Puspa*

**Ion scattering as a tool for material science**

*F. Paszti*

**Interaction of MeV ions with porous materials: morphological changes and their investigation by ion beam analysis**

#### IONS AND ELECTRONS WITH INSULATORS

*J. Cazaux*

**Electron irradiated insulators: mechanisms of charging and correlation with some chemical modifications**

*B. Thiel*

**Control of secondary electron emission from insulating surfaces by soft-landing ions in the low vacuum SEM**

#### SMALL STRUCTURES

*P. Kruit*

**Electron-beam-induced deposition of sub-10 nanometer structures**

*J.R. Sabin*

**Ion Induced Molecular Fragmentation**

#### ENERGY LOSS AND ELECTRON EMISSION

*V.A. Khodyrev*

**The current density approach in treatment of energy loss**

*M.S. Gravielle*

**Differential electron emission spectra produced by grazing ion-surface collisions**

#### ION-SURFACE INTERACTIONS

*P. Bauer*

**Electronic interactions of slow He ions at a metal surface**

*D. Boerma*

**Surface and thin layer physics at the CNAM of the UAM**

#### TECHNOLOGICAL APPLICATIONS

*J. Colligon*

**Modification of surface hardness using ion-assisted deposition**

*W.H. Bruenge*

**Ion projection direct structuring of surfaces: technology and applications**

#### MOLECULES AT SURFACES

*D. Farias*

**Looking at the hydrogen dissociation process via diffraction experiments**

*F. Busnengo*

**Low energy H<sub>2</sub> scattering from metal surfaces: reactivity and dissociation mechanisms**

#### ELECTRONS AND PHOTONS IN CRYSTALS

*N. Vast*

**Anisotropy of the microscopic fluctuations of the polarization, confinement effects, and the dielectric function of crystals**

*E.J. G. de Abajo*

**The Cherenkov effect in photonic crystals**

## **PARTICIPANTS**

E. Aldaba ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
I. Aldazabal Mensa ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
M. Alducin ..... Donostia International Physics Center, Spain  
A. Arnau ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
P. Bauer ..... Johannes Kepler Universität, Austria  
D. O. Boerma, ..... Universidad Autónoma de Madrid, Spain  
W. Bruenger ..... Fraunhofer-IsiT, Germany  
H.F. Busnengo ..... Instituto de Física, Rosario, Argentina  
J. Cazaux ..... Université de Reims, France  
S. Chenakin ..... Université Libre de Bruxelles (ULB), Belgium  
A. Climent Font ..... Universidad Autónoma de Madrid, Spain  
J. S Colligon ..... Manchester Metropolitan University, UK  
R. Díez Muino ..... UFM-CSIC, Spain  
P.M. Etxenike Landiribar ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
D. Farias ..... Universidad Autónoma de Madrid, Spain  
F.J. García de Abajo ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
G. García López ..... Universidad Autónoma de Madrid, Spain  
M.S. Gravielle ..... Instituto de Astronomía y Física del Espacio (IAFE), Argentina  
I. García de Gurtubay Gállego ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
A. Howie ..... Cambridge University, UK  
I. Juaristi ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
V.A. Khodyrev ..... Moscow State University, Russia  
P. Kruit ..... Delft University of Technology, The Netherlands  
M.L. Martiarena ..... Centro Atomico Bariloche, CONICET, Argentina  
D. Menzel ..... Universität München, Germany  
J.E. Miraglia ..... Instituto de Astronomía y Física del Espacio, Argentina  
E. Ogando Arregul ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J.I. Pascual ..... Universidad Autónoma de Barcelona, Spain  
F. Paszti ..... KFKI-Research Institute for Particle and Nuclear Physics, Hungary  
J.M. Pitarke ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain

L.E. Porter ..... Washington State University, USA  
P. Pusa ..... University of Helsinki, Finland  
A. Rivacoba ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
P. Rowntree ..... Université de Sherbrooke, Canada  
J.R. Sabin ..... University of Florida, USA  
A. Salin ..... CNRS-Université Bordeaux, France  
A. Sarasola ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
J. Sjakste ..... Université Paris-Sud, France  
B.L. Thiel ..... Cambridge University, UK  
N. Tolk ..... Vanderbilt University, USA  
N. Vast ..... Ecole Polytechnique, France



*Professors Jacques Cazaux, Peter Kruit and Wilhelm Bruenger*

SEPTEMBER 21-24, 2003

Chairmen

*Prof. R.W. Godby* (York University, UK)

*Prof. A. Rubio* (Universidad del País Vasco, Euskal Herriko Unibertsitatea, Spain)

Organizers

*Dr. P. García-González* (Universidad Autónoma de Madrid, Spain)

*Prof. A. Rubio* (Universidad del País Vasco, Euskal Herriko Unibertsitatea, Spain)

**The aim of this workshop** is to assess the present status of theoretical approaches to the study of spectroscopic properties of real materials, and explore their capability for applications in further systems with technological and biological interest. Due to the different methods used to tackle this problem (Many-Body Theory, Density Functional Theory, Configuration Interaction, semi-empirical approaches), this workshop is intended as a way to promote links among scientists coming from different communities working or interested in electron excited states.

## CONTRIBUTIONS

### THEORETICAL FOUNDATIONS I

*E.K.Gross*

**ELFs and Ghosts in Density Functional Theory**

*Y.M. Niquet*

**High-accuracy XC potentials from the linear-response Sham-Schluter equation: Asymptotic behavior and properties**

### THEORETICAL FOUNDATIONS II

*F. Sottile*

**Parameter-free calculation of response functions in time-dependent density-functional theory**

*A. Marini*

**Bound excitons in time-dependent density-functional-theory: optical and energy-loss spectra**

*S. Biermann*

**Electronic structure of strongly correlated materials-a view from dynamical mean field theory**

### BIOLOGICAL AND ORGANIC SYSTEMS I

*P. Carloni and M. Rohlfing*

**Dynamics of electronically excited molecules**

#### COMPLEX SYSTEMS I

*G. Onida*

**Calculating optical spectra of surfaces and other non infinite systems using plane waves in DFT-LDA and Beyond: bottlenecks and progresses**

*O. Gunnarsson*

**Calculation of dynamical correlation functions: Application to resistivity saturation**

#### COMPLEX SYSTEMS II

*C. Hogan*

**Electron energy loss spectroscopy at As-rich GaAs(001) surfaces**

*M. Friak*

**Ab Initio investigation of the Halfmetal-Metal transition in magnetite**

*K. Tsemekhman*

**Self-Consistent Self-Interaction corrected DFT: The Method and applications to extend and confined systems**

*K. Tatarczyk*

**Surface plasmons in surface alloys**

#### BIOLOGICAL AND ORGANIC SYSTEMS II

*F.J. Himpsel*

**Electronic excitations at the interface between soft and hard matter**

*G. Schmidt*

**Ground-and excited-state properties of small molecular systems: Pyrimidine and purine bases in the gas phase and adsorbed on silicon**

#### BIOLOGICAL AND ORGANIC SYSTEMS IV

*A. Seitsonen*

**TDDFT in molecules and extended systems**

*A. Castro*

#### BIOLOGICAL AND ORGANIC SYSTEMS V

*M. Sulpizi*

**A Hybrid time-dependent density functional/molecular mechanics investigation of aminocoumarins in solution**

*E. Molinari*

**Optics and transport of (bio) molecular systems: solid state effects and P-P interactions**

*A. Calzolari*

**Electron channels in biomolecular nanowires**

*G. Stefanucci*

**Different ways of treating the bias and the inclusion of many-body interactions in the description of quantum conductance**

#### ELECTRON TRANSPORT

*J. G. Herrero*

**Measuring the electrical transport properties of individual molecules: carbon nanotubes and DNA**

*P. Bokes*

**Coherent steady current-carrying states from the maximum entropy principle and the Kubo Formula**

*A. Wacker*

**Nonequilibrium quantum transport in quantum cascade lasers**

## PARTICIPANTS

E. Aldaba	Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain
T. Adachi	University of Tokyo, Japan
C.O. Almbladh	Lunds Universitet, Sweden
F. Aryasetiawan	Royal Institute of Science Tsukuba, Japan
U. von Barth	Lunds Universitet, Sweden
F. Bechstedt	Friedrich Schiller Universität, Jena, Germany
S. Biermann	Ecole Polytechnique, Palaiseau, France
P. Bokes	University of York, UK
S. Botti	Ecole Polytechnique Palaiseau, France
F. Bruneval	Ecole Polytechnique Palaiseau, France
A. Calzolari	INFM Nanostructures and Biosystems at Surfaces, Italy
P. Carloni	International School for Advanced Studies, Italy
N. Carneiro	University of York, UK
M. Cascella	International School for Advanced Studies, Italy
A. Castro	Universidad de Valladolid, Spain
E. K. Chang	INFM Nanostructures and Biosystems at Surfaces, Italy
L. Chiodo	Università di Roma Tor Vergata, Italy
L. Dash	Ecole Polytechnique Palaiseau, France
K. Delaney	University of York, UK
J. Dobson	Griffith University, Australia
P. Eggert	Fritz Haber Institut Berlin, Germany
M. Elstner	Paderborn Universität, Germany
R. di Felice	INFM S3 Modena, Italy
D. Foester	Université de Bordeaux, France
M. Friak	Fritz Haber Institut Berlin, Germany
J. Furthmüller	Friedrich Schiller Universität Jena, Germany
P. García-González	Universidad Autónoma de Madrid, Spain
R. W. Godby	University of York, UK
J. Gómez-Herrero	Universidad Autónoma de Madrid, Spain
E. K.U. Gross	Freie Universität Berlin, Germany
O. Gunnarsson	Max Planck Institut Stuttgart, Germany
I. G. de Gurtubay	Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain
F. Himpfel	University of Wisconsin-Madison, USA
C. Hogan	Università di Roma Tor Vergata, Italy
A. Hoglund	Università di Roma Tor Vergata, Italy
A. Incze	Università di Milano, Italy
J. Jung	Universidad Nacional de Educación a Distancia, Spain
S. Kurth	Freie Universität Berlin, Germany
G. Mallocci	Università di Cagliari, Italy
A. Marini	Donostia International Physics Center, Spain

A. Marinopoulos ..... Ecole Polytechnique Palaiseau, France  
 M. Marqués ..... Freie Universität Berlin, Germany  
 M. Marsili ..... Università di Roma Tor Vergata, Italy  
 H. Maruyama ..... University of Tokyo, Japan  
 H. Mera ..... University of York, UK  
 E. Molinari ..... Università di Modena, Italy  
 P. Monachesi ..... Università di Roma Tor Vergata, Italy  
 Y. Nagata ..... University of Tokyo, Japan  
 I. Nekrasov ..... Institute of Metal Physics, Russia  
 Y.-M. Niquet ..... Université Catholique de Louvain, Belgium  
 V. Olevano ..... Ecole Polytechnique Palaiseau, France  
 G. Onida ..... Università di Milano, Italy  
 C. Ortiz ..... Uppsala Universitet, Sweden  
 M. Palumbo ..... Università di Roma Tor Vergata, Italy  
 Z. Pchelkina ..... Institute of Metal Physics, Russia  
 T. Pitarke ..... Universidad del País Vasco / Euskal Herriko Unibertsitatea, Spain  
 O. Pulci ..... Università di Roma Tor Vergata, Italy  
 V. Quequet ..... Ecole Polytechnique Palaiseau, France  
 L. Ramos ..... Friedrich Schiller Universität, Jena, Germany  
 L. Reining ..... Ecole Polytechnique Palaiseau, France  
 P. Rinke ..... Fritz Haber Institut Berlin, Germany  
 U. Roehrig ..... Swiss Federal Institute of Technology, Switzerland  
 M. Rohlfing ..... Munster Universität, Germany  
 C. A. Rozzi ..... Freie Universität Berlin, Germany  
 A. Rubio ..... Donostia International Physics Center, Spain  
 G. Satta ..... Università di Cagliari, Italy  
 G. Schmidt ..... Friedrich Schiller Universität, Jena, Germany  
 A. Seitsonen ..... Universität Zürich, Switzerland  
 R. del Sole ..... Università di Roma Tor Vergata, Italy  
 F. Sottile ..... Ecole Polytechnique Palaiseau, France  
 G. Stefanucci ..... Lunds Universitet, Sweden  
 K. Spiegel ..... SISSA, Trieste, Italy  
 M. Sulpizi ..... Swiss Federal Institute of Technology, Switzerland  
 K. Tatarczyk ..... Fritz Haber Institut Berlin, Germany  
 J. Titantah ..... Universiteit Antwerpen, Belgium  
 K. Tsemekhman ..... University of Washington, USA  
 N. Vast ..... Ecole Polytechnique Palaiseau, France  
 A. Wacker ..... Technische Universität Berlin, Germany  
 L. Wirtz ..... Donostia International Physics Center, Spain  
 A. Zacarias ..... Freie Universität Berlin, Germany