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II

Review of Research Projects

GENERAL INTRODUCTION

The Institute of Physics was founded in Shanghai in 1928 and was reestablished in Taiwan in 1962, with Dr. Ta-You Wu as its first Director. The succeeding Directors of the Institute were: Dr. W. N. Wang (1976-1977), Dr. E. K. Lin (1977-1989), Dr. L. T. Ho (acting, 1989-1990), Dr. T. T. Tsong (1990-1999), Dr. Y. D. Yao (acting, 1999-2002), and Maw-Kuen Wu (2002-present). In 1966, the Institute, together with the National Tsing-Hua University and the National Taiwan University, co-organized the Physics Research Center, under the auspices of the National Science Council, in order to promote physics research in Taiwan. In 1970, an interdisciplinary research program for atmospheric science and fluid mechanics was initiated in the Institute of Physics, and later a similar program for biophysical research in 1975. During the First Five-Year Plan (1981-5) of the Academia Sinica, the original two-story Physics Building was replaced by a four-story building at the same site in April, 1983. The Institute's scope of research was then further expanded to include theoretical physics, covering mainly field theory and particle physics, nuclear physics, and statistical and computational physics. Since the beginning of the Second Five-Year Plan (1986-91), the Institute has continued to grow, both in research staff and facilities. To meet the demands of rapidly growing research activities in the Institute, a new ten-story building immediately adjacent to the original building was completed in 1999. The Institute of Physics is expected to play an increasingly important role in the development of physics and technology in Taiwan.

At present, the Institute has 41 research staffs: 2 distinguished research fellows, 27 research fellows, 7 associate research fellows, 4 assistant research fellows, and 1 research assistant. The Institute also maintains regularly 200 temporary employees, including visiting scholars, postdoctoral research associates, as well as research assistants and graduate students. Currently, the researches can be grouped into three major areas: Nanoscience, Complexity, Medium and High Energy Physics. Specific interests are in the areas of particle physics and cosmology, experimental high-energy physics, nuclear physics, condensed-matter and surface physics, statistical and computational physics, biophysics, as well as fluid and nonlinear physics. The whole Physics Building has been named the "Ta-You Hall" to commemorate its first director, who passed away on March 4, 2000.

The Institute of Physics Logo

The logo for the Institute of Physics was the winning design from a logo submission contest held by the Institute. It was an idea born on April 15, 2003 by Dr. Chia-seng Chang, an Institute Fellow, with the following spirit in mind:

The letters I.O.P are drawn with the additive primary colors blue, green, and red, and are placed in such a way that one can picturize G、ϵ、c、h、k, the 5 fundamental physical constants which represent classical mechanics, electromagnetism, relativity, quantum mechanics, and statistical mechanics respectivity. The design also vaguely impresses on the number 1928, which is the year the Institute of Physics was founded.

Nanoscience Research Group

Nanoscience and nanotecnology have become the major research focus in the Institute. We have already built up our capabilities and expertise during the past few years. To further enhance our research strength we have decided that all our efforts and interests will be grouping into the following categories:

(i) Development of state-of-the-art research tools for nano-science
(ii) Synthesis and characterizations of nano-structures, nano-materials
(iii) Manipulation and control of single atom and single molecules
(iv) Theoretical modeling and simulations of nano-system

The followings are the research groups that involve in nanoscience researches and summaries of their research activities:

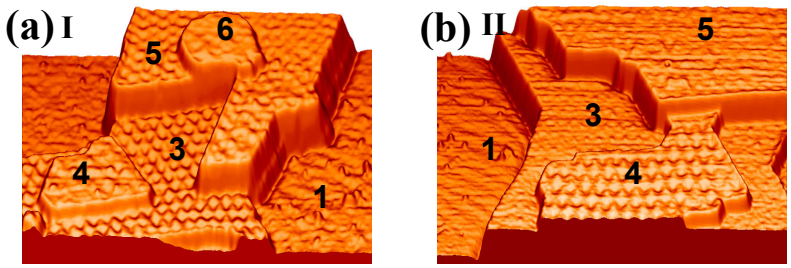
(I) Surface Physics and Nanoscale Microscopy

This research group includes six faculty members (Tien-Tzou Tsong, Ching-Ming Wei, Jason Chia-Seng Chang, Ing-Shouh Hwang, Yeu-Kuang Hwu, Wei-Bin Su) and routinely maintains a size of around 20 researchers comprised of

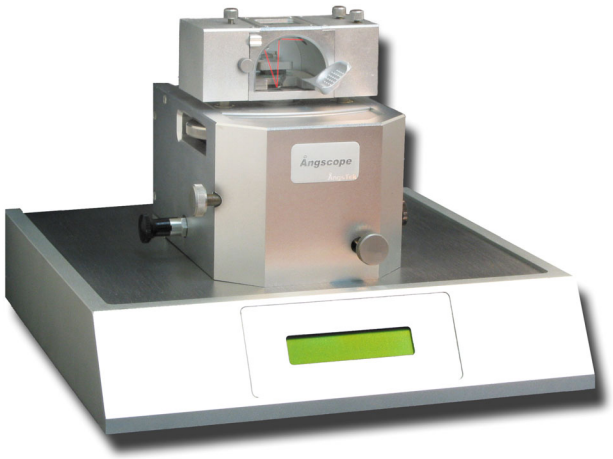
visiting scholars, post-doctors, assistants, and students. We have established several major research tools such as scanning tunneling microscopy (STM), atomic force microscopy (AFM), field ion microscopy (FIM), transmission electron microscopy (TEM), photoemission electron microscopy (PEEM), low energy electron diffraction (LEED), Auger spectroscopy (AES), x-ray microscopy and etc. In past years, our focus has been on studying surface dynamics, film growth mechanisms, principles of atomic manipulation, quantum phenomena associated with low dimensionality, and microscopic instrumentations. In next five years, we plan to make progress in investigating the site-specific and shape-related properties of nanoscale objects with atom-resolvable STM; analyzing the real-time correlation between the functionality of a quantum dot or quantum wire and its structure with the TEM/STM combined system; designing quantum phenomena laboratory at the atomic scale with ultra-low temperature STM equipped with superconducting magnet; improving the resolution of x-ray radiology to nanometer scale; and modeling nanomaterials with calculations and simulations. Some past research accomplishments are summarized in the following:

- We can routinely and repeated create single-atom sharp pyramidal W tips, wrapped in a Pd overlayer, that having atom-perfect wedges using a surface-science technique.
- We discovered that the nucleation and growth of two-dimensional (2D) Ge islands at a Pb layer covered Si(111) surface are reaction limited.
- We have carried out first-principles calculations of Pb (111) films up to 25 monolayers to study the oscillatory quantum size effects exhibited in the surface energy and work function.
- We observed two types of islands having different stacking with the substrate on 2D Pb-island of a few atomic layers that grown on the incommensurate Si(111)-Pb surface at low temperatures. These islands respectively display an alternating image contrast with their thickness. Besides, the contrasts of the islands of different types are complementary to each other layer by layer. These intriguing behaviors can be explained by the vertical charge oscillation with the growth of a new layer. The charge oscillation in the out-of-plane direction originates from electron scattering by the in-plane potential variation at the Pb/Si interface.

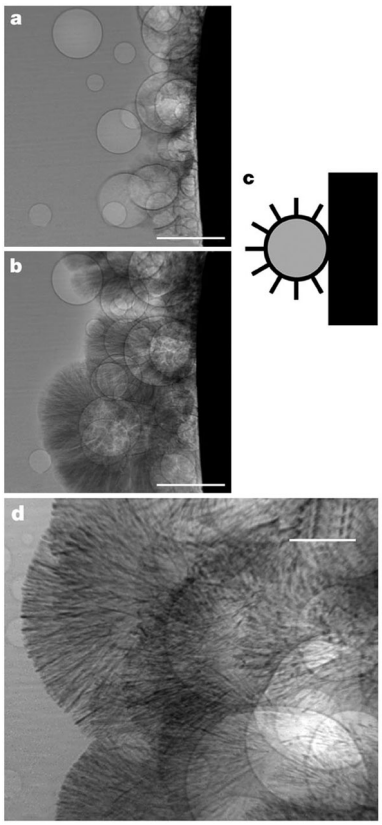
- We have developed a new phase-contrast radiology using synchrotron radiation to witness directly and in real time the accumulation of zinc on hydrogen bubbles in the electrodeposition coating of metals.



Vertical Friedel oscillation manifested in surface charge density modulations as function of island thickness. (a) STM image (120 nm x 60 nm), taken at sample bias voltage of +2 V, showing patterns on 3-6 layer-high islands of the Type I. (b) STM image (120 nm x 60 nm), taken at sample bias voltage of +2 V, showing patterns on 3-5 layer-high islands of the Type II.



Homemade Atomic Force Microscope



Phase-contrast microradiographs showing the growth of zinc on hydrogen bubbles. **a, b,** Images (taken 6 s apart) showing growth of zinc dendrites. **c,** Diagram of radial dendritic growth along the electric-field lines. **d,** Image showing the microstructure of the dendrites. Scale bars, 300 μm (**a**, **b**) and 200 μm (**d**).

(II) Optic Materials and Semiconductor Physics

This research group consists of two faculty members (L. T-M. Ho, Wan-Sun Tse) and some research associates. The major research interest covers a broad range of topics concerned with the fundamental properties of shallow-levels in semiconductors and with impurity related issues of importance to semiconductor physics and technology, e.g., single and multiple donors and acceptors, shallow excited states of deep-level impurities, defect interaction on the atomic scale such as impurity-pair or complex formation. Crystal growth technique of some optical materials is also being studied hoping to manufacture useful tunable solid state lasers.

(III) Nanomaterial and Low Temperature Physics

The nanomaterial and low temperature physics research group was first established in 1989. Now it involves two full-time faculty members (Maw-Kuen Wu,Yang-Yuan Chen) and maintains a size of around 15 researchers comprised of visiting scholars, post-doctors, assistants, and students. Our research interests include phenomena that associated with strongly correlated electrons such as heavy fermion physics, Kondo effect and high temperature superconductivity. Other areas include the understanding of quantum-size effects on the above mentioned phenomena and others such as thermopower and thermoconductivity in alloys and/or semiconductors. We have developed our own research equipments such as a SQUID magnetometer operated in He^3 cryostat, low-temperature microcalorimeter, and measurements of thermopower & thermoconductivity, transport measurements to 20 Tesla in a dilution refrigerator; magnetic susceptibility and electrical resistivity measurements at high pressure up to 20 kilobars. We also have setups for the preparation of nanoparticle, thin film and single crystals. Some past research accomplishments are summarized in the following:

- We have observed several interesting quantum-size effects on the magnetisim or superconductivity in nanomaterials that show conventional heavy fermion characteristics when they are in bulk forms.
- We have developed new methods for the production of high quality magnetic/or superconducting nanoparticles and thin films.
- We have developed a new wide-range low temperature sensor for calorimeter application using Ru-Al based oxides.
- We have observed the coexistence of magnetic order and superconductivity in Ru-based double perovskite oxides.

Dilution Refrigerator Kelvinox 100 Lowest temperature 10 mK and magnetic field 9 Teslas.

(IV)Spintronics and Magnetotranport Physics

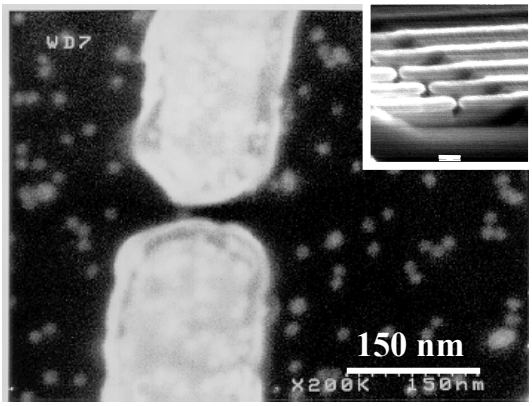
This research group was established more than twenty years. Currently it includes four full-time members (Y. D. Yao, S. U. Jen, Yung Liou, S. F. Lee) of the institute and maintains about 40 researchers comprised of visiting scholars, post-doctors, assistants, and students. Our research areas cover wide-range of topics associated with interesting magnetic properties such as the interface properties between ultra-thin magnetic films on semiconductor; magnetic superlattices; magnetic

coupling in multilayer magnetic/superconductor thin films, patterned magnetic nano-structures and etc. Other topics such as the magnetostriction of single-layered or multi-layered magnetic films; the magneto-optical effect; the piezoresistance (or the elastic properties) of metal (magnetic or non-magnetic) films are also of our research interests. We have established the capabilities to create artificial nano-patterned magnetic structures and ultra-thin magnetic multilayer films. We have also developed a very sensitive technique to measure at low temperature the very small current perpendicular to plane (CPP) resistance of large area thin films piezoresistance (or the elastic properties) of metal (magnetic or non-magnetic) films are also of our research interests with our SQUID pico-voltmeter setup. This technique provides us the possibility to further understand the interplay between spin-relaxation and Andreev reflection at the ferromagnetic/superconducting interface and to quantitatively study the Andreev reflection as functions of different physical quantities. We have built up a highly sensitive "Optical-cantilever" system that can be used to measure the saturation magnetostriction ($_s$) of a magnetic thin film. We have also built up a "Resistance-cantilever" system, which can be utilized to measure the strain gauge factor ( ) of a thin-film sample. A "Polar Kerr effect magnetometer" has been developed to study the polar Kerr rotation, polar Kerr ellipticity, and reflection coefficient of MO multi-layers.

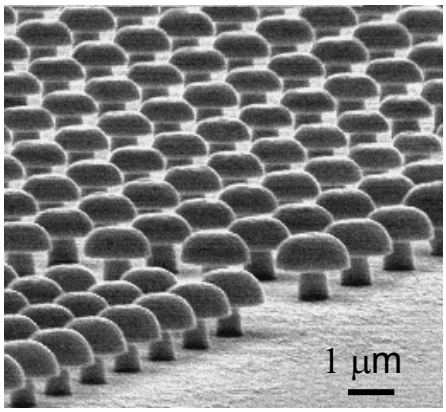
(V) Quantum Electronics Physics

Taking advantage of modern electron-beam lithography technology, we (Chii-Dong Chen) are able to fabricate various nanometer-scaled electronic devices with the critical dimension as small as 30 nm. The objective is two-fold: to study novel (quantum) effects associate the small length scale of the devices and to utilize these effects for applications such as signal detection or information processing. The relevant length scales range from electron wavelength to phase breaking length, or spin relaxation length in magnetic systems. The materials that may be employed are superconductors, ferromagnets, semiconductors and novel materials such as carbon nanotubes and other synthesized nanowires, colloidal particles. These materials are patterned or arranged into one-dimensional narrow wires, quantum dots and point contacts. In area of fundamental research, we investigate superconductor-insulator phase transitions as well as interplay between magnetism and superconductivity. In

addition, a project on shot noise properties in nanoelectronics is initiated. In application-oriented researches, we wish to study electron transport properties of devices with synthesized materials such as carbon nanotubes, colloidal particles or DNA molecules. Our recent research activities include: Transport properties of Multiwalled Carbon Nanotubes; Single electron memory cells with Au colloidal islands; Single electron transistors made of silicon; Spin injection in GaAs/AlGaAs heterostructures; Spin transport in ferromagnetic-superconductor-ferromagnetic single electron transistors; Quantum phase transitions in one-dimensional arrays of small Josephson junctions; and Fabrication of CdSe 2D photonic crystals



An SEM image of the fabricated device; the gate electrode is not shown. The inset shows the suspended Au leads before attachment of Au particles; the scale bar is 150 nm. The source and drain electrodes are bridged by C_{60}-Au-C_{60} nano-particles, acting as an electrometer, and the gate electrode is also attached by a chain of C_{60}-Au nano-particles, acting as a charge storage cell.



Two-dimensional arrays of high refractive index structures can be fabricated using a combination of e-beam lithography for pattern definition and electrochemical deposition for structure formation. The potential of this method is demonstrated for CdSe, where nanopillars, walls, and crosses are prepared. Such arrays have potential in optical device applications such as photonic crystals and waveguides

(VI) Theoretical Condensed Matter Physics

This group consists of two faculty members (T. K. Lee, S. K. Yip) and more than 15 postdoctors, visiting scholars and research assistants including graduate students. The major research interests are High temperature superconductivity; Nano-materials; Protein structure prediction; Protein folding; Quantum Monte Carlo method. Cold trapped atoms: physics in low dimension, optical lattices, spinor Bose condensates and Fermionic superfluids; electric transport and noise properties in superconducting quantum point contacts; properties of unconventional superconductors

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Selected Publications

A01 I. S. Hwang, T. C. Chang, and T. T. Tsong, Direct observation of reaction-limited aggregation on semiconductor surfaces, Phys. Rev. Lett. 83, 1191 (1999).

A02 T. Y. Fu, L. C. Cheng, C. H. Nien and T. T. Tsong, "Mechanism and Method of Single Atom Pyramidal Tip Formation from a Pd Covered W Tip", Phys. Rev. B 64, 113401 (2001).

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High and Medium Energy Physics Group

(I) Theory Program

A. Particle Phenomenolog

(1) Study of charmless and charmful baryonic B decays

(2) Nonresonant three-body decays of D and B mesons

(3)Weak annihilation and the effective parameters a_1 and a_2 in nonleptonic D decays

(4) Hadronic $D \rightarrow SP$ decays

(5) PQCD study of exclusive B decays - k_T factorization theorem

(6) Threshold resummation

(7) Three-body nonleptonic B decays

(8) Symmetry breaking effects in heavy mesons

(9) Out of equilibrium and RHIC physics

(10)Direct photons: a nonequilibrium signal of the expanding quark-gluon plasma at RHIC energies

(11)Photon production from nonequilibrium disoriented chiral condensates in a spherical expansion

(12) Field theory

(13) Nonperturbative bound on high multiplicity cross sections in theory in three dimensions from lattice simulation

(14) p-brane production in fat brane or universal extra dimension scenario

(15) Quantum bit commitment

B. Particle Astrophysics and Cosmology

(1) Primordial magnetic fields from dark energy

(2) Constraining evolution of quintessence with CMB and SNIa data

(3) Time-dependent correlation of primordial cosmic perturbations in the inflationary cosmology

(4) Observational strategies of CMB temperature and polarization interferometry experiments

(5) SPOrt: an experiment aimed at measuring the large scale cosmic microwave background polarization

C. Theoretical Nuclear Physics

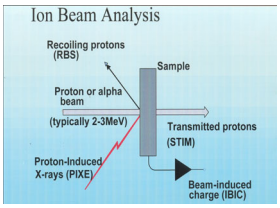
(1) Two-frequency Shell Model for hypernuclei and meson-exchange hyperon-nucleon potentials

(2) Tsallis information theory

(II) Nuclear Physics Experiment

We have a on-site facility of 3MV 9SDH-2 pelletron tandem accelerator which was installed in 1989. Since then the accelerator became an important facility for experimental research in the low energy nuclear physics, accelerator based atomic physics, and applied accelerator technology. The accelerator system has two negative ion sources, SNICS for solid source material and Alphatross for noble gases Helium-3 and Helium-4, capable of producing a wide range of ion beam species. The ion-beams for a given charged (q) state with a maximum energy E=3(q+1)MeV can be obtained and selected by an analyzing magnet to meet experimental need. There are three beamlines available with different scattering chambers for various research needs, especially the newly-installed Oxford micro-beam system (Fig. 1). We have made the accelerator available for outside users. Every year a fraction of the machine time was provided to people of domestic institutions such as Institute of Atomic and Molecular Sciences, Academia Sinica, the National Tsing-Hua University, National Taiwan University and National Sun Yat-sen University

As for the high energy nuclear experiment, we participate at two international projects: SPring-8 LEPS experiment (Fig. 2) and BNL PHENIX experiment (Fig. 3). Photon whose largest energy is 2.5 GeV can be obtained from the backward Compton-scattering of incident eV laser photons with 8 GeV electrons circulating inside the storage rings of SPring-8 Japan. We study the mechanism of interactions between photon and quarks at a few GeV via the reconstruction of $\gamma N \rightarrow \Phi N$ reaction; We also construct Time-of-flight detector and flash ADC electronics in this project. In Brookhaven National Lab, U.S., RHIC collider can crate a collision of Au nuclei of center of mass energy to be 200 GeV. PHENIX experiment is capable of measuring the di-lepton and photon signal of Quark Gluon Plasma. The experimental confirmation of QGP will greatly help the understanding the effect of finite temperature and baryon density on QCD and also the story of universe creation.



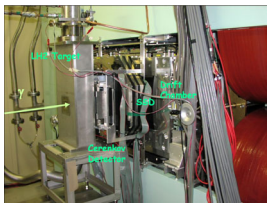
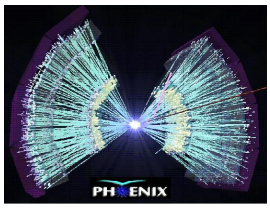



Figure 1: The newly-installed Oxford micro-beam system

2: SPring-8 LEPS experiment

3: BNL PHENIX experiment

(III) Particle Phyiscs Experiment

(A) Collider Experiment CDF at Fermilab

For the next decade, Fermilab Tevatron Collider remains the highest energy frontier of particle physics. With the completion of Main Injector (which will enhance the luminosity) and with the upgrade of the collider detectors (CDF and D0), Tevatron Run II provides the potential for discovery of new phenomena and opportunities for the precision measurements in hadron collider physics. The Collider Detector at Fermilab in Run II (CDF II) is a general-purpose solenoidal detector that combines precision charge particle tracking with fast projective calorimetry and fine-grained muon detection for the study of p anti-p collisions. Precision measurement of the top mass and the W mass are primary goals of CDF II. Search for Higgs and new phenomena beyond the Standard Model will be explored.

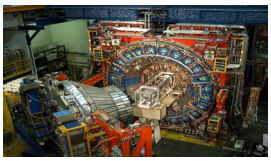
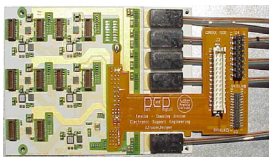
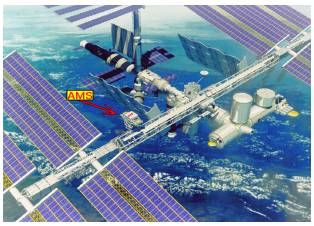



Figure 4: Insertion of silicon detector to the CDF II detector.

5: DOIM on Port Card

B) AMS Experiment at International Space Station[B14]



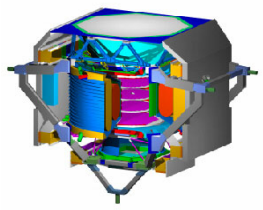


Figure 6. AMS at the International Space Station
7.AMS Detector : Schematic Design

The goal of the AMS experiment is to build the first precision magnetic spectrometer to be placed on the International Space Station in 2005 to search for anti-matter and dark matter in the Universe and to study cosmic ray physics and other exotic phenomenon. A simplified detector successfully operated on board the space shuttle Discovery for 10 days in June 1998, already producing important results. The AS group is leading the Taiwan participation in AMS, which includes the construction of the superconducting magnet, electronics and computing systems, as well as simulation and analysis.

(C) Neutrino and Astro-particle Physics Group

The group was started in 1997 with the goal of pursuing an experimental program in neutrino and astro-particle physics in Taiwan. The TEXONO Collaboration, at present 40-member strong, has been built up, under the leadership of the Academia Sinica group, and with the participation of several major research institutes from Mainland China. The efforts represent the first big research collaboration among scientists from Taiwan and Mainland China. The "flagship experiment" is based on scintillating crystal and solid state detectors placed near the core of Kuo-Sheng Nuclear Power Plant II at the northern coast of Taiwan to study various low-energy neutrino interactions. This is the first particle physics experiment performed in Taiwan. World-level results have been achieved in the search of neutrino magnetic moment. Various R&D projects are pursued, in further enhancing the detector techniques, in developing methods to measure trace radiopurities, in developing advanced electronic modules and in exploring the feasibilities of future experiments in areas like Dark Matter searches and Solar Neutrino studies.

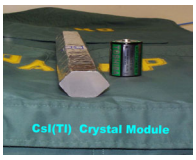


Figure 8. A 40-cm long CsI(Tl) crystal, the basic detector unit.

9. Flash-Analog-Digital-Convertor module.

10. The shielding and control room at the Kuo Sheng Neutrino Laboratory.

(D) LHC-ATLAS at CERN and the GRID Project

The European Laboratory of Particle Physics (CERN) is building the World's largest hadron collider, the Large Hadron Collider (LHC), which is expected to commission in 2006 and will allow us to explore the new frontier of physics at the TeV energy scale. Two general purpose detectors, namely ATLAS and CMS, are being constructed for LHC experiments. The high energy physics group of the Institute joined ATLAS Collaboration in September 1999. The main responsibility of the Taiwan team in ATLAS is to develop and produce compact opto-packages for the inner detectors (PIXEL and Semi-Conductor Tracker (SCT)), as well as the high-speed (1.6GHz) transmitter and receiver modules for the optical link of the Liquid Argon Calorimeter (LAr). A miniature optopackage (1.6mm in height) which consists of two VCSEL's (Vertical Cavity Surface Emitting Laser) and one Epitaxial Silicon PIN diode has been developed by Taiwan for SCT to readout the 6 million channel silicon micro-strip detector. The SCT opto harness is now in production phase. The final design review (FDR) for the PIXEL optical link was held in February 2003. Our design is well received and become the baseline. The other responsibility for inner detectors is to provide the 12-channel VCSEL and PIN array modules for use in the readout driver (ROD) of both SCT and PIXEL.

CERN had decided to implement the idea of Grid Computing for the LHC project. The LHC Computing Grid Project (LCG) which is to build a prototype computing grid to test the LHC computing models was initiated in late 2001 and will continue to 2005. Taiwan formally joined LCG project since September 2002. LCG firmware version zero (LCG-0) was released on Feb. 28, 2003. LCG-1 is expected to release in July 2003. Our group also works in ATLAS mock data challenge (DC). The EU-Data Grid (EDG) firmware has been installed and tested. The Computing Centre of Academia Sinica (ASCC) is in the process of being recognized as a Certification Center. A high bandwidth link (622Mbit/s) between Taiwan and Starlight (Chicago)

has been established in March 2003. Taiwan has been assigned by the LHC Grid Deployment Board (GDB) to be the first in Asia (after France, Italy and UA) to connect to CERN to test the LCG-0 firmware.

Grid computing is expected to be the “next big thing” of information technology and application. It may very well change the way we use computing resources whether it is for commercial、industrial or research purpose. As in the case of World-Wide-Web, the need of high energy physics research is once again leading and guiding the revolution. ASCC and the Institute is working hard to keep Taiwan abreast of the ensuing change.

Figure 11: SCT Opto-electronic Module
12: VCSEL array module for ROD of SCT and PIXEL
13: PIN array Module

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Tel：886-2- 2789-6769 / phycyu@ccvax.sinica.edu.tw
Research Interest：Accelerator based atomic physics and materials characterization.

Visiting Scholars and Postdoctoral Research Associates

Ting-Hua Chang； Yuh-Kuei Chang； Chuan-Hung Chen； Yen-Chu Chen； Chung-Hsien Chou； Ming-Lee Chu； Li-Shing Hou； Si-Yeon Kim； Wo-Lung Lee； Hau-Bin Li； Huei-shih Liao； Shih-Yuin Lin； Yong-Hui Liu； Rong-Shyang Lu； Hirobumi Mineo； Kosuke Odagiri； Dmitry S. Oshuev； Di Qing； Zhong-Liang Ren； Venktesh Singh； Jie Jun Tseng； Chang-Chun Wan； Biao Xin。

Selected Publications

B01 H.Y. Cheng, "Hadronic D Decays Involving Scalar Mesons", Phys. Rev. D67, 034024 (2003).

B02 C.Y. Cheung and W.M. Zhang "Nonperturbative Determination of Heavy Meson Bound States", Phys. Rev. D 60, 014017-1 (1999).

B03 S.P. Li, "A guided Simulated Annealing Method for optimization problems", (with C.I. Chou, R.S. Han and T.K. Lee, accepted for publication in Phys. Rev. E).

B04 Makiko Nagashima and H.N. Li, "*k*T factorization of exclusive processes", Phys.Rev. D67 034001 (2003).

B05 W.B. Yeung, H.-E. Horng, C.Y. Hong and H.C. Yang, "Magneto-Chromatic Effects in Magnetic Fluid Thin Films", Applied Optics (1998).

B06 D.Boyanovsky, De. Vega, D.S. Lee, S.Y. Wangand H. L. Yu "Dynamical renormalization group approach to the Altarelli-Parisi equations", Phys. Rev. D65, 045014(2002).

B07 K.-W. Ng , "Complex visibilities of cosmic microwave background anisotropies", Phys. Rev. D 63, 123001 (2001).

B08 Y. Tzeng, S.Y.T. Tzeng and T.T.S.Kuo, "Hypernucleus Ca40-Lambda and recent hyperon-nucleon potentials", Phys. Rev. C65 047303 (2002).

B09 K.Adcox, W.C. Chang et al., PHENIX Collaboration, "Suppression of Hadrons with Large Transverse Momentum in Central Au + Au Collisions at $\sqrt{Snn} = 130$ GeV", 2002, Phys. Rev. Lett. 88, 022301 (2002).

B10 Y.C. Yu, A.R. Azordegan, H.L. Sun, J.L. Duggan, F.D. McDaniel, E.K. Lin, C.W. Wang, and G. Lapicki, "Charge state dependence of L-shell x-ray production cross sections of Ni, Cu, Zn, Ga, and Ge by 12 MeV oxygen ions", Nucl. Instr. Meth. in Phys. Research B150, 27 (1999).

B11 S. Hou, Belle collab., K. Abe et al., "Observation of large CP violation in theneutral B meson system", Phys. Rev. Lett. 87, 091802 (2001).

B12 P.K. Teng, CDF Collaboration, "Search for New Physics in Photon-Lepton Events in Collisions at = 1.8 TeV", Phys. Rev. Lett. 89, 041802 (2002).

B13 M.J. Wang, CDF Collaboration (F. Abe et al.), "Observation of Diffractive b-Quark Production at the Fermilab Tevaron", Phys, Rev. Lett. 84, 232 (2000).

B14 S.C. Lee, AMS Collaboration,“The Alpha Magnetic Spectrometer(AMS) on the International Space Station: Part I - results from the test flight on the space shuttle”, Phys. Rept. 366(2002)331.

B15 H.B. Li, Henry T-K Wong et al., TEXONO Coll. “Limit on Neutrino Magnetic Moment from the Kuo-Sheng Reactor Neutrino Experiment”, Phys. Rev. Lett. 90, 131802 (2003).

Complex System Research Group

Complexity and Non-linear Science

Complex systems are systems consisting of many simple elements which interact with each other nonlinearly. In general, the most interesting aspect of complex systems is the cooperative behavior among the elements mediated by their nonlinear interaction. Such cooperative behavior is manifested in the spatial and/or temporal patterns, which give the systems a variety of structures. In our institute, there are ten faculties and more than ten postdocs and several graduate students working in different areas of complexity and non-linear science. Our studies of nonlinear and complex systems involve the following directions.

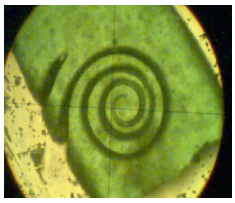
(I)Basic and Applied Research on Hydrodynamics and Atmospheric Physics

It is our goal to understand the physics of fluid flow through experimental observations in wind tunnels and water tunnels as well as numerical solutions to Navier-Stokes equations in the turbulence regime. Thermal-magneto-aerodynamics effects on encapsulated floating liquid mixture under microgravity conditions were investigated using CFD technique[C01-C03]. Numerical methods had been used to simulate square jets, and near-wall eruption and unsteady three-dimensional interaction[C04-C06]. On the other hand, measurement of strong wind characteristics had been carried out for the coastal area of Taiwan. The aerosol parameters retrieved from meteorological satellite visible data were studied to trace the origin of the aerosol particles in Taiwan[C07-C09]. Semi-Lagrangian cloud model, a nonlinear atmospheric fluid dynamic model with phase changes, has been developed for better understanding of meso-scale weather phenomena[C10-C12]. (Lai-Chen Chien, Robert R. Hwang, Bao-Shi Shau, Chung-Yi Tseng)

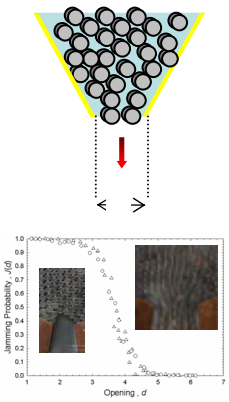
(II)Non-linear Phenomena in Complex Systems

Complex fluids, such as polymer and surfactant solutions, electrorheological fluids, and granular fluids, are among the most important materials studied in basic and applied sciences. Experimental studies on phase transitions of binary liquid mixture with polymer revealed a possible universality class at the critical point

[C13](Kiwing To). Rheology data of protein and DNA solution may reveal the molecular structures as well as the formation mechanism of these biologically important macromolecules and single-molecule measurements have just been started [C16](Chi-Keung Chan). Other nonlinear phenomena we studied include spiral wave dynamics in chemical reaction[C17] (Chi-Keung Chan); pattern formation in fracture phenomena[C18,C19]; collective behavior of driven and self-propelled particles[C20] (Kwan-tai Leung); and jamming of granular flow in hoppers [C14,C15](Kiwing To).



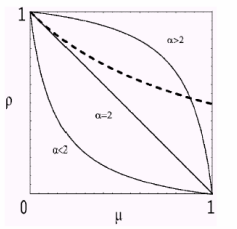
A 1mm-size spiral crack as viewed from below.



Jamming probability in 2-D hopper.

(III) Statistical and Computational Physics Approach to Complex Systems

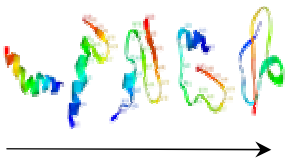
Laboratory of Statistical and Computational Physics (LSCP, website: http://www.sinica.edu.tw/~statphys/) at our institute is devoted to frontier research in statistical and computational physics (SCP), applications of SCP to problems in physical, biological, and social sciences, sponsoring meetings in SCP, and promoting education and research of SCP in developing countries. The research topics at LSCP include: equilibrium critical systems, such as the Ising, dimer, and percolation models; non-equilibrium critical systems, such as sand-pile and avalanche models[C23]; synchronization in nonlinear coupled systems and analysis of physiological data; models of biological evolution[C24-C26]; analytic and numerical studies of macromolecules, polymer, DNA, RNA, and proteins; stochastic dynamic model for stock-stock correlations; universality and scaling in statistical data of literary works. (Chin-Kun Hu, Simon C. Lin)



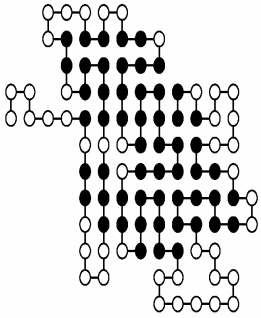
Exact phase diagram for an asymmetric avalanche process, which shows the critical density of particles ρ as a function of parameters α and μ of toppling rules in the model. This figure is taken from *Phys. Rev. Lett.* **87**, 084301(2001)

(IV)Biology-Inspired Physics

Biological organisms are likely the most complex and the least understood systems that one can imagine, due to their intricate biochemical and physical interactions among macromolecules. Biology is essentially an experimental science with huge amount of data, physicists hope to distill basic principles from them. Because all biological processes operate in a thermal environment, statistical physics is an indispensable tool in studying them. Equipped with such tools, we have been studying theoretically: biological and physiological signals (such as heart beat); development of algorithms and simulations of macromolecules (DNA, RNA and proteins) with parallel computers[C24-C26] (Chin-Kun Hu), development of new optimization algorithms to study complex systems including protein structure prediction[C27,C28] (Ting-Kuo Lee); and physical mechanisms of molecular motors (Kwan-tai Leung). Moreover, Experimental studies on synchronized firing of neural net has also been carried out (Chi-Keung Chan).



Breakdown of protein structure due to increasing side chains interaction



The lowest energy conformation of 2-D HP lattice model with 100 monomers.

Experimental setup for synchronous firing of neural net.

Principal Investigators

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Interests: nonlinear phenomenon in the dynamic behaviors of complex fluid systems, phase separation dynamics of simple fluids, polymer solutions and surfactant solutions, granular flows, Light scattering & imaging techniques, firing in neural net.

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Committee on Space Processing, AIAA,
Committee on Advanced Material Science, IAA.
Interests: Computational Fluid Physics, Microgravity Fluid Dynamics, Space Material Processing.

Chin-Kun Hu
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Interests: Statistical and computational physics, nonlinear science, theoretical biophysics, complex systems.

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Ph.D., University of Iowa.
Professor, National Taiwan University; Dean, National Taiwan Ocean University; President, National Taiwan Ocean University;

Visiting Professor, North Carolina State University;
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Interests: Vortex dynamics; Turbulent diffusion process; Fluid dynamics;
Wave mechanics.

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Ph.D. Brown University, USA.
Assistant Professor - Professor, Virginia Polytechnic,
Institute and State University; Research Fellow, Academia Sinica.
Research Interest: High temperature superconductivity;
Nano-materials; X-ray crystallography; Protein structure;
Protein folding; Quantum Monte Carlo method.
Interests: Nonequilibrium statistical mechanics;
phase transitions & critical phenomena;
modeling of nonlinear & complex systems.

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Research Interest: Computational Physics, Statistical
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Computing, Internet Strategic Planning, Digital Library/Museum.

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Ph.D. in Mechanical Engineering, National Taiwan University.
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Research Interest: Wind Engineering, Environmental Engineering in Ocean and Atmosphere.

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Ph. D. in Meteorology, University of Oklahoma, U. S. A. ;
Assistant Research Fellow and Associate Research Fellow,
Academia Sinica; Associate Professor and Professor,
National Taiwan University.
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Kiwing To
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Postdoctoral Research Fellow, Institute of Physics Academia Sinica ;
Postdoctoral Research Fellow, Universite Paris VI, France.
Assistant Research Fellow, Institute of Physics Academia Sinica.
Research Interests: Phase transitions and critical phenomenon;
physics of fluids and hydrodynamics; electrorheological fluids;
granular materials; polymer physics.

Visiting Scholars and Postdoctoral Research Associates

Ruey-Lin Chen； Chung-I Chou； Zhyrair Gevorgian； Rong-Sheng Han； Jiun-Yan Huang； Evgeni Ivachkevitch； Nickyolay Izmailian； Cheng-Hsiao Lin； Wen-Johg Ma； Koryun Oganesyan； Amalendu Sau； You-Hsien Shiau； Hayryan Shura； Hsin-Tza Wu； Ming-Chya Wu； Wen-Chang Yang。

Selected Publications

C01 L. C. Chien, Maxwell-Navier-Stokes Model on Material Process, AIAA 2002-0759 (2002).

C02 L. C. Chien, Magnetic Control on Mitigating Thermocapillary Convection in Floating Zone, AIAA 2003-1155(2003).

C03 L. C. Chien, Flight Dynamic Characteristics of Ancient Chinese Multi-stage Rocket, IAA-02.2.2.06 (2002).

C04 Chiang, T.P., Sheu, T.W.H., Hwang, R.R. and Sau, A., Spanwise bifurcation in plane-symmetric sudden-expension flows, Physical Review E, Vol. 65, 016306 (2002).

C05 Chiang, T.P., Sheu, T.W.H., and Hwang, R.R., Three-dimensional flow details in suddenly contracted channels, Physics of Fluids, Vol. 14(5), 1601-1616 (2002).

C06 Sau, A., Sheu, T.W.H., and Hwang, R.R., Three-dimensional simulation of square jets in cross-flow: the near field flow structure, Journal of Fluid Mechanics, submitted (2002).

C07 Bao-Shi Shiau, and Yuan-Bin Chen, *Observation on Wind Turbulence Characteristics and Velocity Spectra Near the Ground at the Coastal Region*, Journal of Wind Engineering and Industrial Aerodynamics, Vol.90, Issue 12-15, pp.1671-1681 (2002).

C08 Bao-Shi Shiau, and Wen-Chan Yang, *Numerical Simulation on the Dilution of Ocean Outfall Discharges in the Keelung City of Taiwan*, The 2nd International Conference on Marine Water Discharges, Istanbul, Turkey (2002).

C09 Bao-Shi Shiau, Ta-Chun Chen, and Yun-Pei Ko, *Coastal Hydrodynamic Modeling of Oil Slick Transport in Western Waters of Taiwan*, The 5th World Congress on Computational Mechanics, Vienna, Austria (2002).

C10 郭國新, 曾忠一, 2002: 利用 GMS 的新頻道求取海溫和雲參數. 氣象學報, 第 44 卷, 第 1 期, 33-49.

C11 張博雄, 曾忠一, 2003: 三維可壓縮半拉格朗日法雲模式的研究. 投稿大氣科學.

C12 曾忠一等人, 2003: 由 NOAA 衛星可見光資料決定氣溶膠參數. 投稿天氣預報與分析.

C13 Kiwing To, Coexistence curve exponent of a binary mixture with a high molecular weight polymer, Phys. Rev. E 63, 26108, 2001.

C14 Kiwing To, Pik-Yin Lai and H.K. Pak, Jamming of granular flow in a

two-dimensional hopper, Phys. Rev. Lett. 86, 71, 2001.

C15 Kiwing To and Pik-Yin Lai, Jamming pattern in a two-dimensional hopper, Phys. Rev. E 66, 011308, 2002.

C16 H. J. Choi, S. T. Lim, Pik-Yin Lai and C. K. Chan, Turbulent Drag Reduction and Degradation of DNA, Phys. Rev. Lett. 89, 088302 (2002).

C17 C. Tung and C. K. Chan, Dynamics of spiral waves under phase feedback control in a Belousov-Zhabotinsky reaction, Phys. Rev. Lett. 89, 248302 (2002).

C18 Pattern formation and selection in quasi-static fracture, K.-t. Leung and Z. Neda, Phys. Rev. Lett. 85, 662 (2000).

C19 Spiral cracks without twisting, K.-t. Leung, L. Jozsa, M. Ravasz and Z. Neda,Nature 410, 166 (2001).

Guided simulated annealing method for crystallography, Acta Crystal A58, 42 (2002) (C. I. Chou and T. K. Lee).

C20 Non-trivial stochastic resonance temperature for the kinetic Ising models, K.-t. Leung and Z. Neda, Phys. Rev. E 59, 2730 (1999).

C21 N. Sh. Izmailian and C.-K. Hu. Exact universal amplitude ratios for two-dimensional Ising models and a quantum spin chain, Phys. Rev. Lett. 86 , 5160-5163 (2001).

C22 H.-P. Hsu, S.-C. Lin, and C.-K. Hu. Universal scaling functions for bond percolation on planar random and square lattices with multiple percolating clusters, Phys. Rev. E 64, 016127 (2001).

C23 V.B.~Priezzhev, E.V.~Ivashkevich, A.M. Povolotsky, and C.-K. Hu. Exact phase diagram for an asymmetric avalanche process, Phys. Rev. Lett. 87, 084301 (2001).

C24 H.-P. Hsu, U. H. E. Hansmann, and S. C. Lin, Structure determination of organic molecules from diffraction data by simulated annealing, Phys. Re. E. 64, 056707 (2001).

C25 H. P. Hsu, S. C. Lin, and U. H. E. Hanamann, Energy landscape paving for X-ray structure determination of organic molecules, Acta Crystallographica A, 58, 259 (2002).

C26 C.-Y. Lin, C.-K. Hu, and U. H.E. Hansmann. Parallel tempering simulations of HP-36, Proteins -- Structure, Function and Genetics 51, in press (2003).

C27 C. I. Chou and T. K. Lee, *Guided simulated annealing method for crystallography*, Acta Crystal A58 , 42 (2002).

C28 F. Hsieh, Y.C. Lan, M.H. Tsai, C.N. Chou, C.R. Hwang, S.B. Horng and T.K. Lee,

Exploring and reassembling patterns in female bean weevil's cognitive processing networks, submitted (2002).

III

List of Ongoing Research Projects

List of Ongoing Research Projects

中央研究院物理所九十二年度計劃清單一覽表

(2002年8月~2004年7月)

主持人	計畫名稱	執行期間	計畫編號
曾忠一	半拉格朗日法雲模式的改進(Ⅰ)	91/08/01-92/07/31	NSC91-2111-M-001-005
張志義	強子結構之研究	91/08/01-92/10/31	NSC91-2112-M-001-024
曾詣涵	超核系統之研究(1/3)	91/08/01-92/10/31	NSC91-2112-M-001-025
吳建宏	電磁性黑暗能量的宇宙義意	91/08/01-92/07/31	NSC91-2112-M-001-026
杜其永	顆粒流堵塞之實驗研究(Ⅲ)	91/08/01-92/11/30	NSC91-2112-M-001-027
侯書雲	重夸克及強作用物理之實驗探討(總計劃)-及 (子計畫三)CDF實驗之電腦模擬與數據 分析	91/08/01-92/10/31	NSC91-2112-M-001-031
鄧炳坤	重夸克及強作用物理之實驗探討:- (子計畫二)CDF及相關實驗粒子偵測器研製	91/08/01-92/07/31	NSC91-2112-M-001-033
章文箴	在SPring-8研究光致向量介子產生中之核物質效應(Ⅲ)	91/08/01-92/10/31	NSC91-2112-M-001-035
王子敬	微中子及天文粒子物理與相關實驗技術之研究	91/08/01-92/10/31	NSC91-2112-M-001-036
李世昌	以精密質譜儀探測宇宙中之反物質及暗物質(Ⅲ)	91/08/01-93/01/31	NSC91-2112-M-001-037
鄭海揚	重強子現象學之研究(1/3)	91/08/01-92/07/31	NSC91-2112-M-001-038

主持人	計　　畫　　名　　稱	執行期間	計　　畫　　編　　號
余岳仲	重離子在薄膜中的阻止本領研究	91/08/01-92/10/31	NSC91-2112-M-001-040
任盛源	鐵鎳合金多層膜之機械性，磁性，與電性研究(1/3)	91/08/01-92/07/31	NSC91-2112-M-001-042
陳啟東	奈米電子元件中的散亂電子雜訊)1/3)	91/08/01-92/10/31	NSC91-2112-M-001-046
蘇維彬	利用4.2K超高真空掃描穿隧顯微儀研究碳六十分子在銀薄膜中的電荷轉移現象	91/08/01-92/07/31	NSC91-2112-M-001-047
謝雲生	矽酸鎘單晶生長與物理性質研究(1/2)	91/08/01-92/07/31	NSC91-2112-M-001-048
梁鈞泰	裂紋路徑之不穩性(2/2)	91/08/01-92/11/30	NSC91-2112-M-001-049
陳志強	神經網路中同步發火現象之研究(2/2)	91/08/01-92/10/31	NSC91-2112-M-001-052
李湘楠	B物理與CP破壞(3/3)	91/08/31-92/07/31	NSC91-2112-M-001-053
余海禮	微擾QCD與非平衡系統(3/3)	91/08/01-92/07/31	NSC91-2112-M-001-055
胡進錕	統計物理在跨領域之應用(2/3)	91/08/01-93/05/31	NSC91-2112-M-001-056
魏金明	金屬薄膜的量子井態(1/2)	91/08/01-92/07/31	NSC91-2112-M-001-057
何侗民	半導體內雜質之高解析度紅外線吸收光譜之研究	91/08/01-93/07/31	NSC91-2112-M-001-059

主持人	計　　畫　　名　　稱	執行期間	計　　畫　　編　　號
陳洋元	奈米樣品之磁微結構與高解析交直流共軛比熱量測技術開發(1/3)	91/08/01-92/11/30	NSC91-2112-M-001-062
葉崇傑	介觀超導與原子陷阱中之超流體(3/3)	91/08/01-92/12/31	NSC91-2112-M-001-063
李尚凡	超導/鐵磁多層薄膜的邊際 效應與電流垂直平面電阻的量測(2/3)	91/08/01-92/07/31	NSC91-2112-M-001-064
黃英碩	表面上動態過程與奈米結構性質之研究(2/3)	91/08/01-92/10/30	NSC91-2112-M-001-066
陳洋元	非傳統超導及不尋常磁性之研究-子計畫三:重費米子系統之非傳統超導及量子相轉變研究	91/08/01-92/07/31	NSC91-2112-M-001-067
李定國	高溫超導的機制(3/3)	91/08/01-93/01/31	NSC91-2112-M-001-068
張嘉升	奈米系統中的區限效應對其相變的影響(2/3)	91/08/01-92/07/31	NSC91-2112-M-001-069
姚永德	圖案化奈米結構之製作及物性研究(1/3)	91/08/01-92/12/31	NSC91-2120-M-001-004
鄭天佐	奈米材料和大分子中指定原子與分子鍵結特性的研究(3/3)	91/08/01-92/07/31	NSC91-2120-M-001-005
黃榮鑑	含自由液面的三維複雜流場之數值研究(1/3)	91/08/01-92/07/31	NSC91-2611-E-001-001
黃榮鑑	二維方柱體渦漩逸出流場之研究(3/3)	91/08/01-92/07/31	NSC91-2611-E-001-002
李世昌	參與ATLAS實驗搜尋新物理 現象	91/08/01-93/01/31	NSC91-2112-M-001-034

主持人	計　　畫　　名　　稱	執行期間	計　　畫　　編　　號
李世昌	參與ATLAS實驗搜尋新物理 現象--偵測器組件研製等相關費用	91/08/01-93/01/31	NSC91-2119-M-001-028
胡宇光	超高解析度即時相對比X-光顯術	91/08/01-92/07/31	NSC91-2112-M-001-061
胡進錕	90學年度高級中學基礎科學教學人才培育計畫	91/03/01-93/02/28	中研02-物理 (教育部)
張嘉升 黃英碩	磁力顯微術與靜電力顯微術	91/10/01-93/09/30	安冠奈米科技股份有限公司
物理所	建立博士後人員制度(13)	92/01/01-92/12/31	主題 9201
吳茂昆	延攬資深學人開辦費(21)	92/01/01-92/12/31	主題 9202
李定國	最佳化運用在計算生物學(42)	92/01/01-92/12/31	主題 9203
李世昌	以精密太空質譜儀觀測宇宙射線(43)	92/01/01-92/12/31	主題 9204
胡進錕	非線性動力學與複雜系統研究(47)	92/01/01-92/12/31	主題 9205
鄭天佐	量子點線材料的特性與其結構之關聯(48)	92/01/01-92/12/31	主題 9206
胡進錕	巨分子結構與相變問題研究(4o)	92/01/01-92/12/31	主題 9207
姚永德	奈米結構物質之物性研究(4p)	92/01/01-92/12/31	主題 9208

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吳茂昆	奈米國家型科技計畫辦公室運作計畫(1/2)	91/09/01-92/06/30	NSC91-2119-M-001-030
吳茂昆	奈米國家型科技計畫辦公室運作計畫(2/2)	92/01/01-92/12/31	NSC92-3113-M-001-001
魏金明	凝體物理規劃推動計畫	92/01/01-92/12/31	NSC92-2114-M-001-002
曾忠一	半拉格朗日法雲模式的改進-系集預報	92/08/01-93/07/31	NSC92-2111-M-001-003
鄭海揚	重強子現象學之研究(2/3)	92/08/01-93/07/31	NSC92-2112-M-001-016
陳志強	神經網路中同步發火現象之研究II-同調共振之研究	92/08/01-93/07/31	NSC92-2112-M-001-024
杜其永	顆粒氣體的實驗研究(1/2)	92/08/01-93/07/31	NSC92-2112-M-001-028
吳建宏	宇宙微波背景各向異性的干涉性觀測(1/2)	92/08/01-93/07/31	NSC92-2112-M-001-029
李湘楠	B物理中的量子色動力學(1/3)	92/08/01-93/07/31	NSC92-2112-M-001-030
余岳仲	輕離子誘發重元素之K-層游離截面研究	92/08/01-93/07/31	NSC92-2112-M-001-031
侯書雲	CDF實驗物理研究(總計劃) 及子(計畫三)—實驗數據分析與新粒子搜尋	92/08/01-93/07/31	NSC92-2112-M-001-036
鄧炳坤	CDF實驗物理研究(子計畫二)—CDF實驗粒子偵測器研製	92/08/01-93/07/31	NSC92-2112-M-001-037

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余海禮	非平衡系統研究	92/08/01-93/07/31	NSC92-2112-M-001-038
蘇維彬	碳六十分子在銀薄膜中的電荷轉移之研究	92/08/01-93/07/31	NSC92-2112-M-001-040
葉崇傑	超導之介觀現象及低溫原子陷阱中超流體(1/3)	92/08/01-93/07/31	NSC92-2112-M-001-041
胡宇光	發展超高速Ｘ光顯微照相術以研究材料與生物中之動態行為	92/08/01-93/07/31	NSC92-2112-M-001-042
吳茂昆	高溫度電阻係數氧化物薄膜之製程及應用 研究(1/2)	92/08/01-93/07/31	NSC92-2112-M-001-043
李定國	變分法探討高溫超導體之模型(1/3)	92/08/01-93/07/31	NSC92-2112-M-001-044
陳洋元	奈米樣品之磁微結構與高解析交直流共軛比熱量測技術開發(2/3)	92/08/01-93/07/31	NSC92-2112-M-001-045
劉鏞	磁性邏輯運算元件設計與應用	92/08/01-93/07/31	NSC92-2112-M-001-046
陳啟東	奈米電子元件中的散亂電子雜訊(2/3)	92/08/01-93/07/31	NSC92-2112-M-001-047
張嘉升	奈米系統中的區限效應對其相變的影響(3/3)	92/08/01-93/07/31	NSC92-2112-M-001-048
任盛源	鐵鎳合金多層膜之機械性, 磁性,與電性研究(2/3)	92/08/01-93/07/31	NSC92-2112-M-001-049
黃英碩	表面上動態過程與奈米結構性質之研究(3/3)	92/08/01-93/07/31	NSC92-2112-M-001-050

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謝雲生	矽酸鎘單晶生長與物理性質研究(2/2)	92/08/01-93/07/31	NSC92-2112-M-001-051
魏金明	金屬薄膜的量子井態(2/2)	92/08/01-93/07/31	NSC92-2112-M-001-052
李尚凡	超導/鐵磁多層薄膜的邊際 效應與電流垂直平面電阻的量測(3/3)	92/08/01-93/07/31	NSC92-2112-M-001-053
王子敬	微中子及天文粒子物理與其相關領域的研究	92/08/01-93/07/31	NSC92-2112-M-001-057
張志義	強子之結構	92/08/01-93/07/31	NSC92-2112-M-001-058
章文箴	在Spring-8研究光致向量介子產生中之核物質效應 (IV)	92/08/01-93/07/31	NSC92-2112-M-001-061
胡進錕	統計物理在跨領域之應用(3/3)	92/08/01-93/07/31	NSC92-2112-M-001-063
曾詣涵	超核系統之研究(2/3)	92/08/01-93/07/31	NSC92-2112-M-001-064
鄧炳坤	ATLAS實驗偵測器研發	92/08/01-93/07/31	NSC92-2119-M-001-002
陳啟東	奈米生物電子元件-生物分 子的檢測(1/3)	92/08/01-93/07/31	NSC92-2120-M-001-001
鄭天佐	在原子尺度下觀測及操控單一奈米精品與位置和結構有關的性質-子計畫一(1/3)	92/08/01-93/07/31	NSC92-2120-M-001-003
姚永德	奈米科學尖端研究設施之建構(1/3)	92/08/01-93/07/31	NSC92-2120-M-001-007

主持人	計　　畫　　名　　稱	執行期間	計　　畫　　編　　號
黃榮鑑	含自由液面的三維複雜流場之數值研究(2/3)	92/08/01-93/07/31	NSC92-2611-E-001-001
黃榮鑑	方形射流與橫向流交會之三維流場構造研究(1/3)	92/08/01-93/07/31	NSC92-2611-E-001-002
李世昌	以精密質譜儀探測宇宙中之反物質及暗物質(Ⅲ)	92/08/01-93/07/31	NSC92-2112-M-001-059
李世昌	參與ATLAS實驗搜尋新物理 現象(Ⅱ)	92/08/01-93/07/31	NSC92-2112-M-001-060
梁鈞泰	裂隙面之生長機制研究(1/2)	92/08/01-93/07/31	NSC92-2112-M-001-067
鄧炳坤	ATLAS實驗模擬數據處理及計算網格建構		NSC92-2119-M-001-021
姚永德	圖案化奈米結構之製作及物性研究(2/3)	92/12/01-92/12/31	NSC92-2120-M-001-008
張嘉升	奈米碳管探針應用研究	92/03/15-92/11/30	財團法人工業技術研究院
謝雲生	奈米碳管生物反應系統連接活性測試評析—以整齊排列的碳奈米管作生化偵檢器（壬基苯酚檢 定的探討）	92/01/01-92/12/31	財團法人工業技術研究院
胡進錕	第一屆92年度高級中學基礎科學教學人才培育計畫	91/03/01-93/02/28	教育部
陳啟東	奈米孔洞快速定序DNA分子:以奈米粒子標幟放大訊號	92/03/01-92/12/31	財團法人工業技術研究院
李尚凡	92年度大專學生參與專題計畫-磁性薄膜之製作與物性 研究	92/07/01-93/02/29	92-2815-C-001-010-M

IV

Publication List of 2003

Institute of Physics Publications list 2003

Chan, Chi-Keung (陳志強)

1. X. Yan, Q. Shi, M. Hou, K. Lu, and C. K. Chan, Effects of air on the segregation of particles in a shaken granular bed, Phys. Rev. Lett. 91, 014302 (2003).
2. M. Hou, W. Chen, T. Zhang, K. Lu, and C. K. Chan, Global nature of dilute-to-dense transition of granular flows in a 2D channel, Phys. Rev. Lett. 91, 204301 (2003).

Chang, Chia-Sen (張嘉升)

1. W.B. Jian, W.B. Su, C.S. Chang, and T.T. Tsong, Vertical Friedel Oscillations in Interface-Induced Surface Charge Modulations of Ultrathin Quantum Islands, Phys. Rev. Lett. 90, 196603 (2003).
2. Y.C. Chang, D.C. Wang, C.S. Chang, and T.T. Tsong, Easy method to adjust the angle of the carbon nanotube probe of an atomic force microscope, Applied Phys. Lett. 82, 3541 (2003).
3. W.B. Su, S.H. Chang, H.Y. Lin, Y.P. Chiu, T.Y. Fu, C.S. Chang, and T.T. Tsong, Formation of Multi-layer 2D Pb Islands on Si(111)7x7 at Low Temperature: From Nucleation to Growth, to appear in Phys. Rev. B.
4. W.B. Jian, W.B. Su, C.S. Chang and T.T. Tsong, Complementary Alternation of Vertical Charge Oscillations in Two Types of Thin Pb Islands on Si(111), submitted to Phys. Rev. B (2003).

Chang, Wen-Chen (章文箴)

1. B.B. Back et al. (E917 Collaboration), PRODUCTION OF PHI MESONS IN AU+AU COLLISIONS AT 11.7-A-GEV/C, submitted to Phys.Rev.C, e-Print Archive: nucl-ex/0304017(2003).
2. R.G.T. Zegers et al. (LEPS Collaboration), BEAM POLARIZATION

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3. S.S. Adler et al. (PHENIX Collaboration), Elliptic Flow of Identified Hadrons in Au + Au Collisions at sqrt(s[sub NN]) = 200 GeV, Phys.Rev.Lett. 91, 182301(2003).

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6. S.S. Adler et al. (PHENIX Collaboration), Suppressed pi^0 Production at Large Transverse Momentum in Central Au+Au Collisions at sqrt(s_NN) = 200 GeV , Phys.Rev.Lett. 91, 072301(2003).

7. T. Nakano et al. (LEPS Collaboration), Evidence for a Narrow S_ _1 aryon Resonance in Photoproduction from the Neutron, Phys. Rev. Lett. 91, 012002(2003).

8. K.Adcox et al. (PHENIX Collaboration), Centrality Dependence of the High p_T Charged Hadron Suppression in Au+Au collisions at sqrt(s_NN) = 130 GeV, Phys. Lett. B561, 82(2003).

9. Q. Yue et al. (TEXONO Collaboration), Effective Dynamic Range In Measurements With Flash Analog To Digital Convertor, Nucl. Instrum. Meth. A511: 408-416(2003).

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8. H. Y. Cheng and W.S. Hou, B Decays as Spectroscope for Charmed Four-quark States, Phys. Lett. B566, 193 (2003).
9. H. Y. Cheng, Hadronic Charmed Meson Decays Involving Tensor Mesons, Phys. Rev. D68, 014015 (2003).
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11. H. Y. Cheng, $B \to f_0(980)K$ Decay Revisited, in preparation(2003).
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V

Academic Activities

Attendance in International Conferences

中研院物理所九十二年度出席國際會議表

(2003年1月~2003年12月)

會 議 名 稱	會議期間	舉辦地點	出席人員	經費來源
nano tech 2003 +Future International Congress and Exhibition on Nanotechnology	92.02.25-92.02.28	日本東京	林思育 蘇郁鈞	國科會
第八十九屆統計力學研討會	92.05.18-92.05.20	美國New Jersey	吳明佳	本所+主題
Semiconductor Microstructures and Atom and Solid State Systems	92.05.01	英國倫敦	吳欣澤	本所+自理
國際工業及應用數學大會	92.07.07-92.07.11	澳洲雪梨	陳瑞琳	本所+自理
國際磁性研討會	92.07.27-92.08.01	義大利羅馬	郭光宇	主題
European physical Society會議	92.07.17-92.07.23	德國Aachen	陳泉宏	本所+自理
European physical Society會議	92.07.17-92.07.23	德國Aachen	李浩斌	本所
國際磁性研討會	92.07.27-92.08.02	義大利羅馬	周群淵 魏大華	國科會+自理
2003國際電子陶瓷會議	92.08.03-92.08.07	美國	陳宜君	主題+自理
國際磁性研討會	92.07.27-92.08.02	義大利羅馬	蔡佳霖	主題
國際磁性研討會	92.07.27-92.08.02	義大利羅馬	柯松仁	主題+自理
Statistical Physics and Dynamical Systems: Methods and Applications	92.09.18-92.09.23	亞美尼亞 Nor-Amberd	伊士麥 林尼可	本所+自理

會 議 名 稱	會議期間	舉 辦 地 點	出席人員	經費來源
Statistical Physics and Dynamical Systems: Methods and Applications	92.09.18-92.09.23	亞美尼亞 Nor-Amberd	海耳倫	本所+自理
Statistical Physics and Dynamical Systems: Methods and Applications	92.09.18-92.09.23	亞美尼亞 Nor-Amberd	歐甘仁	本所+自理
2003天文粒子與高能物理國際研討會	92.10.13-92.10.19	西班牙華倫西亞	曾玠郡	本所+自理
2003天文粒子與高能物理國際研討會	92.10.13-92.10.19	西班牙華倫西亞	盛偉德	本所
第六屆亞太重力暨天文物理國際會議	92.10.06-92.10.09	韓國漢城	李沃龍	本所+自理
第六屆早期宇宙研究中心國際研討會-天文粒子物理與宇宙學前沿	92.11.04-92.11.07	日本東京	李沃龍	國科會
第二屆國際味物理研討會	92.10.06-92.10.11	韓國漢城	張有毅	本所+自理
第六屆亞太重力暨天文物理國際會議	92.10.06-92.10.09	韓國漢城	林世昀	本所+自理
第二屆國際味物理研討會	92.10.06-92.10.11	韓國漢城	蔡俊謙	本所+自理
第三屆過度金屬氧化物之新穎量子現象國際研討會及第一屆強相關電子系統亞太區國際研討會	92.11.05-92.11.08	日本仙台	周崇斌 黃信銘	主題
第七屆原子操控表面介面及奈米結構研討會	92.11.16-92.11.20	日本奈良	張仕欣	本所
磁性技術與應用國際研討會	92.12.02-92.12.07	韓國大田	蔡佳霖	主題
2003Material Research Society Fall Meeting	92.12.01-92.12.05	美國Boston	史牧笛	本所

會 議 名 稱	會議期間	舉 辦 地 點	出席人員	經費來源
磁性技術與應用國際研討會	92.12.02-92.12.07	韓國大田	周嵩傑	主題
磁性技術與應用國際研討會	92.12.02-92.12.07	韓國大田	余進忠	主題
第十一屆國際掃描探針顯微術研討會	92.12.11-92.12.13	日本Shizuoka	張淵智	本院奈米研究計畫
磁性技術與應用國際研討會	92.12.02-92.12.07	韓國大田	魏大華	主題
國際奈米科學及技術會議	92.12.07-92.12.20	印度Kolkatta	尼斯瓦	本所
第四十一屆美國航太科學會議	92.01.04 - 92.01.09	美國Reno, Nevada	簡來成	本所
顆粒物質研討會	92.02.17 - 92.02.21	中國北京	杜其永	會議主辦單位
第二屆瑞士韓國聯合相對比X光顯微術學術研討會	92.02.18~92.02.22	韓國濟州島	胡宇光	國科會
2003年海峽兩岸磁性及磁性材料研討會	92.02.21 - 92.02.25	中國海南島	任盛源	本所
2003年海峽兩岸磁性及磁性材料研討會	92.02.21 - 92.02.25	中國海南島	姚永德	私人基金會
第二屆瑞士韓國聯合相對比X光顯微術學術研討會	92.02.18~92.02.22	韓國濟州島	吳茂昆	本所
Nano Tech2003+未來國際奈米科技會議及展覽	92.02.25~92.02.28	日本東京	吳茂昆	國科會
第一屆中捷雙邊學術研討會	92.02.28~92.03.07	捷克布拉格	曾詣涵	國科會+捷克主辦單位

會 議 名 稱	會議期間	舉 辦 地 點	出席人員	經費來源
第一屆中捷雙邊學術研討會	92.02.28~92.03.07	捷克布拉格	王子敬	國科會+捷克主辦單位
第一屆中捷雙邊學術研討會	92.02.28~92.03.07	捷克布拉格	章文箴	國科會+捷克主辦單位
第一屆中捷雙邊學術研討會	92.02.28~92.03.07	捷克布拉格	李湘楠	國科會+捷克主辦單位
2003年美國物理學會春季年會	92.03.03 - 92.03.07	美國奧斯汀	李定國	國科會+本所
2003年美國物理學會春季年會	92.03.03 - 92.03.07	美國奧斯汀	魏金明	本所
2003年美國物理學會春季年會	92.03.03 - 92.03.07	美國奧斯汀	何侗民	本所
匹茲堡會議	92.03.09~92.03.14	美國匹茲堡	何侗民	本所
4th International Conference on Intelligent Data Engineering and Automated Learning IDEAL 2003	92.03.21~92.03.23	香港	李世炳	本所
巴西奈米結構材料研究網路—表面科學研討會：奈米薄膜之結構與電子性質	92.03.20~92.03.22	巴西Porto Alegre	胡宇光	國科會+主辦單位
The XXXVIIIth Rencontres de Moriond Session Devoted to QCD and High Energy Hadronic Interactions	92.03.22~92.03.29	法國里昂	李湘楠	國科會
國際磁性會議	92.03.30~92.04.03	美國波士頓	姚永德	本院
Maria Steslicka紀念研討會	92.04.03~92.04.04	波蘭Wroclaw	鄭天佐	本院
第五屆磁性電漿空氣動力學會議	92.04.07~92.04.11	俄羅斯莫斯科	簡來成	自理

會 議 名 稱	會議期間	舉 辦 地 點	出席人員	經費來源
前緣凝態物理研討會	92.04.11~92.04.13	美國賓州	鄭天佐	本院
第四屆海峽兩岸計算流體力學學術研討會	92.04.11~92.04.18	中國雲南大理	黃榮鑑	本所
第二十三屆電化學會議	92.04.27~92.05.02	法國巴黎	胡宇光	本所
中波奈米材料與科學會議	92.05.07~92.05.09	波蘭華沙	姚永德	國科會
第七屆高溫超導體材料與超導的機制國際會議	92.05.25~92.05.30	巴西里約熱內盧	李定國	自理
第十六屆離子束分析國際會議	92.06.29~92.07.04	美國阿爾伯克基市	余岳仲	國科會
第廿二屆IUPAP國際統計物理國際會議指導委員會	92.06.30~92.07.01	印度邦加羅爾	胡進錕	本所
「Exploring the Interface between Cold Atoms and Condensed Matter Physics」「Competing Orders and Quantum Criticality in Correlated Electrons」	92.06.30 - 92.07.11	美國Aspen	葉崇傑	本所
第十六屆美國工程力學學術研討會	92.07.16~92.07.18	美國西雅圖	黃榮鑑	本所
第十二屆掃描穿隧顯微術及相關技術國際會議	92.07.21~92.07.25	荷蘭阿姆斯特丹	黃英碩	國科會
國際磁學研討會	92.07.26~92.08.02	義大利羅馬	姚永德	本所
第廿一屆輕光子高能作用國際研討會	92.08.11~92.08.16	美國芝加哥	余海禮	國科會
第廿一屆輕光子高能作用國際研討會	92.08.11~92.08.16	美國芝加哥	鄭海揚	國科會

會 議 名 稱	會議期間	舉 辦 地 點	出席人員	經費來源
第廿一屆輕光子高能作用國際研討會	92.08.11~92.08.16	美國芝加哥	李湘楠	國科會
第卅屆國際水理學研討會	92.08.24 - 92.08.29	希臘Thessaloniki	蕭葆義	本所
第一屆海峽兩岸統計物理會議	92.08.27~92.08.31	中國揚州	胡進錕	國科會
奈米材料及技術國際研討會	92.08.30~92.09.06	希臘克里特島	姚永德	本院
奈米材料及技術國際研討會	92.08.30~92.09.06	希臘克里特島	胡宇光	本所
X International Conference on Hadron Spectroscopy	92.08.31~92.09.06	德國法蘭克福	侯書雲	國科會
ERATO量子資訊科學會議	92.09.02~92.09.09	日本京都	張志義	國科會
Spin and Charge Transport in Nanostructures	92.09.01~92.09.05	葡萄牙Braga	葉崇傑	國科會 本所
Fundamental Problems in Mesoscopic Physics	92.09.06~92.09.11	西班牙格瑞那達	葉崇傑	國科會 本所
Bose-Einstein Condensation	92.09.13~92.09.18	西班牙San Feliu de Guixols	葉崇傑	國科會 本所
第八屆天文粒子物理國際研討會	92.09.05~92.09.09	美國西雅圖	王子敬	國科會 本所
第八屆天文粒子物理國際研討會	92.09.05~92.09.09	美國西雅圖	吳建宏	國科會
國際表面物理研討會－金屬原子在表面上	92.09.13~92.09.15	波蘭Polanica Zdroj	鄭天佐	本所

會 議 名 稱	會議期間	舉 辦 地 點	出席人員	經費來源
第六屆國際海岸與港口工程研討會	92.09.15~92.09.19	斯里蘭卡可倫坡	蕭葆義	本所
統計物理與動力系統國際會議	92.09.18~92.09.23	亞美尼亞葉里溫	胡進錕	國科會 本所
International Micro and nanotechnology Meeting	92.09.21~92.09.28	法國Grenoble	吳茂昆 陳啟東 胡宇光 黃英碩	國科會
第廿八屆國際紅外線及毫米波會議	92.09.29~92.10.03	日本京都	何侗民	本所
第四屆國際新材料及元件之原子層級特性研討會	92.10.05~92.10.10	美國夏威夷Kauai	余岳仲	本所
第四屆國際新材料及元件之原子層級特性研討會	92.10.05~92.10.10	美國夏威夷Kauai	鄭天佐	國科會 本所
2003國際先端材料會議	92.10.08~92.10.13	日本橫濱	鄭天佐	國科會 本所
2003國際先端材料會議	92.10.08~92.10.13	日本橫濱	吳茂昆	國科會
第二屆味物理國際研討會	92.10.06~92.10.11	韓國漢城	鄭海揚	主辦單位
第二屆味物理國際研討會	92.10.06~92.10.11	韓國漢城	李湘楠	主辦單位
奈米材料加工特性研討會	92.10.07~92.10.10	波蘭	陳啟東	國科會
第一屆台瑞科學研討會奈米科學之尖端技術及挑戰	92.10.12~92.10.15	瑞士策馬特	胡宇光	本院
第一屆台瑞科學研討會奈米科學之尖端技術及挑戰	92.10.12~92.10.15	瑞士策馬特	張嘉升 黃英碩 魏金明 陳啟東	本所

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第一屆台瑞科學研討會奈米科學之尖端技術及挑戰	92.10.12~92.10.15	瑞士策馬特	李定國	國科會
科學與系統新方向國際會議	92.10.16~92.10.18	日本沖繩	陳志強	國科會
第三屆複雜系統緩動力國際會議	92.11.02 - 92.11.09	日本仙台	杜其永	國科會
臺日今後之科學教育研討會	92.11.05~92.11.07	日本東京	吳茂昆	本所
第三屆過渡金屬氧化物之新穎量子現象國際研討會及第一屆強相關電子系統亞太區國際研討會	92.11.05~92.11.08	日本仙台	李定國	自理
第六屆電子結構會議	92.11.10~92.11.12	日本築波	魏金明	本所
第七屆原子控制之表介面和奈米結構會議	92.11.16~92.11.20	日本奈良	鄭天佐 黃英碩 張仕欣	本所
微中子振盪研討會	92.11.27~92.11.29	中國香港	王子敬	本所
美國材料學會秋季年會	92.12.01~92.12.05	美國波士頓	劉鏞	本所
先進材料國際會議	92.12.07~92.12.12	新加坡	張嘉升	國科會

Institute Sponsored Meetings

本所協辦會議

研討會名稱	會議期間	地點	主辦人
2003 年海峽兩岸磁性物理、材料和應用研討會 Symposium on Magnetism,Magnetic Materials and Application Across Taiwan Strait	92.02.21~92.02.25	中國海南島	姚永德
2003 Taipei Workshop on Economic Models and Related Problems	92.02.24~92.02.25	中研院物理所	胡進錕
中捷雙邊學術研討會 Czech-Taiwan Workshop on the Intermediate and High Energy Physics	92.03.02~92.03.05	捷克	李湘楠
International Symposium on Grid Computing 2003&TW Grid Workshop	92.03.08~92.03.12	中研院 計算中心	林誠謙
2003 Taipei Summer Workshop on Nonlinear and Complex Systems	92.06.23~92.06.24	中研院物理所	胡進錕
軟物質研討會	92.09.12~92.09.13	南投雪霸	陳志強
2003 日台前瞻磁性技術研討會 International Symposium on Advanced Magnetic Materials-2003(ISAMM)	92.10.07~92.10.12	日本橫濱	姚永德
中瑞雙邊「奈米科學相關檢測技術」研討會	92.10.12~92.10.15	瑞士	胡宇光
2003 年國際前瞻磁性技術研討會 International Symposium on Advanced Magnetic Technologies(ISAMT2003)	92.11.13~92.11.16	中研院物理所	姚永德
Softmatter and Biophysics Journal Club	92.12.22	中研院物理所	陳志強

Seminars

中央研究院物理所九十二年度演講一覽表

(2003年1月-2003年12月)

演講題目	演講者	所屬機構	日期
The Hole Argument: A Stumbling Block on Einstein's Path to General Relativity	高涌泉	國立台灣大學 物理系	92. 03. 06
Thermodynamic and Gravitational Instability on Hyberbolic space	Ishwaree Neupane	國立台灣大學	92. 03. 07
High Pressure X-ray Diffraction Studies On Nanocrystalline Materials	Bogdan Palosz	High Pressure Research Center, Polish Academy of Sciences	90. 03. 07
Probing Solar Subsurface Magnetic Fields	周定一	國立清華大學 物理學系	92. 03. 11
Killing the Two Higgs Doublet Model	江祖永	國立中央大學	92. 03. 14
Double Beta Decays and Neutrino Masses	Hiro Ejiri	Osaka University, Japan	92. 03. 19
Democracy plus Confucian ethics: an ideology to survive and evolve in complex Environment.	David B. Saakian	中央研究院 物理研究所	92. 03. 20
Model for the Growth of Universal Genome	李弘謙	國立中央大學 物理系	92. 03. 20
Extra dimensions and String theory	林豐利	國家理論科學中心	92. 03. 21
Shape energy of fluid membranes: Analytic expressions for the fourth variation of the bending energy.	蔡炎熾	中正大學物理系	92. 03. 21

演講題目	演講者	所屬機構	日期
Molecular Stretching of Long DNA in Agarose Gel using AC Electric Fields	陳志強	中央研究院 物理研究所	92. 03. 24
Quantum Size Effects in Metal Thin Films； Manipulation and Intramolecular Structure of C60 on Pb/Si(111) Surface	魏金明方崇開	中央研究院 物理研究所	92. 03. 28
Force-Induced unzipping of DNA with long-range correlated sequence.	格物乾	中央研究院 物理研究所	92. 03. 28
Softmatter Journal Club:Granular Clustering	杜其永	中央研究院 物理研究所	92. 03. 31
Bloody Stones -- toward an understanding of AGN engines	Mike Cai	Institute of Astronomy and Astrophysics, AS	92. 04. 04
Spin Ledder and Kondo Lattice	Hartmut Monien	Univ. Bonn, Germany	92. 04. 08
Electrodynamics for Taiwan's Infrastructure	朱國瑞	國立清華大學 物理系	92. 04. 10
On the 5-D Standard Model with Split Fermions	張維甫	TRIUMF	92. 04. 11
Softmatter and Biophysics Journal Club: Modeling Cell Locomotion	梁鈞泰	中央研究院 物理研究所	92. 04. 14
Application of High Energy Ion Beam on the Control of Boron Diffusion in Silicon	朱唯幹	美國休士頓大學 物理系	92. 04. 15
Low Energy Ion Scattering Spectroscopy Studies of Metallic and Bimetallic Surfaces	何志松	東華大學 材料工程系	92. 04. 15
Generalized Parton Distribution for Nucleon-> Delta DVCS	Thomas Spitzenberg	University Mainz	92. 04. 16
核子有變形嗎？	楊信男	國立台灣大學 物理系	92. 04. 17

演講題目	演講者	所屬機構	日期
生物巨分子之操作與分析簡介	張家靖	東華大學 物理系	92. 04. 17
HBT study in PHOBOS	林宗泰	國立中央大學	92. 04. 18
Softmatter and Biophysics Journal Club:A toy model of motor-driven mechanism for cell propulsion	陳宣毅	中央研究院 物理研究所	92. 04. 21
新世代資訊基礎架構：網格計算	林誠謙	中央研究院 計算中心	92. 04. 24
Optimal domain-wall fermions for lattice QCD	趙挺偉	國立台灣大學	92. 04. 25
Softmatter and Biophysics Journal Club : From Simple to Complex Gene Regulatory Networks	黃俊燕	中央研究院 物理研究所	92. 04. 28
The Spin Structure of Lambda Hyperon:Theory & Experiment	Bo-Qiang Ma	Peking University	92. 05. 02
Softmatter and Biophysics Journal Club:Giant Stress Fluctuations at the Jamming Transition	陸駿逸	中央大學 物理系	92. 05. 05
強關聯假三元氧化物之磁性	古煥球	國立清華大學 物理系	92. 05. 08
低溫STM的建造	陳頂立	中央研究院 物理研究所	92. 05. 08
黃偉彥教授至本所討論理論科學中心事宜			92. 05. 08
Taming the renormalon in heavy quark physic	Taekoon Lee	KAIST	92. 05. 09
Softmatter and Biophysics Journal Club:The Characterization of Neuronal aggregation	羅健榮	中央研究院 物理研究所	92. 05. 12
Construction and Application of 10-Terawatt Lasers	汪治平	中央研究院 原子與分子科學研究所	92. 05. 15

演講題目	演講者	所屬機構	日期
藝術上的相對論（Relativity in Arts）	歐豪年	中央研究院 嶺南美術館	92. 05. 16
Quantum Fluctuations of the Stress Tensor	巫俊賢	國立東華大學	92. 05. 16
Softmatter and Biophysics Journal Club:Secrets of Actin-Based Motility Revealed By a Bacterial Pathogen	江宏仁	台灣大學 應力研究所	92. 05. 19
Field Emission through Pyramidal Tips: Electrochemical Deposition of Pd on W	郭鴻曦	中央研究院 物理研究所	92. 05. 22
Procedure of Factorization and Practical Application to B decays in PQCD	Makiko Nagashima	國立台灣大學	92. 05. 23
聖嬰現象與台灣氣候變化	陳昭銘	中央氣象局科技中心	92. 05. 29
Charmless Two-Body Baryonic B Decays	蔡俊謙	國立台灣大學	92. 05. 30
My Participation in the Research of GMR (Giant Magnetoresistance)for Ten Years	江文中	文化大學 物理系	92. 06. 02
“Electron Entanglement via Quantum Dot”	周志隆	中原大學	92. 06. 06
熱電材料應用簡介	郭永綱	國立東華大學 物理系	92. 06. 12
From Gravitational Mirage, Gravitational Rainbow to Critical Opalescence and Beyond	郭中一	東吳大學	92. 06. 13
太空快遞——淺介微中子天文物理	林貴林	國立交通大學 物理系	92. 06. 19
Introduction to Diluted Magnetic Semiconductor Nanocrystals	簡紋濱	美國紐奧良大學 物理所	92. 06. 19
2003 Summer Workshop on Nonlinear and Complex Systems	胡進錕	中央研究院 物理研究所	92. 06. 23

演講題目	演講者	所屬機構	日期
2003 Summer Workshop on Nonlinear and Complex Systems	胡進錕	中央研究院 物理研究所	92. 06. 24
Spanning Tress, Dimer Statistics and Related Problems	曾文哲	淡江大學物理系	92. 06. 24
Synchronization Phenomena of Van Der Pol Oscillators	梁鎧廣	中央大學 物理系	92. 06. 24
Information Flow and Phase Synchronization in Chaotic Coupled-Map Lattices	何明宗	高雄師範大學 物理系	92. 06. 24
細胞組織變化知分析與探討			92. 06. 25
Superparamagnetic Monodispersed Magnetic Fluid Nanoparticles and Dynamics of Water Confined in Nanopores	Narsinga Rao Gade	National Taiwan University	92. 06. 26
Softmatter and Biophysics Journal Club: Hydrodynamics of Respiration in our Lung	陳明志	台灣科技大學 機械系	92. 06. 30
Materials Evaluation by Mossbauer Spectroscopy	何健民	Wichita State University, Kansas	92. 07. 03
Softmatter and Biophysics Journal Club: Neurons under Strong Laser Beam-Living Softmatter	江宏仁	台灣大學 應力所	92 .07. 07
Triple Product Correlations in B Decays	Somasundaram Arunagiri	國立清華大學	92. 07. 09
Protein Stabilization by Naturally Occurring Osmolytes: Calorimetric Studies	Pannur Venkatesu	中央研究院 物理研究所	92. 07. 10
Microbe-Based Bioterials with Potential Applications in Nanotechnology	譚世特	國立清華大學 生物科技研究所	92. 07. 11
Softmatter and Biophysics Journal Club: DNA Packaging Motor	楊大衍	中央研究院 分子生物研究所	92. 07. 14

演講題目	演講者	所屬機構	日期
Softmatter and Biophysics Journal Club: From Bird Flock to Bacteria Swarm	梁鈞泰	中央研究院 物理研究所	92. 07. 21
Structural and Mechanistic Studies of Photosynthetic Water Oxidation by FTIR Difference Spectroscopy	朱修安	中研院植物所	92. 07. 24
Identification and Functional Studies of TE2-Associated Proteins	李中帆	Instutite of Physics and NHRI	92. 07. 24
Softmatter and Biophysics Journal Club:Asymmetric pores in a silicon membrane acting as massively parallel brownian ratchets	陳志強	中央研究院 物理研究所	92. 07. 28
心肌細胞電傳導特性之研究與分析	薛銘彬	國立東華大學 物理系	92. 08. 04
Models on Financial Markets	Jaroslav Skrivanek	Technical University of Kosice (Slovakia)	92. 08. 05
General Introduction to Virus	李中帆	中央研究院 物理研究所	92. 08. 05
ARVO:A Fortran package for computing solvent accessible surface area and volume of overlapping spheres via analytic equations	Jan Busa	Technical University, Slovak Republic	92. 08. 06
Paralle tempering simulation of HP-36 and related computer programs	林財鈺	國立中正大學 物理系	92. 08. 06
Viruses and Immune System	李中帆	中央研究院 物理研究所	92. 08. 12
爵士樂介紹	吳孟軒		92. 08. 12
實驗室災害危機應變處理（Safety in Labs）	謝榮泰	中華民國安全防護委員會	92. 08. 14
Virus and immune system II	李中帆	中央研究院 物理研究所	92. 08. 19

演講題目	演講者	所屬機構	日期
以全頻譜掃描探測顯微術研究微波材料的介電機制	陳宜君	中央研究院 物理研究所	92. 08. 19
Learning-induced synchronization and plasticity of a developing neural netwrork	陳啟明	國立台灣師範大學 物理系	92. 08. 21
Acceleration from Extra Dimension: Hyperbolic Space Cosmologies	王振	國立台灣大學	92. 08. 21
Molecular Switch Studies by SPM 探針掃描顯微術在分子開關上的研究	洪沂伯	中央研究院 物理研究所	92. 08. 21
Cavities excluded accessible surface area and volume evaluation	Jan Busa	Department of Mathematics, Technical University in Kosice	92. 08. 21
Immunology for Physicists (I)	李中帆	中央研究院 物理研究所	92. 09. 02
Immunology for Physicists (II)	吳明佳	中央研究院 物理研究所	92. 09. 02
Error Thresholds in Models of Biological Evolution	David Saakian	Yerevan Physics Institute	92. 09. 03
Introction to MEMS	鄭兆	中央研究院 物理研究所	92. 09. 04
Pentaquark Surprise - Recent observation of 5-quark resonance at SPring-8/LEPS experiment	章文箴	中央研究院 物理研究所	92. 09. 18
The time dependent CP asymmetry in B--\>\\\\phi K_S	Chao-Shang Huang	Institute of Theoretical Physics(ITP) China Academy of Science (CAS)	92. 09.24
Quest for New Physics : Extra Dimensions	張敬民	國立清華大學 物理系	92. 09. 25

演講題目	演講者	所屬機構	日期
Forays into Relativistic Quantum Information Science: Wigner Rotations and Bell States	許祖斌	國立成功大學	92. 09. 26
Josephson Quantum Bits	蔡兆申	NEC Fundamental Reserach Labories	92. 09. 30
Revisiting $B \\to \\pi l \\nu$ in perturbative QCD	Susan Gardner	University of Kentucky	92. 10. 02
Inclusive decays of b-hadrons	Alexander Lenz	University of Regensburg	92. 10. 03
Complexity and Simplicity	李定國	中央研究院 物理研究所	92. 10. 04
粒子世界的物理及研究方法	王子敬	中央研究院 物理研究所	92. 10. 04
General Introduction to DNA Transcription	李中帆	中央研究院 物理研究所	92. 10. 07
結核病相關衛教課程		肺結核防治中心	92. 10. 07
The Formation of Stars and Planetary Systems	徐遐生	國立清華大學	92. 10. 08
Near Field Optical Probing Techniques	楊志文	中央研究院 物理研究所	92. 10. 09
科學精神要義	劉源俊	私立東吳大學	92. 10. 16
Phenomenology of 3-3-1 models	黃玉龍	Institute of Physics, National Center for Natural Science and Technology,Vietnam	92. 10. 17
Basic introduction of protein translation	李中帆	中央研究院 物理研究所	92. 10. 21

演講題目	演講者	所屬機構	日期
The finding and use of protein structural alphabets	黃明經	中央研究院 生物醫學科學研究所	92. 10. 22
高分子半導體之物理及應用	孟心飛	國立交通大學 物理研究所	92. 10. 23
Bimolecular Chemical Reaction in the Framework of Micro-irreversible Quantum Scattering Theory	Ashot Gevorkyan	Institute of Informatics and Automation Problems, Yervan	92. 10. 23
Investigation of Au clusters on Si(111) surface with STM	張哲誠	中央研究院 物理研究所	92. 10. 23
Probing the strangeness content of the proton with the electromagnetic production of phi meson	楊信男	國立台灣大學	92. 10. 24
Pairing Ultracold Atoms: Quantum Statistics and Quantum Computation	Cheng Chin	Gastwissenschaftler and Gastprofessor Institut fu\r Experimentalphysik Universita\"t Innsbruck"	92. 10. 27
CROSSOVER BEHAVIOUR IN A MODEL COMMUNICATION NETWORK	Brajendra Kumar Singh	Indian Institute of Technology-Madras, India	92. 10. 28
Elecatronic structure and magnetism of 3d transition atom doped ZnO	簡彰宏	中央研究院 物理研究所	92. 10. 29
\Non-equilibrium Dynamics of Fermions in Medium\". "	李大興	國立東華大學	92. 10. 31
GMR, nanomagnetics, and spintronics	張亞中	Department of Physics, University of Illinois at Urbana Champaign	92. 10. 31
台大高能組的建立、成長與前瞻	張寶棣	國立台灣大學 物理系	92. 11. 06
Formation of 2D Ge islands on Pb covered Si(111) surfaces	張仕欣	中央研究院 物理研究所	92. 11. 06

演講題目	演講者	所屬機構	日期
The Fritzsch Ansatz Revisited	施華強	國立師範大學	92. 11. 07
Large Tan beta SUSY QCD corrections to b-> s gamma	Francesca Borzumati	KIAS	92. 11. 12
Top Quark Identification and Its Mass Measurement at CDF	陳彥竹	中央研究院 物理研究所	92. 11. 12
New Room Temperature Ferromagnetic Materials	K.V. Rao	The Royal Institute of Technology	92. 11. 18
Multifunctional Nanosensors, Super-Dense Memory and Other Nanoscience	Harold Weinstock	US-Air Force Office of Scientific Research (US-AFOSR)	92. 11. 19
Recent Results in Neutrino Physics and Astrophysics	王子敬	中央研究院 物理研究所	92. 11. 20
Supersymmetric radius stabilization in Randall-Sundrum background	Nobuchika Okada	KEK	92. 11. 20
Nuclear Physics Research with Radioactive Beams at ORNL	Felix Liang	Oak Ridge National Laboratory	92. 11. 21
Happy Birthday to Sri Sathya Sai Baba	S.M.D. Rao	中央研究院 物理研究所	92. 11. 21
Making Contact to Nanostructures: Interfacing to the Nanoworld	Peter Grutter	Physics Department, McGill University, Montreal	92. 11. 21
Gene Therapy of Bone Diseases:Applications of Magnetic Retroviral Vectors	Shin-Tai Chen	Musculoskeletal Disease Center	92. 11. 21
In-situ electron microscopy study of Ag nanocluster and nanowire growth	Jian-Min Zuo	美國伊利諾大學 香檳分校材料系教授	92. 11. 24
Structure and Growth of Nanostructures made from Layered Metal Oxides	彭練矛	北京大學電子系	92. 11. 24
Fractal-like structures as a photonic band gap and meta-material	陳子亭	Hong Kong University of Science & Technology	92. 11. 24

演講題目	演講者	所屬機構	日期
磁學ABC	鄭德娟	中國科學院	92. 11. 26
New Mathematical Approach to Disordered 3D Spin Systems inthe External Field	Ashot Gevozkyan	Institute of Informatics and Automation Problems Armenia	92. 11. 26
Cool Thing on the Hot Trail - Observation of Dilute Bose - Einstein Condensation at CCU	韓殿君	國立中正大學 物理系	92. 11. 27
Multiscale Molecular Modeling of Membrane Proteins	Jung-Hsin Lin	School of Pharmacy, National Taiwan University	92. 11. 27
Field emission of a faceted tip-Recent FIM and FEM observations	郭鴻曦	中央研究院 物理研究所	92. 11. 27
Casimir Energy in Extra Dimensions and Dark Energy	顧哲安	國立台灣大學	92. 11. 28
The DNA wrapping around a protein	Yan-Chr Tsai	Dept. of Physics, National Chung Cheng University, Taiwan	92. 11. 28
Which Matters for Survival, Risk Preference or Forecasting Accuracy? -- An Analysis based on Agent-Based Artificial Stock Markets	Shu-Heng Chen	Department of Economics, National Chengchi University	92. 11. 29
磁學ABC (II)	鄭德娟	中國科學院	92. 12. 03
「LELIS」-鹿林前山星際物質巡天計劃	孫維新	國立中央大學 天文所	92. 12. 04
Flame anneal of gold on mica substrate and paper review of fiber optic interferometer	李明達	中央研究院 物理研究所	92. 12. 04
Introduction to Immuse System III	李中帆	中央研究院 物理研究所	92. 12. 04
$B \to \eta(\eta')K(\pi) $ in the Standard Model with Flavor Symmetry	蕭佑國	國立清華大學	92. 12. 05

演講題目	演講者	所屬機構	日期
Histophysics: What Physicists and Historians Can Do Together Apart from Sipping Tea	Lui Lam 林 磊	Department of Physics, San Jose State University	92. 12. 08
High Resolution Atomic Force Microscopic Imaging of the Si(111)-(7*7) Surface:Contribution of short-Range Force to the Images	Toyoaki Eguchi	The Institute for Solid State Physics, The University of Tokyo	92. 12. 08
Dynamic processes of molecular wiring and atomic switching	Masakazu Aono	Osaka Univ.& Nanomaterials Labs.,NIMS	92. 12. 08
Superconductivity and resistivity saturation in alpha - TiAl Alloy	張殿琳	Institue of Physics,The Chinese Academy of Sciences	92. 12. 09
Resolution of the Solar Neutrino Problem -- Results from the Sudbury Neutrino Observatory	Alan Poon	Lawrence Berkeley National Laboratory	92. 12. 10
奈米光學簡介	蔡定平	國立台灣大學 物理系	92. 12. 11
One-dimensional Bose-Einstein Condensation of Ultracold Atoms---- mixture, dynamics, and disorder effects	Daw-Wei Wang	Harvard University	92. 12. 12
Chiral Symmetry in Light-front QCD	張為民	國立成功大學	92. 12. 12
運動講習	高志光		92. 12. 12
Linguistic Analysis od Genetic Sequences	楊智傑	Beth Israel Deaconess Medical Center/Harvard Medical School	92. 12. 16
Linguistic Analysis od Genetic Sequences	楊智傑	Beth Israel Deaconess Medical Center/Harvard Medical School	92. 12. 16

演講題目	演講者	所屬機構	日期
Liquid Crystal Rheology	陸駿逸	國立中央大學 物理系	92. 12. 18
Ghost condensation and infrared modification of gravity.	鄭信嘉	Harvard University	92. 12. 18
Some observation on Ag/Si(111) 7× 7 system with room temperature STM	施華德	中央研究院 物理研究所	92. 12. 18
Play Quantum Mechanics in the Nanoworld	牛謙	Department of Physics,University of Texas at Austin	92. 12. 18
磁學ABC	鄭德娟	中國科學院	92. 12. 19
Time-resolved Photoacoustic Calorimetry Studies of Nanoseconds Protein Refolding	范文祥	中央研究院原子與分子科學研究所	92. 12. 22
The search of Resonating Valence Bond state in the strongly correlated systems	陳永忠	東海大學 物理系	92. 12. 25
Perturbation along Black Holes	Bin Wang	復旦大學	92. 12. 29

Visiting Scholars

中央研究院物理所九十二年度訪問學人表

（ 2003 年 1 月- 2003 年 12 月）

訪 問 學 人	所 屬 機 構	訪 問 期 間
Jan Busa	斯洛伐克 Technical U of Kosice	2002.12.14~2003.01.19
李匡邦	美國麻州大學化學系	2002.12.26~2003.01.24
Choong Sun Kim	韓國延世大學物理系	2003.01.01~2003.01.06
何健民	美國Wichita State University	2003.01.01~2003.01.21
劉思煌	美國University of Nebraska	2003.01.02~2003.01.13
Chung-Ngoc Leung	美國德拉瓦大學	2003.01.08~2003.02.07
曾文哲	淡江大學物理系	2003.01.10~2003.02.11
蕭又新	東海大學物理系	2003.01.13~2003.02.12
陳宣毅	中央大學物理系	2003.01.13~2003.02.17
俞大鵬	中國北京大學	2003.01.14~2003.01.24
李大興	東華大學物理系	2003.01.14~2003.02.14
周志隆	中原大學物理系	2003.01.15~2003.02.14
蔡志申	東海大學物理系	2003.01.15~2003.02.15
何孟書	中興大學物理系	2003.01.15~2003.02.15
周玥	中國南京大學	2003.01.15~2003.03.05
路家棋	中國南京大學	2003.01.15~2003.03.05
Nerses Ananikyan	亞美尼亞 Yerevan Physics Institute	2003.01.15~2003.03.14
林財鈺	中正大學物理系	2003.01.18~2003.02.18

訪 問 學 人	所 屬 機 構	訪 問 期 間
彭逸凡	暨南國際大學土木系	2003.01.20~2003.02.19
David B. Saakian	亞美尼亞 Yerevan Physics Institute	2003.01.22~2003.03.21
Ian Low	美國哈佛大學	2003.01.23~2003.01.31
Jonathan Dunshoff	美國普林斯頓大學	2003.02.09~2003.02.12
Eduard Hulicius	捷克科學院MOVPE實驗室	2003.02.10~2003.02.23
Zhyrair Gevorkian	亞美尼亞 Yerevan Physics Institute	2003.02.12~2003.06.11
Thomas Lux	德國基爾大學	2003.02.23~2003.02.27
Evgeni Ivashkevich	俄羅斯JINR	2003.02.25~2003.06.24
唐洪慶	中國原子能研究院	2003.03.01~2003.03.31
劉永輝	中國原子能研究院	2003.03.01~2003.11.16
陳廷揚	中國南京大學	2003.03.08~2003.03.21
平加倫	中國南京師範大學	2003.03.08~2003.03.21
龔儉	中國東南大學	2003.03.08~2003.03.21
葉巍	中國東南大學	2003.03.08~2003.03.21
吳樺	中國東南大學	2003.03.08~2003.03.21
李匡邦	美國麻州大學化學系	2003.03.12~2003.03.25
蔣正偉	芝加哥大學費米實驗室	2003.03.04~2003.03.19
Edik Hayryan	俄羅斯聯合核子科學院	2003.03.25~2003.05.26
Taekoon Lee	韓國KAIST物理系	2003.04.17~2003.05.16
李匡邦	美國麻州大學化學系	2003.05.28~2003.08.28
Ravindra E. Amritkar	印度科學院	2003.05.31~2003.07.02

訪 問 學 人	所 屬 機 構	訪 問 期 間
何健民	美國Wichita State University	2003.06.02~2003.07.01
Jeung-Hun Park	韓國釜山大學	2003.06.10~2003.08.31
曾文哲	淡江大學物理系	2003.06.18~2003.09.15
江祖永	中央大學物理系	2003.06.23~2003.08.23
陳宣毅	中央大學物理系	2003.06.23~2003.09.10
何孟書	中興大學物理系	2003.07.01~2003.08.31
林財鈺	中正大學物理系	2003.07.01~2003.08.31
周志隆	中原大學物理系	2003.07.01~2003.08.31
黃建文	高雄師範大學物理系	2003.07.01~2003.08.31
徐統	清華大學材料系	2003.07.01~2003.08.31
鮑建國	蘭陽技術學院電子工程系	2003.07.01~2003.08.31
蔡志申	東海大學物理系	2003.07.01~2003.09.15
李大興	東海大學物理系	2003.07.01~2003.09.15
吳家樂	嶺東技術學院資管系	2003.07.01~2003.09.15
彭逸凡	暨南國際大學土木系	2003.07.01~2003.09.30
蕭又新	東海大學物理系	2003.07.01~2003.09.30
馬遠榮	東華大學物理系	2003.07.01~2003.09.30
梁正宏	清華大學工程與系統科學系	2003.07.01~2003.09.30
黎璧賢	中央大學物理系	2003.07.01~2003.09.30
齊正中	清華大學物理系	2003.07.01~2003.12.31
郭博成	台灣大學材料研究所	2003.07.01~2003.12.31

訪 問 學 人	所 屬 機 構	訪 問 期 間
羅玉林	新埔技術學院機械系	2003.07.01~2003.12.31
林宏一	台南師院自然科學系	2003.07.01~2003.12.31
David B. Saakian	亞美尼亞 Yerevan Physics Institute	2003.07.06~2003.09.04
Jaroslav Shrivanek	斯洛伐克 Technical U of Kosice	2003.07.13~2003.08.15
Jan Busa	斯洛伐克 Technical U of Kosice	2003.07.13~2003.08.29
包健華	中正大學	2003.07.16~2003.07.20
崔瑩鎮	韓國仁荷大學	2003.07.24~2003.07.31
梁宗嶽	美國德拉瓦大學	2003.07.31~2003.08.12
楊弘敦	中山大學	2003.08.01~2004.07.31
包健華	中正大學	2003.08.17~2003.08.24
梁培德	美國波特蘭大學	2003.09.01~2003.09.15
琴龍淵	日本名古屋大學	2003.10.01~2003.10.04
Ashot Gevorkyan	亞美尼亞NAS	2003.10.02~2003.11.30
David B. Saakian	亞美尼亞 Yerevan Physics Institute	2003.10.16~2003.12.28
朱越鋒	中國清華大學	2003.10.20~2004.06.19
金政	奧地利因斯布魯克大學	2003.10.23~2003.11.03
Andreas Bauer	德國Freie University Berlin	2003.11.06~2003.11.17
Jack Bass	美國密西根州立大學	2003.11.07~2003.11.17
Russell P. Cowburn	英國Univeristy of Durham	2003.11.08~2003.11.17
Jonathan Wilkenfeld	美國馬里蘭大學	2003.11.12
高橋研	日本Tohoku大學	2003.11.12~2003.11.16

訪 問 學 人	所 屬 機 構	訪 問 期 間
鄭德娟	中國科學院	2003.11.12-2003.12.20
韓寶善	中國科學院	2003.11.12-2003.12.20
蔡兆申	日本電氣基礎研究所	2003.11.14~2003.11.19
早川尚夫	日本名古屋大學	2003.11.15~2003.11.21
Kaice T. Reilly	美國California Institute of Technology	2003.11.15~2004.07.31
劉思煌	美國University of Nebraska	2003.11.17~2003.11.24
辛標	中國北京原子能科學研究院	2003.11.20~2004.07.19
鮑杰	中國北京原子能科學研究院	2003.11.20~2004.07.19
Kan Chen	新加坡大學	2003.11.26~2003.12.01
Mai Suan Li	波蘭科學院	2003.11.26~2003.12.06
Tigran K. Davtyan	亞美尼亞Armenicum Research Center	2003.11.26~2003.12.07
歐陽鍾燦	中國科學院	2003.11.26-2003.12.09
Andrew Blum	美國馬里蘭大學	2003.12.02~2003.12.06
Monty G. Marshall	美國馬里蘭大學	2003.12.02~2003.12.06
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