



# Annual Report for the Year 2004

National Institute of Physics  
College of Science, University of the Philippines  
Diliman, Quezon City 1101, Philippines  
[www.nip.upd.edu.ph](http://www.nip.upd.edu.ph)

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## Chapter I. Executive Summary

by Caesar Saloma

### A. Introduction

This is the second annual report during the second term of Caesar Saloma as Director of Institute that began on June 1, 2003 and ends on May 31, 2006. The four previous annual reports that were released in 2000, 2001, 2002 and 2003, are available *on-line* in the official website ([www.nip.upd.edu.ph](http://www.nip.upd.edu.ph)) of the National Institute of Physics.

The NIP was established by then President Ferdinand Marcos in 1983 via the issuance of Executive Order 889. The NIP which evolved from the Department of Physics of UP Diliman, began operation on 26 May 1983 immediately after the approval of UP Board of Regents. The *mission* of NIP is to serve as the national center of excellence for the acquisition, dissemination and application of knowledge in physics and applied physics. Today, the NIP occupies a pre-eminent place among schools that offer BS, MS and PhD degree programs in physics and applied physics in the Philippines. The number of schools offering BS degree programs in physics and applied physics is thirteen (13) and four (4), respectively while those offering MS and PhD degree programs in physics are eight (8) and three (3), respectively.

Our *vision* is to make NIP into one of the finest schools of physics in the ASEAN region by 2006. A review of the past performance will be undertaken in early 2007 to determine its relative strengths and weaknesses of NIP as a research institute and training center of PhD and MS students. The outcome of the review will be utilized to determine the future research thrusts of NIP and to improve its performance as the main producer of PhD graduates in physics in the country.

In SY2004-2005, the NIP faculty consisted of eight (8) full professors, two (2) associate professors, and fifteen (15) assistant professors. Out of the thirty-six (36) faculty items assigned to NIP, twenty-four or 66% have PhD degrees. The remaining items were used to hire physics instructors (with temporary appointments) who were also NIP graduate students. In addition, the NIP has fifteen (15) instructor positions that are supported with funds from the general savings of UP Diliman.

Eleven (11) faculty members representing 33% of the total number, have permanent appointments. Dr Maricor Soriano and Dr Carlo Mar Blanca were granted tenure by the University of the Philippines in 2004. The NIP has the lowest percentage of faculty with permanent appointment among the various academic units of the College of Science. The low tenure level provides the NIP with the flexibility to open new research areas (and close old ones) in response to emerging trends in physics and applied physics and to recruit young and competitive PhD's.

Between 1993 and 2004, NIP researchers produced eighty-three percent (83.8%) of all physics publications from the Philippines that appeared in scientific journals that are indexed by the Institute of Scientific Information (ISI). Fifty-four percent (54.48%) of the ISI publications from NIP were produced in the last five years (2000-2004).

Caesar Saloma was recognized with the 2004 *Galileo Galilei Award* by the International Commission for Optics ([www.ico-optics.org](http://www.ico-optics.org)) for his significant contributions in optics that were achieved under comparatively unfavorable conditions. Professor Saloma is the first ASEAN scientist to receive the Galileo Award that was first given in 1994.

In SY 2004-2005, the number of MS Physics students rose to sixty (60) representing an increase of 15% relative to the previous school year. A smaller increase in the number of PhD students is also recorded from eighteen (18) in the previous year to twenty-two (see Figure 1).

The NIP has the largest undergraduate population among academic units in the College of Science, UP Diliman. In SY 2004-2005, the average number of students enrolled per semester in our BS Physics and BS Applied Physics programs was 142 and 136, respectively (see Figure 1). The enrollment in the BS Physics and BS Applied Physics programs declined by 12.8% and 17% respectively relative to the previous school year. The NIP admits a maximum of sixty freshmen per BS degree program during each year.

One PhD and twelve (13) MS students were graduated in SY 2003 – 2004 ending April 2004. In the same school year, twenty-five (25) BS Physics and fifteen (15) BS Applied Physics graduates were also produced (see Figure 2). The number of BS graduates is the largest in the history of NIP including those years when it was still the Department of Physics of UP Diliman.

Five (5) PhD and thirteen (13) MS students were graduated in SY 2004 – 2005 ending April 2005. Twenty (20) BS Physics and thirteen (13) BS Applied Physics graduates were also trained.

In 2004, Phase III construction which is aimed at completing the Research Wing of the future NIP Building was carried out and is expected to end in January 2005. Phase III is worth PhP 40M and the funds were provided by the UP System (President Francisco Nemenzo Jr) and UP Diliman (Chancellor Emerlinda Roman) on a 50-50 burden sharing. The NIP also succeeded in securing construction funds in the amount PhP44.5M for the implementation of Phase IV that will involve the completion of the Lecture Hall and portions of the Administration section. Phase IV is expected to start in the second half of 2005. In addition, UP Diliman also gave NIP the amount of PhP13.5M for the purchase of furniture, furnishings and equipment for the Research Wing.

In 2004, a number of NIP faculty members also performed administrative functions for other units. Professor Henry Ramos served as the Associate Dean for Research and Extensions of the College of Science. Drs Marisciell Litong-Palima and Maricor Soriano served as Secretary-General

and President (vice Dr Marlon Daza who resigned) of the Samahang Pisika ng Pilipinas, respectively. Professors Jose Magpantay and Arnel Salvador served as faculty advisers to the Office of the UP President/Office of the Vice-President for Administration.

## **B. Personnel & Organization**

In 2004, the NIP was managed by Caesar Saloma with the assistance of Dr. Ronald Banzon (*Deputy Director for Academic Affairs*), Dr. Luis Ma. Bo-ot (*Facilities & Resources*), and Dr. Arnel Salvador (*Research & Extension Services*). The deputy directors serve at the pleasure of the NIP Director and are appointed for a term of one year that is subject for renewal. The complete organizational structure of NIP is given in the Annual Reports of 2000 and 2001.

The NIP Executive Council is the highest policy-making body of the Institute. It is composed of full-time Professors and Associate Professors as permanent members, and the three deputy directors, and six program coordinators as *ad hoc* members. The NIP Director chairs meetings of the Executive Council. The Director also chairs the Graduate Committee which consists of all regular (full-time) Ph.D. faculty members of the Institute. The Graduate Committee reviews and approves student applications into the NIP graduate program. It also prepares the M.S./Ph.D. comprehensive examinations when the need arises. In 2004, Dr Cristine Villagonzalo was appointed as the Secretary of the Council with a 1-unit load credit. The Coordinator of the NIP Teaching Laboratories was admitted as a regular resource person of the Council.

The following faculty members were appointed as program coordinators in 2004: Dr Henry Ramos (Plasma), Roland Sarmago (Condensed Matter), Dr Jose Perico Esguerra (Theory), Dr Carlo Mar Blanca (Instrumentation Physics), Dr Cristine Villagonzalo (Structure & Dynamics), Dr Wilson Garcia (Photonics), and Dr Maricor Soriano (NIP Teaching Laboratories).

The Undergraduate Physics Committee consists of all regular faculty members who are handling courses in the B.S. Physics and Applied Physics programs. The Committee is chaired by the Deputy Director for Academic Affairs.

The General Physics Committee (GPC) consists of all faculty members who are handling general physics courses (Physics 71, 72, 73, 71.1, 72.1, and 73.1). It is chaired by a faculty who is appointed (with a term of one academic year) by the NIP Executive Council through the recommendation of the NIP Director. Mr Percival Almoro has served as GPC chair since AY 2002-2003.

Physics 10 is one of the most popular GE course in UP Diliman. To address persistent high student demand, four sections were offered in SY 2004-2005 doubling the number in the previous school year. To achieve better quality level of teaching, the number of students in a Physics 10 class does not exceed forty-five (45) and examinations are essay-type. Dr Jose Perico Esguerra coordinated the Physics 10 program in SY 2004-2005.

In July 2004, Dr May Lim began her postdoctoral research at the New England Complex Systems Institute in Boston, Massachusetts. Dr Lim was awarded a two-year NECSI fellowship and is on faculty leave (without pay) from NIP. Dr Eric Galapon also went on postdoctoral research at the Universidad del Pais Vasco in Bilbao, Spain. Dr Christopher Monterola continued his two-year postdoctoral research at the Max Planck Institute in Dresden. In 2004, Dr Giovanni Tapang and Dr Vincent Ricardo Daria returned to regular faculty duties after carrying-out postdoctoral research in the University of Strathclyde in Scotland (one year) and Risoe National Laboratory in Denmark (three years), respectively. Drs Galapon and Tapang were supported by UP Postdoctoral Fellowship Grants.

The following are the administrative load credit per semester of the various administrative positions: NIP Director (6 units), Deputy Director (3 units), Program Coordinators (1 unit), and System Administrator (3 units). The NIP System Administrator is in-charge of the maintenance and upgrade of the NIP local-area network and represents the NIP in the technical committee of the Computational Science Research Center of the UP College of Science.

To provide administrative and technical support to the academic functions of NIP is a team of fourteen personnel that is under the direct supervision of Ms Flora Luis (NIP administrative officer). Complete information about NIP personnel are found in: [http://www.nip.upd.edu.ph/people/person\\_admin.html](http://www.nip.upd.edu.ph/people/person_admin.html) and [http://www.nip.upd.edu.ph/people/person\\_tech.html](http://www.nip.upd.edu.ph/people/person_tech.html)

### **C. Academic Programs**

The NIP offers the following degree programs: BS Physics, BS Applied Physics, MA Physics, MS Physics, and PhD (Physics). In addition, the NIP co-implements the following graduate degree programs: M.S. Environmental Science and Ph.D. Environmental Science (with other units in the College of Science) and the MS Materials Science and PhD Materials Science (with the College of Engineering).

Every BS student is required to present a thesis that is based on a research work which is done under the supervision of an NIP faculty with an advanced physics degree. The undergraduate thesis is presented to the public at the end of each semester in a scheduled program of the Institute. An examination panel consisting of the thesis supervisor and at least two faculty with advanced physics degrees, is tasked to evaluate the correctness and suitability of the thesis work.

Below is a summary of the number of students in the various academic degree programs offered by the Institute in the last two academic years. Figures in parentheses correspond to the number of graduates in a given term.

**Table. Enrollment Data**

Enrollment Data	AY 2002-03			AY 2003-04			AY 2004-2005		
	1st Sem	2nd Sem.	Sum	1st Sem	2 <sup>nd</sup> Sem	Sum	1 <sup>st</sup> Sem	2nd Sem	Sum
Ph.D. Physics		19(2)			18			22	
M.S. Physics		43(8)			52			60	
M.A. Physics	2								
B.S. Physics	165	157 (11)		174	169			142	
B.S. Applied Physics	164	162 (11)		159	151			136	

Figure 1 reveals the following notable features for SY 2004-2005: 1) Sustained year-to-year increase in MS student population, 2) Slight increase in the number of PhD students, and 3) Decrease in BS student population in both physics and applied physics programs.

The sustained increase in the MS student population could be traced to the larger number of BS graduates from NIP, the infusion of BS Physics graduates from other schools and the availability of more local graduate scholarships from the Philippine Center for Advanced Science and Technology Research and Development (PCASTRD) of the Department of Science and Technology. BS graduates from NIP are now most likely to pursue graduate studies immediately after graduation. The increase in the number of MS students and the corresponding increase in MS graduates are expected to affect positively the PhD student population of NIP in the near future.

The notable decrease in the BS student population is due to the difficult economic situation that continues to prevail even to the present time. Even though the tuition fee that NIP undergraduate students pay for their education has remained very low relative to those paid in the Ateneo de Manila and De La Salle University, living in Metro Manila has become more costly with time due to inflationary pressures.

Figure 2 shows that the NIP has been able to produce at least ten (10) MS graduates per year in the last four years. The total number of BS graduates per year has also exceeded thirty (30) in the last two school years.

Figure 1. NIP student population per academic year

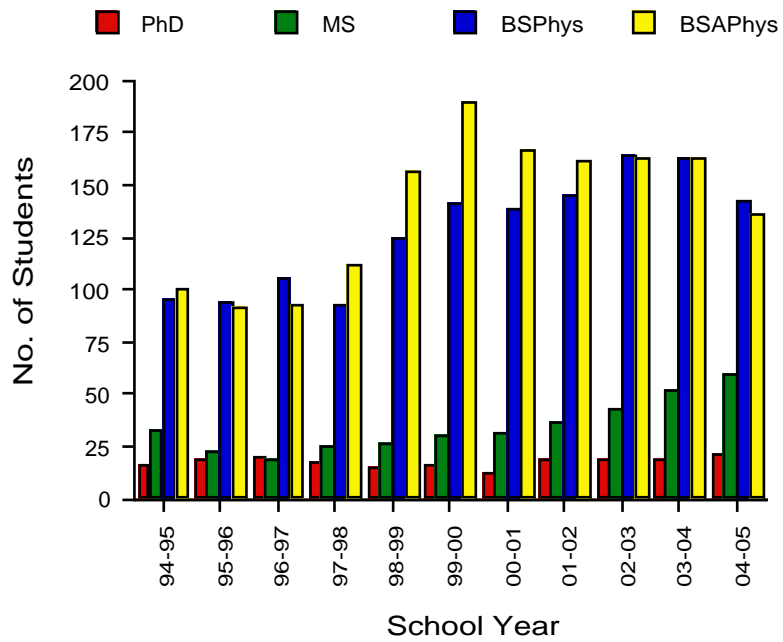
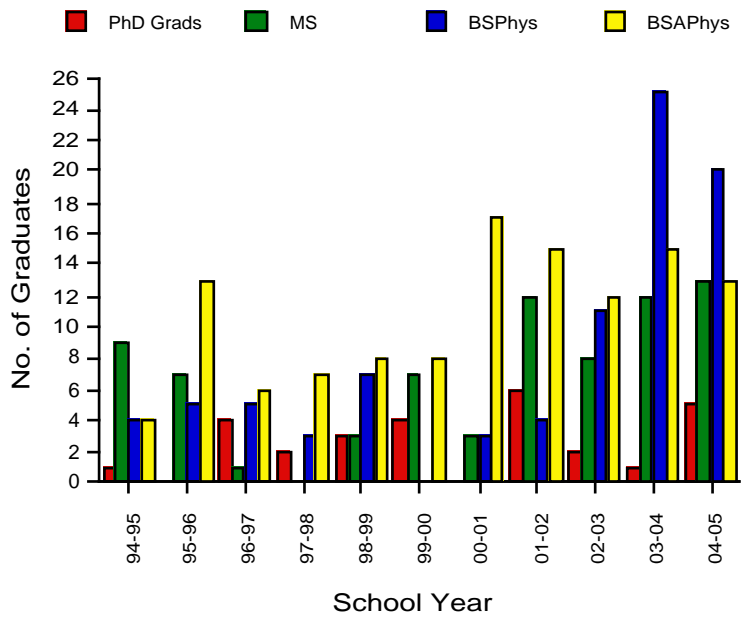


Figure 2. Number of NIP graduates per academic year



The NIP continues to find ways of improving the quality of teaching in the general physics courses. For general (service) physics courses (Physics 71, 72, and 73), the targeted for a passing rate of around 75% or better by improving the quality of instruction and the formulation and content of long examinations. A mechanism between the Office of the NIP Director, the GPC chair, and the various course groups has been instituted to monitor class performance after every long examination. Instructors are constantly advised to undergo seminars to test preparations offered by the Office of Instruction. Teachers have been encouraged to use Powerpoint presentations during lectures.

Based on data that were submitted by Dr Percival Almoró (Chair of the General Physics Committee. the average passing rate was for students enrolled in Physics 71, 72 and 73 was 90.2%, 79.6% and 70.5%, respectively during the 1st semester of SY 2004-2005. For the 2<sup>nd</sup> semester, the passing rate in Physics 71, 72 and 73 was 85.5%, 81.3.6% and 76.2%, respectively

#### **D. Infrastructure and Facilities Development**

The Phase III construction project of the future NIP building along CP Garcia Avenue was implemented in 2004. It started in January 2004 with a total budget of PhP40M. The Phase III project aims at completing the Research Wing that consists of four floors with a total floor area of almost 6000 square meters which is 1.5 times the area of the current NIP site in Palma Hall. The Research Wing houses the six research laboratories and the teaching laboratories in the two BS programs and the service courses. Completion of construction works is expected in January 2005. UP Diliman also gave the NIP the amount of PhP13.5M for the purchase of furnitures, equipment and furnishings for the Research Wing.

In July 2004, the UP Board of Regents approved a budget allotment of PhP44.5M to continue the construction (Phase IV) of the future NIP building. The scope of Phase IV construction includes the NIP Lecture Hall and portions of the Administration Wing. The completion of the Lecture Hall will allow NIP to offer all Physics 7X lecture classes at the new site. Phase IV construction is expected to begin in the second half of 2005.

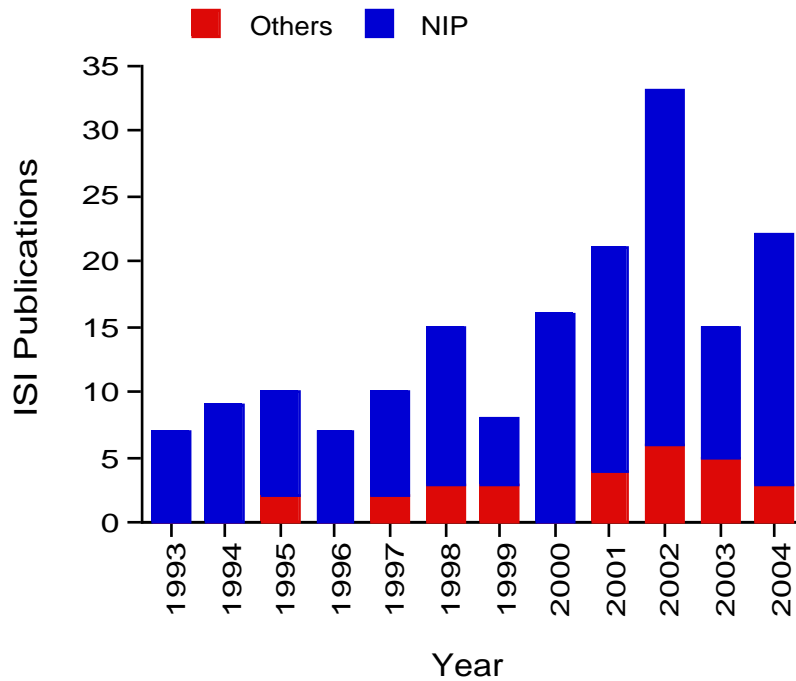
#### **E. Research Highlights**

The NIP is the leading research center of physics and applied physics in the country. In 2004, NIP researchers published nineteen (19) papers in ISI-abstracted journals out of twenty-two (22) that were published from the Philippines. List of ISI publications of NIP in 2002 is presented in Appendix A. A paper by NIP researchers that appeared in *Optics Letters* (1 November 2004 issue) was featured in the *MRS Bulletin* (December 2005 issue) of the Materials Research Society ([www.mrs.org](http://www.mrs.org)).

Figure 3 tracks the number of physics publications in ISI journals that are produced by researchers who are based in the Philippines. Between 1993 and 2004, NIP has produced 83% of all ISI papers in physics.

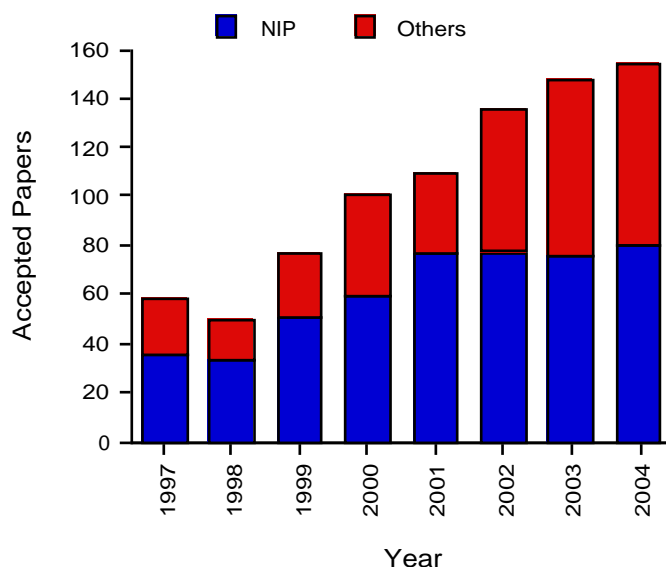


Figure 3. Annual number of ISI publications



NIP researchers also gave 81 technical presentations (52% of total) in the 22<sup>nd</sup> Physics Congress of the Samahang Pisika ng Pilipinas that was held in Tagbilaran City on 25-27 October 2004. Figure 4 presents the number of accepted SPP papers that were delivered through the years. It can be observed that the number of SPP papers has stabilized to around eighty in the last three years while those produced by other physics departments showed an increasing trend. The acceptance rate of peer-reviewed SPP submissions has ranged from a high of 94.41% (in 2002) to a low of 75.3% (in 1997).

Figure 4. Number of accepted papers presented in annual SPP Congresses.



A number of NIP researchers also received awards and recognition from various academic bodies and government agencies. The following NIP students received academic awards during the Recognition Program of the College of Science on 25 April 2004:

*Most Outstanding PhD Graduate*  
Armando Somintac

*Most Outstanding MS Graduate*  
Dranreb Earl Juanico

*Most Outstanding BS Physics Graduate*  
Gabriel Manasan (cum laude)

*Most Outstanding BS Applied Physics Graduate*  
Selnalyn Ledesma (cum laude)

*Best Thesis (BS Physics)*  
Bhazel Anne Rara

*Best Thesis (BS Applied Physics)*  
Godofredo Bautista Jr

The following are recipients of the 2004 Gawad Chanselor:

Caesar Saloma  
*Hall of Fame, Gawad Chanselor*  
*Pinakamahusay na Nilathalang Pananaliksik (Science and Technology Cluster)*

C Saloma, GJ Perez, G Tapang, M Lim, and C Palmes-Saloma, "Self-organized queuing and scale-free behavior in real escape panic," Proc Nat Acad Sci USA 100, pp. 11947- 11952 (2003)  
*Pinakamahusay na Nilathalang Pananaliksik (Science and Technology Cluster)*

Caesar Saloma, Gay Jane Perez, May Lim and Giovanni Tapang together with Cynthia Palmes-Saloma (NIMBB, UP Diliman) won the first CHED Republica Award for their work on the dynamics of real escape panic using mice that were escaping from a water pool. Their research was published in the Proceedings of the National Academy of Science USA in October 2003.

Their research findings were reported in *The New Scientist*, *Nature Science News Update*, *Wired* magazine and *Spektrum der Wissenschaft*.

## **F. Extension Efforts & Alumni Relations**

The *pro bono* services of NIP scientists have been vital to the proper functioning of the *Samahang Pisika ng Pilipinas*. Dr Cristine Villagonzalo assumed the position of SPP Secretary-General on 1 January 2005 succeeding Dr Marisciell Litong-Palima who served for two years. Dr Maricor Soriano prematurely assumed the presidency of SPP after the untimely resignation of Dr Marlon Rosendo Daza. Professor Zenaida Domingo continued to chair (term: one year) of the Division IX (Physics) of the National Research Council of the Philippines in 2004.

The Philippine Foundation for Physics, Inc. (PFPI) has continued the following fund raising activities for NIP: 1) Sale of textbooks for the Physics 71 course series, and 2) Sale of laboratory manuals for Physics 71.1, 72.1, and 73.1. The PFPI is a non-stock non-profit foundation that was established more than five years ago by NIP alumni to promote the interest and well-being of their *alma mater*. Financial assistance (PhP 3,000 per person) was given by PFPI to NIP non-academic personnel in 2004. The Intel Scholarship program for NIP students has been handled by the PFPI since its inception.

In 2004, the PFPI also started giving research grants to two deserving assistant professors of NIP. The grants are worth PhP 30,000 each. The NIP Executive Council has agreed that only assistant professors qualify for the said research grants.

The NIP is also providing space for the UP Physics Association (UPPA) which is a duly-recognized academic organization that is composed mostly of undergraduate physics students of UPD. The UPPA held the following activities in 2004: 1) Physics Week (January), UPPAgibig (February), 3) Freshman Orientation Program (June), 4) CHAOS & Bingo (September), and 5) Lantern Parade (December).

## **G. Prospects for 2005**

The NIP needs to sustain if not surpass, the improvements that were achieved in research, physics instruction and extension services in 2004. The fulfillment of our dream to make the NIP into one of the best school of physics in the ASEAN, strongly depends on the ability of its graduate programs to produce technically competent graduates who can compete on a globally.

The NIP hopes to produce more BS graduates and to continue attracting young graduate students into its MS and PhD degree programs. The NIP will closely coordinate with PCASTRD for the award of more local graduate scholarships and enable most graduate students to pursue their studies on a full-time basis.

Lectures in the BS programs, teaching laboratories at all levels and Physics 10 classes will be held in the Research Wing in the future NIP Building at the start of SY 2005-2006 in June 2005. The NIP hopes to increase the number of Physics 10 sections to at least six to address student demand. A classroom will be solely devoted to Physics 10 lectures. In SY 2005-2006, the NIP plans to double the number of laboratory sections that will be offered in the Physics 7X.1 series. Due to security concerns, graduate classes which are offered only after 4 pm are expected to be held at the old NIP site.

Phase IV will be implemented to complete the Lecture Hall and therefore allow the holding of all lecture classes in the Physics 7X series in the future NIP Building. The NIP expects to secure funds to complete the Administration and Faculty Wings under Phase V. The estimated cost of Phase V including site development is about PhP95M.

New research grants from the Philippine Foundation for Physics, Inc are expected to be available in 2003. The aim of these grants is to encourage our non-tenured PhD faculty members to engage in externally-funded research.

In 2004, the NIP aims to increase the amount of research funds that is contributed by the (non-traditional) private sector including foreign organizations and agencies. The objective is achieved if NIP can package research proposals that are consistent with the specific objectives of these funding agencies.

5 July 2005

## **Chapter II. Report of the Deputy Director for Academic Affairs**

*by Dr Ronald Banzon*

### 2.1 Curricular Proposals

The proposed revision of the Applied Physics (Instrumentation Physics) curriculum was endorsed by the College on Wednesday, 10 November 2004, during the 75th Meeting of the College Assembly.

Details of the proposal may be found in the previous annual report. Minor modifications were to be introduced prior to its consideration by the Cluster Committee in preparation for its presentation to the University Council.

### 2.2 Developments in the Implementation of Undergraduate Programs

#### 2.2.1 Recitation/Problem Solving Sessions for Physics 10X

The Institute did not implement separate recitation sessions for Physics 101, 102, 103, 104, and 105. The motivation for its introduction, to familiarize students with problem solving techniques, has been incorporated into the single-instructor courses with the understanding that problem solving sessions will be conducted.

#### 2.2.2 Retention Rules

As indicated in the previous year, the Secretary's Office of the College of Science still does not have a convenient way of applying the retention rules to students in undergraduate programs of the Institute. The computerization of student records at the College is still ongoing. As with the previous year, the advisers determine and report students who do not meet the requirements for retention.

#### 2.2.3 Applied Physics 195/195A

The Institute entered its fourth year of offering the courses Applied Physics 195 (Special Topics in Applied Physics: Modern Control Systems), and Applied Physics 195A (Special Topics in Applied Physics: Modern Control System II), as substitutes for EEE 101(Control Systems Theory) and ECE 123 (Digital Instrumentation & Control Techniques) respectively.

The Institute intends to continue offering the course until a curricular proposal that eliminates the need for EEE courses in the B. S. Applied Physics (Instrumentation Physics) curriculum is approved. The Institute anticipates its approval by the University Council in the first half of 2005.

#### 2.2.4 Late Undergraduate Thesis Advising for Students

As a response to the increasing number of advanced undergraduate students without a thesis adviser, the Institute started a program that seeks to assign students of Fourth-year standing and beyond to appropriate faculty members for thesis advising. The program is now in its third year.

A minimum of fourth-year standing as a student of a NIP-sponsored program who is not attached to a research adviser may request the Institute to assign one for himself/herself. The letter will be addressed to the Deputy Director for Academic Affairs containing the student's research interest(s) and a list of suggested thesis advisers. The letter of application will include as attachment a comprehensive True Copy of Grades (TCG). The applications are evaluated at the start of the First Semester.

Five (5) applications were received this year. Two (2) were assigned to Dr. Wilson Garcia, one (1) each to Dr. Roy Tumlos, Mr. Herbert Domingo, and Dr. Caesar Palisoc. Unfortunately, the assigned student to Dr. Palisoc refused to shift from B.S. Applied Physics to B.S. Physics, and was subsequently left with no research adviser at the moment. The student was advised to seek one before another attempt at an assignment is made.

### 2.3 Undergraduate Thesis

The undergraduate thesis presentation continues to follow the format of the past four years – a twenty-minute open forum and examination, and then a ten-minute deliberation of the panel members follows the thirty-minute presentation.

As much as possible, faculty members were not assigned consecutive presentations to avoid delays in the schedule. This was a compromise from the suggestion of introducing a short break between presentations, which would have required an extended schedule.

A total of forty-two (42) presentations were made during the year. An increase of thirteen (13) presentations from that of the previous year, an increase of nineteen (19) presentations from two years earlier, and an increase of twenty-four (24) presentations from three years earlier.

The increase in the number of undergraduate thesis presentations stretched the amount of time that faculty members spent for the same in previous years. It certainly increased the amount of resources, personnel and materials, utilized by Institute. The continuously increasing trend is in its fourth straight year.

The table below (Table 1) summarizes the number of undergraduate theses presented during the year and that of the previous years enclosed in parentheses.

Table 1: Number of Undergraduate Thesis Presentations in 2004 and (2003:2002:2001)

Degree Course	Second Semester	Summer	First Semester	Total
BS Physics (13:10:03)	19 (04:04:02)	3 (06:03:01)	4 (03:03:00)	26
BS Applied Physics (16:13:15)	12 (11:11:10)	2 (04:01:00)	2 (01:01:05)	16

Following were the presentations made during the academic year.

### Second Semester 2003-2004

The Undergraduate Thesis Presentations were held on Wednesday, 22 March to Friday, 26 March 2004 at the NIP AVR. Following was the schedule of presentations.

Day 1: Monday, 22 March 2004

09:00 AM

Babang, Bernulf B. (BS Physics)

"Vlasov-Poisson Approach to One-dimensional System Inspired by the Gravitational Suppression Hypothesis (GraS)"

Adviser: Dr. Jose Perico Esguerra

Panel: Dr. Tumlos, Dr. Marisciel Palima

10:00 AM

Bautista, Godofredo Jr. S. (BS Applied Physics)

"Three-dimensional Biological Imaging using a Laser Scanning Confocal Fluorescence Microscope"

Adviser: Dr. Caesar Saloma

Co-adviser: Dr. Carlo Mar Y. Blanca

Panel: Dr. Cynthia Saloma, Mr. Percival Almoró

11:00 AM

Calamba, Aristotle (BS Physics)

"Exact and Approximate Analytical Results for Some Systems Exhibiting Nonlinear Wave Propagation"

Adviser: Dr. Jose Perico Esguerra

Panel: Dr. Ronald Banzon, Mr. Erwin Navarro

01:00 PM

David, John Christian (BS Applied Physics)

"Numerical Analysis of Stimulated Raman Scattering Enhancements using an Optical Waveguide"

Adviser: Dr. Caesar Saloma

Co-adviser: Dr. Carlo Mar Blanca

Panel: Dr. Wilson Garcia, Mr. Carlo Alonzo

02:00 PM

Dimamay, Mariel Grace S. (BS Applied Physics)

"Modeling of the Emission Spectrum of Oxide Confined p-i-n Resonant Cavity Enhanced Light Emitting Diode"

Adviser: Dr. Arnel A. Salvador

Panel: Mr. Percival Almoró, Mr. Nathaniel Hermosa

03:00 PM

Dorilag, Raphael B. (BS Physics)

"Two-dimensional Electron Gas Density and Mobility in a Pseudomorphic Modulation-doped AlGaAs/InGaAs/GaAs Heterostructure"

Adviser: Dr. Arnel A. Salvador

Panel: Dr. Jose Perico H. Esguerra, Dr. Marisciel Palima

Day 2: Tuesday, 23 March 2004

09:00 AM

Guto, Kristel (BS Applied Physics)

"Real-time Holographic Interferometry in Methyl Red Doped Nematic Liquid Crystals"

Adviser: Mr. Nathaniel Hermosa II

Panel: Dr. Maricor Soriano, Mr. Percival Almoró

10:00 AM

Hintay, Charlene T. (BS Physics)

"Fabrication of Optical Devices Based on Liquid Phase Epitaxial Grown Structures"

Adviser: Dr. Arnel Salvador

Panel: Dr. Cristine Villagonzalo, Dr. Henry Ramos

11:00 AM

Lazarte, Jeni Rose S. (BS Applied Physics)

"Effect of Wall Material on Plasma Parameters in a Plasma Sputter-Type Ion Source (PSTIS)"

Adviser: Dr. Henry J. Ramos

Panel: Dr. Perico Esguerra, Dr. Lorenzo Chan

01:00 PM

Ledesma, Selnalyn Corrales (BS Applied Physics)

"Multi-color Three-dimensional Microscopy with Digital Holography"

Adviser: Mr. Percival Almoró

Panel: Dr. Maricor Soriano, Dr. Marisciel Palima

02:00 PM

Mallari, Astra Kristina B. (BS Applied Physics)

"Color Appearance of Textured Surfaces"

Adviser: Dr. Maricor Soriano

Co-adviser: Dr. Caesar A. Saloma

Panel: Dr. Carlo Mar Blanca, Mr. Carlo Alonzo

03:00 PM

Manasan, Gabriel G. (BS Physics)

"Fabrication and characterization of InGaAs edge-emitting lasers"

Adviser: Dr. Arnel Salvador

Panel: Mr. Carlo Alonzo, Dr. Wilson Garcia

04:00 PM

Manding, Mark Gil M. (BS Physics)

"Perturbation Inspired Variational Technique and the Potential  $a x^2 + b x^4$ "

Adviser: Dr. Lorenzo Chan

Panel: Mr. Erwin Navarro, Dr. Eric Galapon

Day 3: Wednesday, 24 March 2004

09:00 AM

Marfil, Maria Ella Angela D. (BS Applied Physics)

"Dynamics of strategy-based competition"

Adviser: Dr. Caesar Saloma

Panel: Dr. May Lim, Dr. Luis Ma. Bo-ot

10:00 AM

Monasterial, Jonathan Lee (BS Applied Physics)

"Effects of Low energy Ion Beam Irradiation onto Narra (*Pterocarpus indicus*)\* Wood Surfaces"

Adviser: Dr. Henry J. Ramos

Panel: Dr. Arnel Salvador, Dr. Carlo Blanca

11:00 AM

Nombres, Chris C. (BS Physics)

"Population Dynamics in the Penna Model with Short Bit-Strings"

Adviser: Dr. Ronald S. Banzon

Panel: Dr. Caesar Saloma, Mr. Johnrob Bantang



01:00 PM

Olbinado, Margie P. (BS Physics)

"Behavior and Mechanism of AC Losses Intrinsic to MgB<sub>2</sub> in the Meissner State at Various Temperatures, AC Field Amplitudes and Frequencies"

Adviser: Dr. Roland V. Sarmago

Panel: Dr. Cristine Villagonzalo, Dr. Luis Ma. Bo-ot

02:00 PM

Pataleta, Florencio Jr. P. (BS Applied Physics)

"Raman Shifting of a Nd:YAG Laser in Methane Gas"

Adviser: Dr. Wilson O. Garcia

Co-adviser: Ms. Marilou Cadatal

Panel: Dr. Roland V. Sarmago, Dr. Roy Tumlos

03:00 PM

Pelicano, Alfie R. (BS Applied Physics)

"Investigating the Dynamics of a Chaotic Sprott Circuit"

Adviser: Dr. Jose Perico Esguerra

Panel: Mr. Erwin Navarro, Mr. Johnrob Bantang

Day 4: Thursday, 25 March 2004

09:00 AM

Ponce, Yvonne Dianne M. (BS Applied Physics)

"Enhancement Effects of Wall Material on Extracted H- Beam in a Plasma Sputter-Type Ion Source"

Adviser: Dr. Henry J. Ramos

Panel: Dr. Roy Tumlos, Mr. Nathaniel Hermosa

10:00 AM

Pulido, Maria Teresa R. (BS Physics)

"Investigation of Business Cycles Arising from Agent-Based Transactions"

Adviser: Dr. Caesar A. Saloma

Co-adviser: Dr. May T. Lim

Panel: Dr. Ronald S. Banzon, Dr. Marisciel Palima

11:00 AM

Rillera, Hannah P. (BS Physics)

"Growth of Y-doped Bi-2212 single crystal superconductor"

Adviser: Dr. Roland Sarmago

Panel: Dr. Roy Tumlos, Dr. Wilson Garcia

01:00 PM

Ronulo, Jonathan B. (BS Physics)

"Current Dependence of the Potential Barriers of Vortex Motion in Bi-2212 High-Temperature Superconductor"

Adviser: Dr. Roland V. Sarmago

Panel: Dr. Carlo Blanca, Dr. Luis Ma. Bo-ot

02:00 PM

Samson, Alfred J. (BS Physics)

"Current Confinement in an Optical Device Using AlAs Oxide"

Adviser: Dr. Arnel A. Salvador

Panel: Dr. Henry Ramos, Mr. Carlo Alonzo

03:00 PM

Senatin, Loujie G. (BS Physics)

"Encrypted optical data storage for identity verification using phase-code multiplexing in a LiNbO<sub>3</sub> crystal"

Adviser: Mr. Nathaniel Hermosa II

Co-adviser: Mr. Raphael Guerrero

Panel: Dr. Arnel Salvador, Dr. May Lim

Day 5: Friday, 26 March 2004

09:00 AM

Singidas, Bess G. (BS Physics)

"AC Losses in the Meissner State of YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7- $\delta$</sub>  Due to Intragrain Shielding and Intergrain Coupling"

Adviser: Dr. Roland V. Sarmago  
Panel: Dr. Luis Ma. Bo-ot, Dr. Ronald S. Banzon

10:00 AM  
Sioson, Remylou D. (BS Physics)  
"Synthesis of Bi-2212 single crystal via growth from the melt"  
Adviser: Dr. Roland V. Sarmago  
Panel: Dr. Henry Ramos, Dr. Arnel Salvador

11:00 AM  
Torralba, Maria Veronica S. (BS Physics)  
"Study of harmonic generation in coupled and uncoupled superconducting YBCO via AC harmonic susceptibility measurements"  
Adviser: Dr. Roland V. Sarmago  
Panel: Dr. Ronald Banzon, Dr. Cristine Villagonzalo

01:00 PM  
Torres, Maria Leilani Y. (BS Physics)  
"An Nd:YAG laser Pump Hydrogen Raman Shifter with a Capillary Waveguide"  
Adviser: Dr. Wilson O. Garcia  
Co-adviser: Ms. Marilou Cadatal  
Panel: Dr. Carlo Blanca, Dr. Roland Sarmago

02:00 PM  
Villanueva, Anthony D. (BS Physics)  
"Perturbation Inspired Variational Technique and the Double Well Potential"  
Adviser: Dr. Lorenzo Chan  
Panel: Dr. Eric Galapon, Dr. Caesar Palisoc

03:00 PM  
Zuniega, Cecile A. (BS Physics)  
"Autoresonance in Driven Relativistic Oscillator Systems"  
Adviser: Dr. Jose Perico Esguerra  
Panel: Mr. Erwin Navarro, Mr. Johnrob Bantang

Summer 2004  
The Undergraduate Thesis Presentations for Summer 2004 were held on Wednesday, 19 May 2004 at the NIP AVR. Following was the schedule of presentations.

1:00 PM Ferrer, Cherisse R. (BS Applied Physics)  
"Dynamics of Lane-Changing in Two-Lane Traffic"  
Adviser: Dr. Caesar A. Saloma  
Co-adviser: Dr. Marisciel Palima  
Panel: Dr. Luis Ma. S. Bo-ot, Dr. Cristine Villagonzalo

2:00 PM Angeles, Lesley Anne C. (BS Physics)  
"Determination of the Absorption Coefficient and Responsivity of an InGaAs/GaAs Quantum Well Device by Photocurrent Spectroscopy"  
Adviser: Dr. Arnel A. Salvador  
Panel: Dr. Caesar Saloma, Mr. Percival Almoró

3:00 PM Pineda, Prydex H. (BS Applied Physics)  
"Sterilization of Medical Instruments using Low Pressure Glow Discharge Plasma"  
Adviser: Dr. Henry J. Ramos  
Co-adviser: Dr. Ma. Auxilia T. Siringan (NSRI)  
Panel: Dr. Carlo Mar Blanca, Dr. Wilson Garcia

4:00 PM Villorente, Liza Marie M. (BS Physics)  
"Effect of the Addition of Cesium Vapor on Negative Hydrogen Ion Production on a Magnetized Sheet Plasma Negative Ion Source"  
Adviser: Dr. Henry J. Ramos  
Panel: Dr. Maricor Soriano, Mr. Carlo Alonzo

5:00 PM Zuniega, Cecile A. (BS Physics)  
"Numerical investigation of the special relativistic dynamics of driven nonlinear oscillators"  
Adviser: Dr. Jose Perico H. Esguerra  
Panel: Dr. May Lim, Mr. Erwin Navarro

First Semester 2004-2005

The undergraduate thesis presentations were held on Wednesday, 6 October 2004 at the NIP AVR. Following was the schedule of presentations:

09:00 AM Rochelle C. Coronel (BS Physics)  
"Vibrational Resonance in a Time-Fractional System"  
Adviser: Dr. Jose Perico Esguerra  
Panel: Mr. Herbert Domingo, Mr. Erwin Navarro

10:00 AM Ronaldo A. Marco Jr. (BS Physics)  
"Self-Consistent Simulations via Root Finding  
Method of Transport Properties of a Two Atom Molecular Device"  
Advisers: Dr. Cristine DLR. Villagonzalo, Dr. Ronald S. Banzon  
Panel: Mr. Marko Arciaga, Mr. Dranreb Earl Juanico

11:00 AM Rommel R. Miranda (BS Applied Physics)  
"A Study on the Effect of Extraction and Focusing of Nitrogen Ion Beam in a Low Energy Gas Discharge Ion Source for Nitridation Purposes"  
Adviser: Dr. Henry J. Ramos  
Panel: Mr. Nathaniel Hermosa, Ms. Wilma Oblefias

01:00 PM Eric Bryan R. Obias (BS Physics)  
"Parallel Tempering Monte Carlo Simulations of a Verdier-Stockmayer Polymer"  
Adviser: Dr. Ronald S. Banzon  
Panel: Dr. Jose Perico Esguerra, Mr. Johnrob Y. Bantang

02:00 PM Ryan Sandagon (BS Applied Physics)  
"2D Time-Independent Quantum Well Systems: A Variational Monte Carlo Study"  
Advisers: Dr. Ronald Banzon, Dr. Cristine Villagonzalo  
Panel: Mr. Carlo Alonzo, Mr. Serafin Delica

03:00 PM Gina Rose Tongco (BS Physics)  
"Monte Carlo Studies of Low Dimensional Magnetic Systems"  
Adviser: Dr. Cristine Villagonzalo  
Panel: Dr. Ronald Banzon, Mr. Vernon Julius Cemine

## 2.4 Undergraduate Program Student Profile

After three consecutive years of having the largest undergraduate student population in the College of Science, the Institute relinquishes the distinction for the current academic year, but is a close second-third. Data from the Secretary's Office of the College indicates that the total number of undergraduate students for the combined undergraduate programs of the NIP is 278 for the first semester, and 260 for the second semester for AY 2004-2005.

Table 2 shows the distribution of students by year of admission during the First Semester, while Table 3 shows the same for the Second Semester AY 2004-2005 and for AY 2003- 2004 enclosed in parentheses.

Table 2: Total Enrolment - First Semester AY 2004-2005 & [2003-2004]

Course	1st	2nd	3rd	4th	5th	6th	7-9th	Total
BS Applied Physics	34[36]	28[47]	27[27]	19[15]	12[22]	9[8]	7[4]	136[159]
BS Physics	29[50]	39[41]	20[28]	19[18]	18[21]	10[7]	7[8]	142[174]
Total	63[86]	67[88]	47[55]	38[33]	30[43]	19[15]	14[12]	278[333]

Table 3: Total Enrolment - Second Semester AY 2004-2005 & (2003-2004)

Course	1st	2nd	3rd	4th	5th	6th	7-9th	Total
BS Applied Physics	30[33]	28[48]	27[28]	19[13]	12[21]	6[7]	5[1]	127[151]
BS Physics	27[50]	38[37]	18[25]	21[20]	17[22]	6[8]	6[7]	133[169]
Total	57[83]	66[85]	45[53]	40[33]	29[43]	12[15]	11[8]	260[320]

The total number of third year standing students (3rd and 4th year by year of admission) continues to be large, such that the offering of a large class size for third year level courses continues. As reported in the previous years, this sustained number of students beyond the third year strains the available resources for instruction, especially those with a laboratory component.

This is the fifth year in a row that the sum of third and fourth year students exceeded eighty (80).

Tables 4 shows extracted data from reports of the Secretary's Office of the College of Science, indicating the number of freshmen and graduates for the academic year over the past few years. The numbers of graduates are enclosed in brackets.

Table 4: Total Freshman Enrolment for the First Semester and Number of Graduates for the Academic Years Starting 1998-2003

Course	98-99	99-00	00-01	01-02	02-03	03-04
BS Applied Physics	67[7]	69[6]	41[17]	45[15]	36[12]	36[15]
BS Physics	67[9]	60[0]	42[05]	53[04]	50[11]	50[25]
Total	134[16]	129[6]	83[22]	98[19]	86[23]	86[40]

As noted in previous reports, the increased number of students retained beyond the third year leads us to expect a larger number of graduates. The recently concluded academic year yielded the largest number of graduates ever.

## 2.5 Service Courses

### 2.5.1 Textbooks

The laboratory manuals for Physics 7x.1 continues to be modified under the supervision of Dr. Maricor Soriano.

After much consideration by the committee assigned to evaluate for the appropriate main reference text for the Physics 7x courses, the committee chose University Physics with modern physics 11th ed. by Young and Freedman for adoption at the start of the First Semester of 2004-2005.

### 2.5.2 Physics 7x and 7x.1

The program to monitor the passing rate of traditional service courses of the Institute, with a target of about seventy-five percent (75%) of the total number of initial enrollees, is now in its fourth academic year.

A summary of data reported by Dr. Percival Almoro, chair of the General Physics Committee (GPC), for the student performance in Physics 7x courses is shown in Tables 5 and 6. The laboratory courses Physics 7x.1 consistently had a passing rate of over ninety-five percent (95%) and was subsequently dropped from the monitored list.

Table 5: Student Performance Second Semester 2003-2004 and [2002-2003]

Course	# of Students	Pass	Fail	"4.0"	Drop	INC	Percent Passed
Physics 71	541[609]	485	25[66]	21[47]	7[na]	03[0]	89.6[78]
Physics 72	517[526]	405	42[79]	55[64]	4[na]	11[0]	77.7[74]
Physics 73	312[305]	221	59[6]	31[8]	0[na]	01[0]	70.9[95]
Total	1370[1440]						

Table 6: Student Performance First Semester 2004-2005 and [2003-2004]

Course	# of Students	Pass	Fail	"4.0"	Drop	INC	Percent Passed
Physics 71	573[606]	510[402]	27[101]	28[94]	5[na]	3[0]	90.2[67]
Physics 72	469[427]	361[299]	53[70]	43[55]	8[na]	4[3]	79.6[72]
Physics 73	230[222]	162[68]	34[41]	34[27]	0[na]	0[0]	70.5[47]
Total	1272[1255]						

The target passing-rate of at least 75% was achieved for Physics 71 and Physics 72. The last course of the series, Physics 73, is also not too far from the target. These target passing rates have been achieved with relative success in the past three consecutive years. The notable exception was Physics 73 for the First Semester 2003-04, for which the low passing rate was attributed to inexperience of the course group at that time - all of them were teaching the course for the first time, except for one.

### 2.5.3 Physics 103 and Physics 104 for College of Engineering Students

As suggested in last year's report, the Institute requested for the utilization of rooms in the EEE department for sections of Physics 103 and Physics 104 reserved for engineering students. The positive response to the request enabled the Institute to utilize its resources in an optimal manner. The two (2) sections that we usually offer engineering students were also reduced in size to fifty (50) slots, instead of the one hundred (100) slots that became customary.

### 2.6 Registration

The College of Science still utilizes its faculty for enlistment. It is hoped that this activity, and those associated with it, will cease from being part of the regular workload of the faculty of the College of Science.

### **Chapter III. Report of the Deputy Director for Research and Extension**

Contributed Dr Arnel Salvador

A total of 19 articles done by NIP researchers were published on ISI journals for the year 2005. Among these articles the NIP was able to publish in high impact journals such as Physical Review Letters and Applied Physics Letters. It is also encouraging to note that there has been a corresponding increase in the number of authors, particularly graduate students, who have not published before. This gives a semblance of how well the NIP is nurturing the culture of research in its graduate school.

The NIP, while maintaining strong ties with government institutions for its traditional sources of funds, continued to search and tap the private sector for externally funded grants and collaborative research projects. This year we had three completed and ongoing research projects with Intel and talks were explored for grants with PLDT and Nokia. Scholarship support to four graduate students was also provided by Intel Philippines.

A crucial issue in obtaining these grants is the implementation of the University's policies on Intellectual Property (IP) Rights. At the moment contracts are being reviewed and rewritten to comply with these policies and at the same time also acceptable to the grantee's position on IP. As expected this has caused some delays of projects in the latter half of the year since there is no precedent contract between NIP and the private sector which can serve as a template for contracts consistent with the University's new position on IP. It is expected though that once the details have been ironed out the other grants can readily be implemented.

The NIP continued to have the strong support from the PCASTRD/DOST. Three Institutional Development Grants, totaling Php 7 M were awarded to NIP to enable it to upgrade its research facilities. The grants will enable NIP to acquire the following equipment:

- a) an EDX attachment to the Institute's SEM
- b) an attachment to the Streak camera to allow for single pulse data acquisition
- c) several optical accessories to keep operational the Nd-YAG laser
- d) an Optical Phase Modulator set up, and
- e) a fiber optic cleaving facility

In addition to the Institutional Development Grants, NIP researchers were also able to obtain contracted research grants.

The Office of the Vice Chancellor for Research also continues to be another source of contracted research for NIP, particularly for the junior faculty .Equally important is that our University Research Associates also now have access to these grants that will allow them to pursue their own research projects.

## **Chapter IV. Report of the Deputy Director for Facilities and Resources**

Contributed Dr Luis Maria Bo-ot

As 2004 opened, the Phase 2 of the Research Wing of the NIP Building along C.P.Garcia St. was finishing and was eventually turned-over on January 2004. With the approval earlier of an additional budget of P 40M, work on the NIP building was then scheduled to continue as Phase 3.

Phase 3 finishes fully all the architectural works of the four floors of the Research Wing which has a total area of over 7500 sq.ms. After reviewing the space requirements, the construction of Phase 3 formally commenced on April 2004 and was scheduled to last until the end of the year. During this time, the Dep. Director chaired the weekly meetings at the site to monitor the progress and give feedback to NIP. Phase 3 entered its finishing works by November and plans for its inauguration in early 2005 were started to be discussed.

In parallel with these, representation and requests were also made for the initial furniture, equipment and networking for the Research Wing, as well as fresh funds for a next phase (Phase 4) which would cover the lecture rooms and cafeteria for the NIP Building.

By September, the NIP was able to secure P 44.5M for Phase 4 and a total of P13M for the furniture, equipment and networking. The availability of funds prompted the start of the in-house manufacture of blackboards to be installed once Phase 3 is finished, an assessment of the airconditioning requirements for Phase 2 including the eventual start of procedures leading to bidding for the first batch of airconditioners, and the preparation of plans for the networking and Dilnet connection. The latter two mentioned above are planned for installation by February 2005 with the cost for the first batch of aircon units estimated at P2M and the networking estimated at P 952,750.00.

Among the furniture items purchased from the 13M outlay were student desks, a computer laptop, projection screens, a mimeo machine and garbage cans. Aside from blackboards, additional laboratory tables are being manufactured based on some special design requirements of the instructors of the laboratory classes. Some small sundries are also planned to be purchased to be used in the maintainance of the building, ie scaffolding and a circular saw.

The Dep. Director for Resources and Facilities also represented NIP during meetings of the CS Landscaping Committee. The NIP Building along C.P. Garcia St. would consult with the Committee regarding the landscaping of the grounds and source the plant seedlings through the Committee.

Last year, the NIP was also assigned by the College of Science to coordinate and spearhead the college lantern for the Annual Lantern Parade. The Dep. Director for Resources and Facilities worked closely with the UP Physics Association in preparation for the event.



Despite of the plans and activities for NIP Building along C.P. Garcia, the welfare and maintenance of the current NIP Building and Llamas Hall was not overlooked. The driveway was overlaid with a new coating of asphalt, anti-termite measures were done in on some areas, new aircons were purchased to replace some old ones, etc. Since the C.P Garcia building will take a little more time to completely finish with informal projections for the concluding phases running into 2006, the current NIP will still continue to house some elements of the NIP operations. It is thus important that the current NIP location be kept in good working condition. In addition, NIP would like to leave the premises with due regard for its future use and users.

With the eventual transfer, occupancy and use of the NIP Building along C.P. Garcia in mind, the Dep. Director for Resources and Facilities started in late-2004 to hold informal conversations with the Coordinators of the NIP Research and Teaching Laboratories. As a matter of fact, some of those recommendations like aircon requirements are already included in Phase 3. As 2004 closed, the Dep. Director was already collecting information and organising them as inputs for the act of transferring NIP to its new home.

## Chapter V. Reports of Program Coordinators

### A. Plasma Physics Laboratory

by Dr Henry Ramos

7 December 2004

#### *Introduction.*

Plasma science and technology has over the past years been of major importance in the understanding and development of processes and materials for a wide range of industrial applications. The Plasma Physics Laboratory, National Institute of Physics, University of the Philippines in Diliman, Quezon City, pioneered the development of modest plasma devices in order to acquire skills and practical knowledge to better employ technologies based on plasma science. Three devices were upgraded from a previous program (from 1999-2003) supported by Department of Science and Technology and served as demonstration-of-principle plasma processing devices for industrial applications. These are: (a) plasma sputter-type negative ion source (PSTNIS); (b) sheet plasma negative ion source (SPNIS); and (c) plasma-enhanced chemical vapor deposition (PECVD) facility. These facilities have undergone modifications and upgrading for specific applications. For example, the PSTNIS facility has been designed as a source of gas and metal ions. It has been utilized for the synthesis of zirconium mononitride (ZrN) on metal substrates. On the other hand, the SPNIS facility has been used for the production of negative hydrogen ions ( $H^-$ ), and the synthesis of titanium nitride (TiN) on industrial tools. Diamond and diamond-like-carbon (DLC) films on silicon have been deposited using the PECVD device. The facility was modified for sterilization applications. Another facility, the gas discharge ion source (GDIS), made operational in 2003, served as test bed for ion transport studies and ion irradiation on organic polymers. While construction and testing of the ECR facility continued in 2004.

In 2004, innovative plasma process technologies developed with these devices were continued. Six project components were undertaken, namely:

- Project A. TiN coating and test of industrial tools
- Project B. Synthesis of hydrogenated amorphous silicon
- Project C. Development of PECVD facility for sterilization methods
- Project D. Production of low energy ions using a gas discharge source
- Project E. Beam focus, enhancement and transport in a sputter-type source

Project F. Construction and testing of ECR device

Highlights of research and development and accomplishments in these projects are detailed in Section B of this report.

Two papers were published in ISI-accredited journals during the year. Four other papers were presented in an international conference/symposium/workshop. Eight papers were presented in a local conference. Details are shown in Section C of this report.

Twelve students affiliated with the laboratory (one Ph.D., five M.S. and six B.S.) were

able to graduate with the completion of their dissertation/thesis requirements based on their research and development work done in the laboratory. They are listed in Section D.

### *Research and Development Highlights*

#### *Project A. TiN coating technology*

The process technology developed in this innovative work uses a magnetized sheet plasma to dissociate the required materials in the synthesis of TiN [Vacuum **65** (2002) 397]. The process is called plasma-enhanced chemical vapor deposition (PECVD). Excellent films exhibiting stoichiometric and non-stoichiometric TiN phases were synthesized on stainless steel samples. Actual industrial tools were then used as substrates using the best conditions of the TiN deposition process obtained with the preliminary runs on flat stainless steel samples. The developed process allowed for a thin layer of TiN to be diffused into the tool surface demonstrating the capacity of the magnetized sheet plasma source for the synthesis of TiN on industrial tools. Results are detailed in the paper by V. R. Noguera and H. J. Ramos titled “A magnetized sheet plasma source for the synthesis of TiN on industrial tools”, presented at the Joint 7<sup>th</sup> Asia Pacific Conference on Plasma Science and Technology and 17<sup>th</sup> Symposium on Plasma Science for Materials, June 29-July 2, 2004, Fukuoka, Japan.

#### *Project B. Synthesis of hydrogenated amorphous silicon*

The hydrogen ions produced, extracted and enhanced from the SPNIS were focused and energized through desired acceleration energies for irradiation of silicon to form amorphous silicon (a-Si:H). Under proper conditions of source parameters, both geometrical and discharge, the argon-seeded hydrogen plasma could deliver a relatively large flux of H<sup>-</sup> which is about 0.26 A/m<sup>2</sup> [Rev. Sci. Instrum. **71** (2000) 3689]. Low energy (< 100 eV) negative hydrogen (H<sup>-</sup>) ions with a current flux of 0.26 A/m<sup>2</sup> extracted from a magnetized sheet plasma source are used in the synthesis of a-Si:H films. The ions are transported to kinetic energies for adsorption by a silicon substrate. The Si substrate is coated with palladium film enhancing absorption of ions by five times thereby increasing the probability of chemical bonding between Si and ion. Surface morphologies from electron microscope scans reveal the distinctive differences of ion-irradiated samples and un-irradiated samples. Atomic microscope pictures further detail the differences. Fourier transform infrared (FTIR) spectroscopy comparative scans signify the presence of peaks in the fingerprint region 800-970 cm<sup>-1</sup> associated with the bending modes for SiH<sub>x</sub> for the irradiated samples. FTIR scans of the same samples also reveal weak intensity peaks from 2180-2250 cm<sup>-1</sup> corresponding to the signature SiH<sub>x</sub> stretching modes. It is shown that the peak intensities of the coupled dihydride symmetric and the asymmetric stretching vibrations depend on the H<sup>-</sup> ion flux and exposure time. Details of the work are presented in the M.S. Thesis of M. Fernandez. (See Section D).

#### *Project C. Development of PECVD facility for sterilization methods*

The PECVD facility is modified for sterilization applications. Radicals like atomic oxygen, the hydroxyl OH and charged particles directly affect outer membranes of biological cells such as microorganisms. Low pressure glow discharges of oxygen and hydrogen peroxide (3% concentration H<sub>2</sub>O<sub>2</sub>) produced these radicals and charged particles, and their effect on the

inactivation or destruction of *Bacillus subtilis* were investigated. Artificially contaminated 65 cm<sup>2</sup> Petri dishes with a pure culture of the microorganism were used to test the efficiency of the plasma treatment. Cell density of the spore suspension of a 24-hour nutrient agar containing the culture is estimated at  $1.5 \times 10^9$  cells/ml using standard plate count techniques. The effect of varied discharge conditions (450V and 500V), gas flow rate (20-60 sccm), sample temperature and exposure time (30-60 minutes) on the decimal reduction value (RDV), that is, the time required to inactivate or destroy 90% of the original population of microorganisms were determined.

Results indicate that for the H<sub>2</sub>O<sub>2</sub> plasma, at a discharge potential of 500V, the RDV is 11.83 minutes with a 99.6% destruction of microorganisms in 60 minutes. For oxygen plasma, the RDV is 10.57 minutes and 99.33% reduction in 60 minutes. The sample temperature in the H<sub>2</sub>O<sub>2</sub> plasma exposure reached a maximum of 109 °C in an hour, while that in the oxygen plasma peaked at 46 °C in less than an hour. These RDV, cycle time and temperature values are much better when compared to common sterilization methods like autoclave, dry heat and gas like ethylene oxide. Details are in the paper by P. H. Pineda, H. J. Ramos, and M. A. T. Siringan titled "Inactivation and destruction of *Bacillus subtilis* using a low pressure glow discharge plasma", presented during the 2<sup>nd</sup> International Workshop on Particle Beams and Plasma Interaction on Materials and the 2<sup>nd</sup> Asia Symposium on Ion and Plasma Surface Finishing, November 25-27, 2004, Chiang Mai, Thailand.

#### Project D. *Production of low energy ions using a gas discharge source*

The emittance, brightness and focusing characteristics of a low energy gas ion discharge are investigated. Hydrogen, helium and nitrogen ions are produced and investigated for their applications on ion treatment of organic polymer samples.

Mixed species positive hydrogen ion beams were successfully produced and extracted from a gas discharge ion source. The extracted beam has a maximum current density of 1.2 nA/mm<sup>2</sup> for a plasma discharge current of 1 mA and constant pressure of 1 mTorr. Mass analysis of the extracted beam indicates the presence of H<sup>+</sup> and H<sub>2</sub><sup>+</sup> ions with H<sup>+</sup> being the dominant species. Optimum combination of extraction and focusing potentials for the range of voltage bias used are 0 V for the extraction voltage and 300 V for the focusing voltage corresponding to a normalized beam emittance of 0.028 mm-mrad and normalized beam brightness of 0.099 mA/(mm-mrad)<sup>2</sup>. Further details are found in the M.S. Thesis of R. Awayan. (See Section D).

To study the hydrogen and helium ion beams generated in the gas discharge ion source, a cast steel magnetic sector mass analyzer was developed. The optimum induced magnetic flux density of 3500 G made it possible to scan the whole spectrum of hydrogen and helium ion species. Analysis of beam characteristics shows that the mass spectrometer sensitivity, and resolving power are approximately inversely proportional. The resolution is enhanced at higher pressures and lower current discharges. In contrast, the instrument sensitivity increased at higher current discharges and decreased at higher pressures. Calculations of the ultimate resolving power with reference to analyzer dimensions yield a numerical value of 30. System anomaly in the form of spherical aberrations was also analyzed using the paraxial beam envelope equation. Beam

divergence is most significant at high discharge conditions where angular spread reaches an upper limit of  $8.6^\circ$ . Details are found in the Ph. D. dissertation of G. Blantocas (Section D) and in the paper G. Blantocas, H. Ramos and M. Wada, , “Design and operational characteristics of a cast steel mass spectrometer”, Rev. Sci. Instrum. **75** (2004) 2848.

Narra (*Pterocarpus indicus*) wood chips were irradiated with positive hydrogen ions  $H^+$  and  $H_2^+$  to make them hydrophobic. The ions were produced and extracted from a gas discharge ion source. The extracted beam current ranges from 0.01 to  $0.07\mu A$  for discharge currents of 1.0 to 4.0 mA, discharge potential between 600 V to 1000 V. The chips, positioned at 70 mm downstream from the ion source, were processed for different time periods and discharge currents. The wettability was characterized by the contact angle of the liquid droplet with respect to the wood surface. Surface modifications were assessed with by measurements of the water contact angle. Tests indicate retarded absorption characteristics for ion-irradiated samples compared to controlled samples. The longest absorptive inhibition were exhibited by samples irradiated for 30 minutes, at discharge current of 1.0 mA, 720 eV ion energy and 0 V extraction potential. Scanning electron micrographs reveal the difference in morphologies of treated and untreated samples. The results prove that low energy beams of hydrogen from a gas discharge ion source are suitable in transforming surfaces of wood chips to be water resistant. Details are found in the paper by J. L. Monasterial, H. J. Ramos and G. Q. Blantocas, “Effect of Low Energy Ion Beam Irradiation on Wettability of Narra (*Pterocarpus indicus*) Wood Chips” presented at the 14<sup>th</sup> International Conference on Ion Beam Modification of Materials, September 5-10, 2004, Monterey, California, USA.

#### Project E. *Beam focus, enhancement and transport in a sputter-type source*

A sequence of accelerators and focusing techniques are employed in the extraction of gas/metal ions produced in a sputter-type ion source. Enhancement of ion yield is tried with noble gases as well as cesium and magnesium vapors. The extracted and highly focused beam is studied in terms of its transport properties specifically on techniques of how to deflect the beam by using a combination of electric and/or magnetic fields.

The effect of wall material on the production of  $H^-$  was investigated. The negative hydrogen ion yield of aluminum, copper and stainless steel were compared. Results show that the highest ion yield generated with aluminum at  $16.97\mu A/cm^2$  represented a 64% increase compared to only  $10.85\mu A/cm^2$  produced with stainless steel. This was obtained at initial gas filling pressure of 1.2 mTorr. The optimum  $H^-$  ion yield of  $20.72\mu A/cm^2$  obtained with aluminum, however, was with a pressure of 1.6 mTorr.

#### Project F. *Development of ECR facility*

The actual power of a 2.45 GHz/1.5 kW magnetron from a domestic microwave oven is obtained and correlated to the power delivered to the plasma chamber with the power absorbed by a dummy load. Calorimetric experiments indicate a relatively stable maximum power of 190 watts is delivered to a 2-liter water load continuously for over ten minutes. This power is enough

to maintain the plasma for the generation of multiply charged ions of the ECR device.

### 2004 Publications

#### a. ISI-accredited journals

1. H. J. Ramos and N. B. Valmoria, "Thin film deposition of ZrN using a magnetized sputter-type negative ion source", *Vacuum* **73** (2004) 549.
2. G. Q. Blantocas, H. J. Ramos and M. Wada, "Design and operational characteristics of a cast steel mass spectrometer", *Rev. Sci. Instrum.* **75** (2004) 2848.

#### b. International conference/symposium/workshop proceedings

1. Noguera, V. R. and Ramos, H. J., 2004, "A magnetized sheet plasma source for the synthesis of TiN on industrial tools", Abstracts of the Joint 7<sup>th</sup> Asia Pacific Conference on Plasma Science and Technology and 17<sup>th</sup> Symposium on Plasma Science for Materials, June 29-July 2, 2004, Fukuoka, Japan, page 493.
2. J. L. Monasterial, H. J. Ramos and G. Q. Blantocas, "Effect of low energy ion beam irradiation on wettability of narra (*Pterocarpus indicus*) wood chips", Abstracts of the 14<sup>th</sup> International Conference on Ion Beam Modification of Materials, September 5-10, 2004, Monterey, California, USA.
3. C. P. Patacsil, G. M. Malapit and H. J. Ramos, "Optical emission spectroscopy of low temperature plasma enhanced chemical vapor deposition (PECVD) of diamond and DLC films", Abstracts of the Joint International Toki Conference on Plasma Physics and Controlled Nuclear Fusion and 4<sup>th</sup> International Conference on Atomic and Molecular Data and Their Applications, October 5-8, 2000, Toki, Gifu, Japan, page 105.
4. P. H. Pineda, H. J. Ramos and M. A. T. Siringan, "Inactivation and destruction of *Bacillus subtilis* using a low pressure glow discharge plasma", Abstracts of the 2<sup>nd</sup> International Workshop on Particle Beams and Plasma Interaction on Materials and the 2<sup>nd</sup> Asia Symposium on Ion and Plasma Surface Finishing, November 25-27, 2004, Chiang Mai, Thailand, page 19.

#### c. Local conference proceedings

All entries refer to the Proceedings of the 22<sup>nd</sup> Samahang Pisika ng Pilipinas Physics Congress, Vol. 1, October 25-27, 2004, Tagbilaran, Bohol. (ISSN 1656-2666)

1. Y. D. M. Ponce, J. R. S. Lazarte and H. J. Ramos, "Effect of wall material on H<sup>-</sup> production in a plasma sputter-type ion source", page 65
2. L. M. M. Villoriente, V. R. Noguera and H. J. Ramos, "Effect of cesium seeding on the production of H<sup>-</sup> ions in a magnetized sheet plasma source", page 66
3. M. E. Arciaga, H. J. Ramos, T. Kasuya, A. G. Mendenilla and M. Wada, "Numerical calculation of the temperature distribution along a tungsten filament cathode to explain its breakage near the negative terminal", page 67.
4. L. M. D. Rosario and R. B. Tumlos, "Calorimetric measurements of the output power of 2.48 GHz commercial magnetron", page 86.
5. P. H. Pineda, H.J. Ramos and M. A. T. Siringan, "Destruction of *Bacillus subtilis* using a low pressure glow discharge plasma", page 106.
6. C. P. Patacsil, G. M. Malapit and H. J. Ramos, "Optical emission spectroscopy of low temperature CVD diamond", page 141.
7. Effect of H<sup>+</sup> and H<sub>2</sub><sup>+</sup> ion beam irradiation on wettability of narra (*Pterocarpus indicus*) wood chips", page 142.

8. V. R. Noguera, L. M. M. Villorente and H. J. Ramos, "Effect of magnesium on the negative hydrogen on production in magnetized sheet plasma source", page 143.

### *Manpower trained*

#### *Doctor of Philosophy in Physics*

Gene Q. Blantocas, "Development of a gas discharge compact ion shower source for low energy charged particle beam studies and its application as modifier of organic materials", Ph. D. Dissertation, University of the Philippines Diliman, Quezon City, October 2004.

#### *Master of Science in Physics*

1. Marko E. Arciaga, "Investigation on the emission and breakage characteristics of tungsten filament cathodes and initial demonstration of tantalum coaxial cathode as a promising novel electron emitter", M. S. Thesis, University of the Philippines Diliman, Quezon City, March 2004.
2. Rainier L. Awayan, "Extraction and emittance characteristics of positive hydrogen ions from a compact gas discharge ion source", M. S. Thesis, University of the Philippines Diliman, Quezon City, March 2004.
3. Marcedon S. Fernandez, "Formation of SiH<sub>x</sub> on silicon (100) using low energy negative hydrogen ions from a magnetized sheet plasma source", M. S. Thesis, University of the Philippines Diliman, Quezon City, March 2004.
4. Crismar P. Patacsil, "Optical emission spectroscopy of low temperature plasma enhanced CVD of diamond and DLC films", M. S. Thesis, University of the Philippines Diliman, Quezon City, May 2004.
5. Virginia R. Noguera, "Effects of magnesium on the H ion production in a magnetized sheet plasma source", M. S. Thesis, University of the Philippines Diliman, Quezon City, May 2004.

#### *Bachelor of Science in Physics/Applied Physics*

1. Jeni Rose S. Lazarte, "Effect of wall material on plasma parameters in a plasma sputter-type ion source", B. S. Thesis, University of the Philippines Diliman, Quezon City, March 2004.
2. Jonathan Lee C. Monasterial, "Effects of low energy ion beam irradiation onto narra (*Pterocarpus indicus*) wood surfaces", B. S. Thesis, University of the Philippines Diliman, Quezon City, March 2004.
3. Yvonne Dianne M. Ponce, "Effect of wall material on H production in a plasma sputter-type ion source", B. S. Thesis, University of the Philippines Diliman, Quezon City, March 2004.
4. Prydex H. Pineda, "Destruction of *Bacillus subtilis* cells using a low-pressure glow discharge plasma", B. S. Thesis, University of the Philippines Diliman, Quezon City, May 2004.
5. Liza Marie M. Villorente, "Effect of the addition of cesium vapor on negative hydrogen ion production on a magnetized sheet plasma negative ion source", B. S. Thesis, University of the Philippines Diliman, Quezon City, May 2004.
6. Rommel R. Miranda, "Extraction and focusing studies of nitrogen ions in a gas discharge ion source", B. S. Thesis, University of the Philippines Diliman, Quezon City, October 2004.

### *Research Grants*

H. J. Ramos, "Effect of cesium seeding in a magnetized sheet plasma negative ion source", UP Research Grant: Creative and Research Scholarship Fund, PhP 201,000.00 from July 1, 2003 to June 30, 2004.

## B. Structure and Dynamics Group

by Dr Cristine Villagonzalo

### Summary

#### 2004 Publications and Theses

1. Total number of publications
  - ISI publications: 0
  - Local conference proceedings: 12
2. Total number of completed undergraduate theses 5
3. Total number of completed master's theses 2

#### 2004 Graduates

1. Undergraduate 5
2. Graduate (Master of Science in Physics) 2

#### Personnel (20)

- |                        |    |
|------------------------|----|
| Ph.D. Faculty members  | 3  |
| Graduate students      | 4  |
| Undergraduate students | 12 |
| Adjunct member         | 1  |

### 2004 Publications

#### A. 2004 ISI Publications (0)

B. 2004 National Publications / National Conference Proceedings (12) Samahang Pisika ng Pilipinas (ISSN: 1656-2666, Vol. 1), 22<sup>nd</sup> SPP Physics Congress, Bohol Tropics, Tagbilaran City, Bohol, 25-27 October 2004.

M.D. Beech and R. Banzon, *Periodicity in a Penna Model*, p. 11

J. Dizon and C. Villagonzalo, *Thermal Conductivity in a One-Dimensional Superlattice*, p. 155

R. Gammag and C. Villagonzalo, *The Specific Heat of a 2DEG in a magnetic Field*, p. 154

R. Marco, R. Banzon and C. Villagonzalo, *Effect of the Hopping Parameter on the Current through a Two-Atom Molecular Wire*, p. 27

M. Morales and C. Villagonzalo, *Enhancement of Fe Magnetic Moments in Fe/Co(001) Multilayer*, p. 72

J. Muldera and C. Villagonzalo, *Thermal Efficiency of a Quasi-One-Dimensional Conductor*, p. 113

C. Nombres and R. Banzon, *Random Deaths and Chaos in a Penna Model*, p. 54

E. Obias and R. Banzon, *Tempering and Annealing in a Verdier-Stockmayer Polymer*, p. 32

R. Pariñas, C. Villagonzalo, *Pre-collision Dynamics of Short 1D Anharmonic Chains*, p. 118

R. Sandagon, R. Banzon and C. Villagonzalo, *Variational Monte Carlo of a 2D Quantum Well System*, p. 153

G.R. Tongco and C. Villagonzalo, *Dipolar Interaction in a 1-D Ising Ring*, p.31



### 2004 Theses

#### A. Undergraduate (5)

October 2004

Ronaldo A. Marco Jr. (B.S. Physics)

Thesis: *Self-Consistent Simulations via Root Finding Method of Transport Properties of a Two-Atom Molecular Device*

Advisers: Dr. R. Banzon and Dr. C. Villagonzalo

Eric Bryan R. Obias (B.S. Physics)

Thesis: *Parallel Tempering Monte Carlo Simulations of a Verdier-Stockmayer Polymer*

Adviser: Dr. R. Banzon

Ryan A. Sandagon (B.S. Applied Physics)

Thesis: *2D Time Independent Quantum Well Systems: A Variational Monte Carlo Study*

Adviser: Dr. R. Banzon and Dr. C. Villagonzalo

Gina Rose N. Tongco (B.S. Physics)

Thesis: *Monte Carlo Studied of Low Dimensional Magnetic Systems*

Adviser: Dr. C. Villagonzalo

### March 2004

Chris C. Nombres (B.S. Physics)

Thesis: *Population Dynamics in the Penna Model with Short Bit-Strings*

Adviser: Dr. R. Banzon

Graduate – M.S. In Physics

Marites J. Labora

Thesis: *Ab-initio Structural Investigation of Fe/V (001) Multilayers*

Adviser: Dr. C. Villagonzalo

Marienette B. Morales

Thesis: *Magnetization and Anisotropy of Fe/Co (001) Multilayers: A First-Principles Calculation*

Adviser: Dr. C. Villagonzalo

### Grants

#### NIP Funded Research Projects (2)

Ronald Banzon

*Periodicity in a Penna Model*

PHP 36,000.00 (Jan.-Dec. 2004)

Cristine Villagonzalo

Numerical calculation of the heat capacity of an electron gas as a function of temperature and magnetic field

PHP 36,000.00 (Jan.-Dec. 2004)

### Externally Funded Research Projects (3)

Louella Vasquez

Modelling of Thermoelectric Transport Properties of Carbon Nanotubes

PHP 30,000.00 (November 2004 – October 2005)

Office of the Vice Chancellor Research and Development Thesis Grant

OVCRD Grant 040418 TNSE

Cristine Villagonzalo

Modelling of Low Dimensional Magnetic Spin Systems

PHP 122,000.00 (December 1, 2004 – November 30, 2005)

U.P. System Creative and Research Scholarship Fund

Cristine Villagonzalo

Investigation on the Structural Relaxation of Magnetic Multilayers in the Presence of Intermixing and Impurities

PHP 24,000.00 (January 1, 2004 – December 31, 2004)

Diamond Jubilee Faculty Grant, U.P.

#### Financial support to attend a workshop (2)

Louella Vasquez

Poster with C. Villagonzalo: Diffusive Thermoelectric Transport in Carbon Nanotubes

Ruhuna International School on Computational and Mathematical Physics

Euro 600.00 and accommodation (December 20 – 31, 2004, University of Ruhuna, Sri Lanka)

Sponsor: CIMPA – International Center for Pure and Applied Mathematics (Nice, France)

Marienette Morales

Poster with C. Villagonzalo: Enhancement of Fe magnetic moments in Fe/Co(001) multilayers

Ruhuna International School on Computational and Mathematical Physics

Euro 500.00 and accommodation (December 20 – 31, 2004, University of Ruhuna, Sri Lanka)

Sponsor: CIMPA – International Center for Pure and Applied Mathematics (Nice, France)

## C. Theory

by Dr Jose Perico Esguerra

### *Papers Published in ISI Journals*

1. B.A. Kniel, C.P. Palisoc, and L. Zwirner, 'Associated Production of Bottomonia and Higgs Bosons at Hadron Colliders', Phys. Rev. D 69, 115005 (2004)
2. E.A. Galapon, 'Shouldn't there be an Antithesis to Quantization?', J. Math. Phys. 45, 3180-3215 (2004)
3. E.A. Galapon, R.E. Caballar, R.T. Bahague, 'Confined Quantum Time of Arrivals', Phys. Rev. Lett. 93, 180406 (2004)
4. A.A. Morales, D.M. Yanga, S. Kurihara, 'Calculation of Entropy and Specific Heat in the Spin Polaron Formulation at Finite Temperature', J. Supercond. 17, 283-287 (2004)

### *Other non-ISI Publications (International and Domestic)*

None

### *International and Local Conference Papers*

Proceedings of the 22<sup>nd</sup> Samahang Pisika ng Pilipinas Physics Congress  
Tagbilaran City, Bohol 22-26 October 2004

1. L. Chan and A. Villanueva, 'A Variational Perturbation Theory', p. 20
2. C.P. Palisoc, 'MX' Distribution of J/y Inclusive Production in ep Deep-Inelastic Scattering at DESY HERA', p. 19
3. G.M. Sardane and J.P. Esguerra, 'New Continuum Approximations to Random Walks with Fixed and Shrinking Steps', p.34
4. E.S.G. Agra and J.P. Esguerra, 'Dynamics of Coupled Fractional Oscillators in a Ring', p.71
5. R. Coronel and J.P. Esguerra, 'Vibrational Resonance in a Time-Fractional System' p.116

### *Grants*

1. Title of Project: Associated Production of Charmonia and Photons in ep Scattering  
Project Leader: Dr. Caesar Palisoc  
Source of Funding: Creative and Research Scholarship Fund of the Office of the Vice President for Academic Affairs  
Amount: PhP 122,000  
Date: 15 July 2004 to 14 July 2005

## **D. Instrumentation Physics Group**

*by Dr Carlo Mar Blanca*

This Annual Report covers the time period when I served as coordinator of the Instrumentation Physics Laboratory (IPL) from January 2004 to December 2004. The Instrumentation Physics Laboratory (IPL) is a research group based in the National Institute of Physics (NIP), University of the Philippines, Diliman. It is currently managed by one Professor (Dr. Caesar Saloma) and a staff of 6 assistant Professors. Fourteen graduate (6 PhD, 8 MS) and 23 undergraduate students are currently working on their theses using the IPL facilities.

The research interests of the group can be classified into the following categories, now headed by staff members:

COMPLEX SYSTEMS – Dr. Caesar Saloma and Mr. Johnrob Bantang  
LASER MICROSCOPY and WIRELESS TECHNOLOGY – Dr. Carlo Mar Y. Blanca  
THEORETICAL OPTICS – Dr. Giovanni Tapang  
OPTICAL MANIPULATION – Dr. Vincetn Daria  
COLOR VISION and PATTERN RECOGNITION – Dr. Maricor Soriano  
PSYCHOPHYSICS – Dr. Marisciell Palima

Concentrating on these areas, 80 refereed articles to date have been published in journals cited in the Science Citation Index all stemming from research done within the facilities of the IPL. In the year 2004 alone, 7 international papers have been published in ISI journals. This is a testament to the competence of locally-trained researchers seeking to solve issues relevant on an international scale.

The IPL has also participated in the Physics Congress of the Samahang Pisika ng Pilipinas last October 2004 in Tagbilaran, Bohol, fielding in 29 papers and 3 plenary talks. The conference has provided a rigorous training ground for young researchers with most of the papers presented by undergraduate and graduate students.

In accordance with the aim to train researchers who can compete on an international level, a workshop was organized in San Mateo, Rizal last August 2004. The workshop focused on refining the research structure of the laboratory by empowering the staff members to form and lead their respective research groups. The return of Dr. Giovanni Tapang and Dr. Vincent Daria from their post-doctoral studies further strengthened the research capabilities of the laboratory. The process of integration into the laboratory was discussed. The staff members then have a weekly brainstorming session with Dr. Caesar Saloma to update, reformulate strategies and forge collaborative efforts.

In line with promoting competitive research is the development of new scientific tools and equipment. This mandates the aggressive application for financial and equipments grants. Various funded projects from the OVCRD, OVPA, PCSTRD and NOKIA Finland are currently ongoing concentrating on Wireless Technology, Spectral imaging of semiconductors and the

development of optical techniques to image deep-site failures in integrated circuits. Collaborative efforts with INTEL Philippines to develop a spectral library for semiconductor defects, with the National Institute of Molecular Biology and Biotechnology to harness different sources of fluorescent dyes and with the Marine Science Institute are currently on the way.

### ***Personnel:***

As of August 2004, the recruitment of 7 undergraduate students has boosted the research workforce to 45 members (2 on postdoctoral research leave).

**Institute Director:** Dr. Caesar A Saloma

**Laboratory Coordinator:** Dr. Carlo Mar Y. Blanca

**Staff:** Dr. Maricor Soriano

Dr. Marisciel Palima

Dr. Giovanni Tapang

Dr. Vincent Daria

Mr. Johnrob Bantang

Eng. Berns Buenaobra (Research Assistant)

Dr. Christopher Monterola (on postdoc leave Germany)

Dr. May Lim (on postdoc leave USA)

PhD Student: (6)

MS Students: (8)

BS Students: (23)

### ***Research Highlights***

This section details the research publications in journals in the International Science Citation Index, conference proceedings and concluded theses.

#### International Refereed Publications

1. M Quito, C Monterola and C Saloma, "[Memory and a priori best strategy in complex adaptive systems](#)," Complexity 9, 41-46 (2004)
2. P Almoró, M Cadatal, Q Garcia, C Saloma, "[Pulsed full-color digital holography with hydrogen Raman shifter](#)," Applied Optics 43, 2267-2271 (2004)
3. M Soriano, A Araullo, and C Saloma, "[A Biometric from front-view gait video](#)," Pattern Recogn Lett 25/14, pp 1595-1602 (2004)
4. VJ Cemine, B Buenaobra, CM Blanca, and C Saloma, "[High contrast microscopy of semiconductor and metals sites in integrated circuits by detection of optical feedback](#)," Opt Lett 29, pp. 2479-2481 (2004).
5. C Saloma, W Obiefias, and M Soriano, "[Spectral microscopy of live luminescent samples](#)," in Nanophotonics: Integrating Photochemistry, Optics, and Nano/Bio Materials Studies, H Masuhara and S Kawata, editors (Elsevier BV, The Netherlands: 2004) Chapter 23, pp 377-394.
6. M. Litong-Palima, R Violanda and C Saloma, "[Voice tracking and spoken word recognition in the presence of other voices](#)," Physica D 199, pp. 400-406 (2004)
7. CA Alonzo, W Garcia and C Saloma, "[Generation of optical-beam induced current via two-color \(two-photon\) excitation](#)," Optics Communications (To be published).

#### **National Conference (22<sup>nd</sup> SPP Physics Congress, October 22-24, 2004 Bohol Tropics, Tagbilaran City, Bohol)**

1. B. Buenaobra, S.D. Separa, J.J. Escay, C. M. Blanca and C Saloma, "Project MAEROL: Microscope Access Everywhere - Remote Optics Laboratory", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).

2. E.C. Samson, C.M. Blanca and C. Saloma, "Near-IR Spectral Imaging of Semiconductor Absorption Sites in Integrated Circuits", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
3. SD Separa, CM Blanca and C Saloma, "Detecting Weak Interferograms by Noise Dithering", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
4. GS Bautista Jr., CM Blanca, C Saloma, "Two-photon Optical Beam-induced Current Microscopy of Light Emitting Diodes", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
5. VJ Cemine, B Buenaobra, CM Blanca and C Saloma, "Localization and imaging of integrated circuit defect using simple optical feedback detection", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
6. S. Delica, C.M. Blanca, B. Buenaobra and C. Saloma, "Enhancing the axial resolution of fluorescence microscopy using non-linear excitation", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
7. VM Sastine, VJ Cemine, CM Blanca and C Saloma, "High-resolution differential thermography of semiconductor edifices", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
8. JJ Escay, SD Separa, B Buenaobra, CM Blanca and C Saloma, "Remote image acquisition and control of a confocal microscope using a mobile handheld device", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
9. MJ Romero, CM Blanca, G Tapang and C Saloma, "Factor of 5 increase in the axial resolution of a confocal system using attosecond pulses", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
10. JR Dungao and CM Blanca, "Molecular discrimination using fluorescence recovery after photobleaching", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
11. AC Baclig and CM Blanca, "Analyzing molecular diffusion using detrended fluctuation analysis", Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
12. D.E. Juanico and C. Saloma, "Size-Distribution Scaling in Clusters of Allelomimetic Agents" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
13. J. Bantang and C. Saloma, "Elementary cellular automata growth model with interacting populations" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
14. S. Marcos, M. Soriano, C. Saloma, "Improved Image-based Coral Reef Component Classification" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
15. M. Go, M. Soriano, C. Saloma, "Recovery of Underwater Object Spectra from Colored Image" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
16. W.R. Oblefias, M.N. Soriano, C.A. Saloma, "Effect of Filter Arrangement in the Estimation Accuracy of an Imaging Spectrometer" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
17. G. P. Perez, M.T. Lim, C.A. Saloma, "Effects of clustering and *a priori* knowledge in panic dynamics" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
18. R.F. Pobre, C.A. Saloma, "Gradient and Scattering Forces on a Kerr nanosphere" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
19. M. Pastor, J. Bantang, and C. Saloma, "Numerical Method of Gravity-assisted Granular Mixing through a Pipe" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
20. J. A. F. Balista, A. P. Araullo, M. N. Soriano, C. A. Saloma, "Effect of Arm Positions on the Curve Spreads: Implications on the Database and New Application" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).

21. M. M. Osma, M. L. Palima, C. A. Saloma, "Why is stochastic resonance enhancement intrinsic in biological neurons?" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
22. A. P. Arullo, G. Tapang, C. Blanca, C. Saloma, "Particle Diffusion via Langevin and Monte Carlo Methods" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
23. J. Soriano, J. Bantang, and C. Saloma, "Queuing Dynamics in a System with Impatient Agents" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
24. M.J. Romero, E.C. Samson, M. Lim and C. Saloma, "A Physical Model of Observed  $\mu$ - Relations in Raindrop Size Distributions" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
25. E.T. Legara, M. Litong-Palima, C. Saloma, "Behavior of an Evolving Business Network in a Social Network" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
26. W.R. Oblefias, M.N. Soriano, C. Saloma, "SVD vs. PCA: Comparison of Performance in an Imaging Spectrometer" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
27. A.E. Paz, M. Soriano, C. Saloma, "Camera Sensitivity Measurements Without a Spectroradiometer" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
28. R.C. Batac, J.Y. Bantang, C. Saloma, "Cellular Automata Model of n-Slit Light Diffraction" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).
29. M.F. Bailon, A.B.Tarun, M.Soriano, C.A.Saloma, "Infrared Emission Spectral Imaging and its Application in Failure Analysis" , Proceedings of the 22nd National Physics Congress of the Samahang Pisika ng Pilipinas (SPP), Tagbilaran, Bohol (2004).

### **College of Science Recognition Program 2004**

Dranreb Earl Juanico      *Outstanding MS Graduate Student*  
 Godofredo Bautista      *Best Thesis in BS Applied Physics*

### **Completed MS Theses (March 2004)**

Vernon Julius R. Cemine, "Combined optical beam-induced current and confocal reflectance microscopy with a laser diode"

Serafin F. Delica, "Angular Scatter Microscopy"

Wilma R. Oblefias, "Localized and Time-Resolved Spectral Analysis of Fluorescent and Bioluminescent Samples"

Dranreb Earl Juanico, "Agent-based modeling of self-organized clustering in nature based on allelomimesis"

Stephen Daedalus E. Separa, "Noise Aided Detection of Weak Interferograms"

## **Completed BS Theses (March 2004)**

Bautista, Godofredo Jr. S., "Three-dimensional Biological Imaging using a Laser Scanning Confocal Fluorescence Microscope"

David, John Christian, "Numerical Analysis of Stimulated Raman Scattering Enhancements using an Optical Waveguide"

Mallari, Astra Kristina B., "Color Appearance of Textured Surfaces"

Marfil, Maria Ella Angela D., "Dynamics of strategy-based competition"

Pulido, Maria Teresa R., "Investigation of Business Cycles Arising from Agent-Based Transactions"



## E. Photonics Research

by *Dr Wilson Garcia*

**Faculty & Staff:** Percival Almoró, Nathaniel Hermosa II, Raphael Guerrero, Carlo Amadeo Alonzo, Marilou Cadatal, Jacque Lynn Gabayno, Ma. Adoracion Manuel, Ma. Leilani Torres, Rodelio Ibarreta

**Students:** Christine Manaois, Brian Maraña, Maria Vanessa Balois, Francesca Celine Catalan, Grace Manahan, Phoebe Gracielle Arevalo, Don Jacob Barrientos, Frances Joy Ebreo, Michelle Francisco, Michael Andrei Paguio, Lourdes Patricia Ramirez

### I. International and Local Publications

#### A. Generation of Laser Light by Stimulated Raman Scattering

1. M. Cadatal, M Torres, and W. Garcia  
Temporal Coherence Behavior of a Nd:YAG Pumped Waveguide Raman Shifter,  
22nd Samahang Pisika ng Pilipinas Physics Congress, Bohol Tropics Resort  
Tagbilaran City, Bohol 25 – 27 October 2004.
2. M. Torres, M. Cadatal and W. Garcia  
A Low Threshold Nd:YAG Laser Pumped Hydrogen Raman Shifter With Capillary  
Waveguide, 22nd Samahang Pisika ng Pilipinas Physics Congress, Bohol Tropics Resort  
Tagbilaran City, Bohol 25 – 27 October 2004.

#### B. Application of Laser Light Produced by Stimulated Raman Scattering

1. P. Almoró, M. Cadatal, W. Garcia, and C. Saloma  
Pulsed Full-Color Digital Holography with a Hydrogen Raman Shifter  
Applied Optics, 10 April 2004, Vol. 43, No. 11
2. F. Catalan, C. Alonzo, W. Garcia, and C. Saloma  
Axial Response of Blue LED's under Multiphoton Excitation  
22nd Samahang Pisika ng Pilipinas Physics Congress, Bohol Tropics Resort  
Tagbilaran City, Bohol 25 – 27 October 2004.

#### C. Holography

1. M. Balois and P. Almoró  
A Technique to Control Chromatic Dispersion of Full-Color Digital Hologram Reconstructions  
22nd Samahang Pisika ng Pilipinas Physics Congress, Bohol Tropics Resort  
Tagbilaran City, Bohol 25 – 27 October 2004.

#### D. Optical Fiber

1. J. Gabayno, C. Alonzo and W. Garcia  
Femtosecond Pulse Propagation in a Highly Nonlinear Photonic Crystal Fiber  
22nd Samahang Pisika ng Pilipinas Physics Congress, Bohol Tropics Resort  
Tagbilaran City, Bohol 25 – 27 October 2004.
2. B. Maraña, J. Gabayno, and W. Garcia

Broadband Continuum Generation in Single-Mode Optical Fiber  
22nd Samahang Pisika ng Pilipinas Physics Congress, Bohol Tropics Resort  
Tagbilaran City, Bohol 25 – 27 October 2004.

## E. Photorefractives

1. R. Guerrero  
Power law response of volume holographic pattern recognition to partial images  
Optics Communications, Volume 239, Issues 4-6, 15 September 2004, Pages 303-310
2. R. Guerrero  
Feature-specific Scale Free Response of Volume Holographic Pattern Recognition to Partial Input Images  
22nd Samahang Pisika ng Pilipinas Physics Congress, Bohol Tropics Resort  
Tagbilaran City, Bohol 25 – 27 October 2004.
3. R. Guerrero  
Generation of Holographic Animation Sequences Using an Elastomer Phase Mask  
22nd Samahang Pisika ng Pilipinas Physics Congress, Bohol Tropics Resort  
Tagbilaran City, Bohol 25 – 27 October 2004.

## F. Novel Beams

1. C. Manaois and N. Hermosa II  
Twin Optical Vortices from Laguerre-Gaussian Beam and Methyl red Doped Nematic Liquid Crystal Interaction  
22nd Samahang Pisika ng Pilipinas Physics Congress, Bohol Tropics Resort  
Tagbilaran City, Bohol 25 – 27 October 2004.

## G. Collaboration with other Research Groups

1. F. Recoletto Jr., E. Estacio, C. Alonzo, J. Mateo, A. Salvador  
Time Resolved Photoluminescence of a GaAs/AlGaAs RCE Structure  
22nd Samahang Pisika ng Pilipinas Physics Congress, Bohol Tropics Resort  
Tagbilaran City, Bohol 25 – 27 October 2004.

## II. Theses and Dissertations

### PhD Dissertation

1. P. Almoro, "Full Color Digital Holography," October 2004.

### MS Thesis

1. M. Cadatal, "Temporal coherence behavior of a 355/532 nm Nd:YAG pumped Hydrogen-filled waveguide Raman shifter," October 2004.

### BS Theses

1. K. Guto, "Grating Formation and Decay Dynamics in Methyl Red-Doped Nematic Liquid Crystals," March 2004.
2. S. Ledesma, "Multicolor Three-Dimensional Microscopy with Digital Holography," March 2004.

3. F. Pataleta, "Raman Shifting of A Nd:YAG Laser in Methane Gas," March 2004.
4. L. Senatin, "Encrypted Optical Data Storage for Identity Verification Using Phase-Code Multiplexing in Fe:LiNbO<sub>3</sub> Crystal," March 2004.
5. L. Torres, "An Nd:YAG laser Pumped Hydrogen Raman Shifter with Capillary Waveguide," March 2004.

### III. Conferences Attended

1. Percival Almoró  
 Technical paper presented: "Full-color holography,"  
 Winter College on Interferometry and Applications in Modern Physics  
 Abdus Salam International Center for Theoretical Physics, Trieste, Italy  
 February 2-13, 2004.
2. Raphael Guerrero  
 Conference on Fractals, Abdus Salam International Center for Theoretical Physics, Trieste, Italy  
 November 2004

### IV. Grants Received

1. Thesis Grant  
 Percival Almoró  
 Title: Full-Color Digital Holography                      Amount: PhP 60, 000.00  
 U.P. OVCRD    July 2004.
2. Thesis Grant  
 Marilou Cadatal  
 Title: Temporal Coherence Control of 355/532 nm Nd:YAG laser pumped Hydrogen Raman Shifter with  
 Capillary Waveguide  
 Amount: PhP 30, 000.00    U.P. OVCRD  
 April 2004 – March 2005
3. Thesis Grant  
 Jacquelyn Gabayno  
 Title: Generation of supercontinuum via femtosecond pulse propagation in a highly nonlinear photonic  
 crystal fiber  
 Amount: PhP 30, 000.00    U.P. OVCRD  
 June 1, 2004 – June 30, 2005

## **F. Condensed Matter**

by *Dr Roland Sarmago*

### **SUPERCONDUCTOR GROUP**

**Supervisor: Dr. Roland V. Sarmago**

#### **I. 2004 Publications**

##### **A. ISI Publications**

1) Low field AC susceptibility of YBCO: the frequency and field dependence of intra- and intergrain coupling losses in the absence of vortices

*Roland V Sarmago and Bess G Singidas, Supercond. Sci. Technol. 17 (2004) S578–S582*

2) Harmonic response of coupled and uncoupled granular YBCO

*Maria Veronica S Torralba and Roland V Sarmago, Supercond. Sci. Technol. 17 (2004) 1381–1388*

3) AC loss intrinsic to MgB<sub>2</sub> at low magnetic fields

*Roland V Sarmago and Margie P Olbinado, Supercond. Sci. Technol. 18 (2005) 307–310*

4) Synthesis of Pb-doped Bi-2223 from Pb-doped Bi-2212 via partial melting

*Marvin U. Herrera and Roland V. Sarmago, Ceramics International 30 (2004) 1611–1614*

##### **B. National Publications / National Conference Proceedings**

Samahang Pisika ng Pilipinas (ISSN: 1656-2666, Vol. 1)

22nd SPP Physics Congress, Bohol Tropics,

Tagbilaran City, Bohol, 25-27 October 2004.

1) Flux Creep Investigation in Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>8+x</sub> High-Temperature Superconductor

*G. R. Blanca, J. Ronulo, G. Dumlaog, and R. Sarmago*

2) Modeling the Intrinsic Loss Generation in High T<sub>c</sub> Superconductors at Low Applied AC Fields

*Roland Sarmago*

3) Analysis of the Frequency Dependence of the AC loss in MgB<sub>2</sub> Based on the Eddy Current Model

*M.P. Olbinado and R.V. Sarmago*

4) Influence of the Oxygen Content on the Superconducting Properties of Bulk Samples of YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7-x</sub> with 0.1 < x < 0.35

*L. C. Dazo and R. V. Sarmago*

5) Even harmonic generation of YBCO with Intergranular Coupling

*JPC Afalla, MVS Torralba and RV Sarmago*

6) Growth of Superconducting Bi-2212 Films by Sedimentation Deposition and Melt Texturing Method under Various Temperature Profiles

*R. L. C. Manahan and R. V. Sarmago*

7) Quantitative Investigation of Hysteresis Loss Peak Response in the Absence of Vortices

*M.B. Uy, B.G. Singidas, and R.V. Sarmago*

8) Absolute Value of the Intragranular Harmonic Susceptibility

*M. V. S. Torralba and R.V. Sarmago*

## **II. 2004 Theses**

### **A. Undergraduate Theses**

1) Behavior and Mechanism of AC Losses Intrinsic to  $\text{MgB}_2$  in the Meissner State

*Margie P. Olbinado*

2) Growth of Superconducting Y-doped Bi-2212 Single Crystal

*Hannah P. Rillera*

3) Flux Creep Investigation in  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$  High-Temperature Superconductor

*Jonathan Ronulo*

4) Synthesis of Superconducting Bi-2212 Single Crystal from Partial Melt and Recrystallization

*Remylou D. Sioson*

5) AC Losses in the Meissner State of the  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$  due to Intragrain Shielding and Intergrain Coupling

*Bess Singidas*

6) Harmonic Generation in the Absence of Vortices Obtained via Mutual Inductance Measurements on Coupled and Uncoupled Granular YBCO

*Maria Veronica Sibayan-Torralba*

## **III. List of 2004 Graduates**

### **A. BS Graduates (6)**

March 2004

*Margie Olbinado*

*Hannah Rillera*

*Jonathan Ronulo*

*Remylou Sioson*

*Bess Singidas, Cum Laude*

*Maria Veronica Sibayan-Torralba*

## **SEMICONDUCTOR GROUP**

### **Supervisor: Dr. Arnel Salvador**

#### **I. 2004 Publications**

##### **A. ISI Publications**

1. Time response characteristics of an oxide-confined GaAs/AlGaAs resonant cavity-enhanced photodetector  
*E. Estacio, C. Alonzo, A. Samson, A. Garcia, A. Somintac and A. Salvador.*  
Applied Physics Letters 85, Number 15, 11 October 2004
2. Raman Spectroscopy of in situ annealed InAs/GaAs quantum dots  
*M.J.M. de Luna, A. Somintac, E. Estacio, and A. Salvador*  
Journal of Applied Physics 96 pp 1267-1269 July 2004

##### **B. National Publications / National Conference Proceedings**

Samahang Pisika ng Pilipinas (ISSN: 1656-2666, Vol. 1)  
22nd SPP Physics Congress, Bohol Tropics,  
Tagbilaran City, Bohol, 25-27 October 2004.

1. Device Fabrication of 60- $\mu\text{m}$  Resonant Cavity Light Emitting Diode  
*J.J. Reyes, W. Bisquerra, R.V. Sarmago, and A. Salvador*
2. Time-resolved Photoluminescence of a GaAs/AlGaAs RCE structure  
*F. Recoleta, Jr. E. Estacio, C.A. Alonzo, J. Mateo and A. Salvador*
3. Time-response characteristics of a GaAs/AlGaAs Modulation-doped Schottky Photodetector  
*E. Estacio, C.A. Alonzo, A. Garcia, A. Somintac, and A. Salvador*
4. Modeling the Profile of an Oxide-Confined p-i-n Light-Emitting Diode  
*M.G. Dimamay, A. Samson, and A. Salvador*
5. Fabrication and Characterization of GaAs-based Edge-emitting Lasers  
*G. Manasan, E. Estacio, and A. Salvador*
6. A Comparative Study of the optoelectronic Properties of 250- $\mu\text{m}$  and 60- $\mu\text{m}$  InGaAs Photodetectors  
*J. Misa, R. Sarmago, and A. Salvador*
7. Electroluminescence of InAs quantum dots-in-a-well (DWELL) p-i-n structure  
*J. Mateo, E. Estacio, M.J. de Luna, A. Podpod, A. Somintac, and A. Salvador*
8.  $\text{In}_x\text{Ga}_{1-x}\text{As}$  Schottky Diode Grown by Liquid Phase Epitaxy  
*C. Hintay, K. Manibog, and A. Salvador*

#### **II. 2004 Theses and Dissertations**

##### **A. Undergraduate Theses**

1. Modeling of the Emission Spectrum of Oxide Confined PIN Resonant Cavity Enhanced Light Emitting Diode  
*Mariel Grace Dimamay*

2. Two Dimensional Electron Gas Density and Mobility in an AlGaAs/InGaAs/GaAs Modulation-Doped Heterostructures

*Raphael Dorilag*

3. Fabrication of an Optical Device Based on Liquid Phase Epitaxial Grown Structures

*Charlene Hintay*

4. Fabrication and Characterization of MBE-grown GaAs-based lasers

*Gabriel Manasan*

5. Current Confinement in an Optical Device Using AlAs Oxide

*Alfred Samson*

## **B. MS Theses**

1. Deep Level Transient Spectroscopy of 50Å and 120Å GaAs/AlGaAs Multiple Quantum Well Grown on On-axis (100) and OFF-axis GaAs (4° towards (111)) GaAs Substrates

*Joanes Paulus Sy*

2. In<sub>x</sub>Ga<sub>1-x</sub>As on (100) InP substrate Optoelectronic Devices via Molecular Beam Epitaxy

*Arnita Podpod*

## **C. PhD Dissertations**

1. Growth and Device Fabrication of Indium Arsenide Quantum Dots Based Emitters

*Armando Somintac*

2. Investigation of Self-Assembled InAs Quantum Dots by Raman Spectroscopy

*Marie Josephine de Luna*

3. High Speed Response Characteristics of GaAs/AlGaAs Photodetectors

*Elmer Estacio*

## **III. List of 2004 Graduates**

### **A. BS Graduates (5)**

March 2004

*Mariel Grace Dimamay*

*Raphael Dorilag*

*Charlene Hintay*

*Gabriel Manasan, Cum Laude*

*Alfred Samson*

### **B. MS Graduates (2)**

1. March 2004

*Joanes Paulus Sy*

2. May 2004

*Arnita Podpod*

### **C. PhD Graduates (3)**

1. March 2004

*Armando Somintac, Most Outstanding PhD Graduate (SY 2003-2004)*

2. October 2004

*Elmer Estacio, Most Outstanding PhD Graduate (SY 2004-2005)*

*Marie Josephine de Luna*

#### **IV. Grants**

*Title of Project:* High Speed Photodetectors Suitable for Dense Wavelength Division Multiplexing (DWDM)

*Project Leader:* Dr. Arnel Salvador

*Funding Institution:* Philippine Council for Advanced Science and Technology Research and Development (PCASTRD)

*Amount:* PhP 5, 030, 930.00

*Duration:* March 2004-May 2005

#### *Technical Achievements:*

1. Fabrication of GaAs p-i-n Photodetectors with High Speed Characteristics
2. Fabrication of Wafer-bonded GaAs p-i-n Photodetectors Through Epitaxial Lift-off Application
3. Growth and Fabrication of InP-based devices
4. Growth of InAs Quantum Dots and the Effect of Arsenic Flux
5. Improved Growth of AlGaAs Layers



## APPENDIX A. PUBLICATIONS

### A1. PAPERS IN ISI-ABSTRACTED JOURNALS (19)

<http://gateway.ut.ovid.com/gw2/ovidweb.cgi>

1. Torralba MVS. Sarmago RV. Harmonic response of coupled and uncoupled granular YBCO. *Superconductor Science & Technology*. 17(12):1381-1388, 2004 Dec.
2. Litong-Palima M. Violanda R. Saloma C. Voice tracking and spoken word recognition in the presence of other voices. *Physica D*. 199(3-4):400-406, 2004 Dec 15.
3. Galapon EA. Caballar RF. Bahague RT. Confined quantum time of arrivals - art. no. 180406. *Physical Review Letters*. 9318(18):406, 2004 Oct 29.
4. Blantocas GQ. Ramos HJ. Wada M. Design and operational characteristics of a cast steel mass spectrometer. *Review of Scientific Instruments*. 75(9):2848-2853, 2004 Sep.
5. Cemine VJ. Buenaobra B. Blanca CM. Saloma C. High-contrast microscopy of semiconductor and metal sites in integrated circuits by detection of optical feedback. *Optics Letters*. 29(21):2479-2481, 2004 Nov 1.
6. Estacio E. Alonzo C. Samson A. Garcia A. Somintac A. Salvador A. Time response characteristics of an oxide-confined GaAs/AlGaAs resonant cavity-enhanced photodetector. *Applied Physics Letters*. 85(15):3011-3013, 2004 Oct 11.
7. Soriano M. Araullo A. Saloma C. Curve spreads - a biometric from front-view gait video. *Pattern Recognition Letters*. 25(14):1595-1602, 2004 Oct 15.
8. Herrera MU. Sarmago RV. Synthesis of Pb-doped Bi-2223 from Pb-doped Bi-2212 via partial melting. *Ceramics International*. 30(7 Special Issue SI):1611-1614, 2004
9. Sarmago RV. Singidas BG. Low field AC susceptibility of YBCO: the frequency and field dependence of intra- and intergrain coupling losses in the absence of vortices. *Superconductor Science & Technology*. 17(9):S578-S582, 2004 Sep.
10. Guerrero RA. Power law response of volume holographic pattern recognition to partial images. *Optics Communications*. 239(4-6):303-310, 2004 Sep 15.
11. Galapon EA. Shouldn't there be an antithesis to quantization?. *Journal of Mathematical Physics*. 45(8):3180-3215, 2004 Aug.
12. Kniehl BA. Palisoc CP. Zwirner L. Associated production of bottomonia and Higgs bosons at hadron colliders - art. no. 115005. *Physical Review D*. 6911(11):5005, 2004 Jun.
13. Delica S. Blanca CM. Monte Carlo model of light scattering in polymer dispersed liquid crystals: Polarization effects and defects. *Molecular Crystals & Liquid Crystals*. 412:2111-2121, 2004.
14. Mahinay CLE. Davila LT. Domingo ZB. Cada LG. Electro-optic characterization of E48 : Tm74A : PMMA PDCLCs. *Molecular Crystals & Liquid Crystals*. 413:2737-2742, 2004.
15. De Luna MJM. Somintac A. Estacio E. Salvador A. Raman spectroscopy of in situ annealed InAs/GaAs quantum dots. *Journal of Applied Physics*. 96(2):1267-1269, 2004 Jul 15.
16. Ramos HJ. Valmoria NB. Thin-film deposition of ZrN using a plasma sputter-type negative ion source. *Vacuum*. 73(3-4):549-554, 2004 Apr 19.
17. Almoró P. Cadatal M. Garcia W. Saloma C. Pulsed full-color digital holography with a hydrogen Raman shifter. *Applied Optics*. 43(11):2267-2271, 2004 Apr 10.
18. Morales AA. Yanga DM. Kurihara S. Calculation of entropy and specific heat in the spin polaron formulation at finite temperature. *Journal of Superconductivity*. 17(2):283-287, 2004 Apr.
19. M Quito, C Monterola and C Saloma, Memory and a priori best strategy in complex adaptive systems. *Complexity* 9, 41-46 (2004)

## A2. BOOK CHAPTER

C Saloma, W Oblefias, and M Soriano, "Spectral microscopy of live luminescent samples," in *Nanophotonics: Integrating Photochemistry, Optics, and Nano/Bio Materials Studies*, H Masuhara and S Kawata, editors Chap 23, pp 377-394 (Elsevier BV, The Netherlands: 2004)

## A3. PAPERS (81) in the 22<sup>nd</sup> PHYSICS CONGRESS OF THE SAMAHANG PISIKA NG PILIPINAS (Tagbilaran City, 25-27 October 2004.)

<i>Title</i>	<i>Authors</i>
<i>Enhancement of Fe magnetic moments in Fe/Co (001) multilayers</i>	Villagonzalo, C, Morales, M.
<i>Dipolar Interaction in a 1D Ising Ring</i>	Villagonzalo, C, Tongco, G
<i>Hopping in a Molecular Wire</i>	Banzon, R. , Marco, R.
<i>Periodicity in a Penna Model</i>	R Banzon, MD Beech
<i>Infrared Spectral Imaging and its Application in Failure Analysis</i>	Tarun, A.B., Bailon, M. F
<i>Tempering and Annealing in a Verdier-Stockmayer Polymer</i>	Banzon, R.S, Obias, E.R.
<i>Optical Emission Spectroscopy of Low Temperature CVD Diamond</i>	Malapit, G., Ramos, H., Patacsil, C.
<i>Destruction of Bacillus subtilis using a Low-Pressure Glow Discharge Plasma</i>	Ramos, H., Siringan, A, Pineda, P.
<i>M_{X'} distribution of J/\psi inclusive production ...</i>	Palisoc, C
<i>A Variational Perturbation Theory</i>	Villanueva, A , Chan, L
<i>Flux Creep Investigation in Bi2Sr2CaCu2O8+ High-Temperature Superconductor</i> Ronulo, J , Dumlao, G , Sarmago R, Blanca, G.	
<i>Calorimetric Measurements of Output Power of 2.48 GHz Commercial Magnetron</i>	Tumlos, R. , Rosario, L
<i>Effect of Arm Positions on the Curve Spreads: Implications on the Database and New Application</i> A. Araullo, M. Soriano, C. Saloma, J Balista	
<i>Effect of Dopant Ions on the Electrical Conductivity and Microstructure of Polyaniline (Emeraldine Salt)</i> M. Catedral, R. Sarmago, J Tamayo, E. del Rosario A Tapia, R Manahan	
<i>Growth of Superconducting Bi-2212 Films by Sedimentation Deposition and Melt Texturing Method under Various Temperature Profiles</i> M. Catedral, R. Sarmago, J Tamayo, E. del Rosario A Tapia, R Manahan	
<i>Localization and imaging of integrated circuit defect using simple optical feedback detection</i> B Buenaobra, C Blanca, C Saloma. V Cemine	
<i>Fabrication of Textured (Bi,Pb)2Sr2Ca2Cu3O10+x/Ag Thick Films by Electrophoretic Deposition Method</i> R. Rivera-Virtudazo, R.Sarmago. M. Sotto	
<i>Effect of Wall Material on H- Production in a Plasma Sputter-Type Ion Sour</i> J. Lazarte, H. Ramos, Y. Ponce	
<i>High-resolution differential thermography of semiconductor edifice</i> V Cemine, C Blanca, C Saloma, V Sastine	
<i>Two-photon Optical Beam-induced Current Microscopy of Light Emitting Diodes</i> C Blanca, C Saloma, G Bautista Jr.	

- Femtosecond pulse propagation in a highly nonlinear photonic crystal fiber* C. Alonzo, W. Garcia, J. Gabayno
- Broadband continuum generation in single-mode optical fiber* J Gabayno, W. Garcia, B.Maraña
- SVD vs. PCA: Comparison of Performance in an Imaging Spectrometer* M Soriano, C Saloma, W Oblefias
- Effect of Deposition Time on Textured Magnesium Diboride Thick Films Fabricated by Electrophoretic Deposition* M Romano, R Sarmago. W. Mutia
- Effect of Filter Arrangement in the Estimation Accuracy of an Imaging Spectrometer*  
M Soriano, C Saloma. W Oblefias
- Cellular Automata Model of n-Slit Light Diffraction* J. Bantang, C. Saloma, R. Batac
- Axial Response of Blue LEDs under Multiphoton Excitation* Alonzo, C, Garcia, W., Saloma, C, Catalan, F.
- Effect of cesium seeding on the production of H<sup>-</sup> ions in a magnetized sheet plasma source* Ramos, H., Villorente, L
- Effect of H<sup>+</sup> and H<sub>2</sub><sup>+</sup> Ion Beam Irradiation on Wettability of Narra (*Pterocarpus indicus*) Wood Chips*  
Ramos, H., Blantocas, G., Monasterial, J
- Effects of Magnesium on the Negative Hydrogen Ion Production in a Magnetized Sheet Plasma Source*  
Ramos, H., Villorente, L., Noguera, V.
- Temporal coherence behavior of a Nd:YAG pumped waveguide Raman shifte* Torres, M.L, Cadatal, M., Garcia, W
- Near-IR Spectral Imaging of Semiconductor Absorption Sites in Integrated Circuit* Blanca, C., Saloma C, Samson, E.
- Gradient and Scattering Forces on a Kerr Nanosphere* Saloma, C, Pobre, R.F.
- A comparative study of the optoelectronic properties of 250 micron and 60 micron InGaAs Photodetectors*  
Salvador, A, Sarmago, R., Misa, J
- Queuing Dynamics in a System with Impatient Agents* Bantang, J. Saloma, C., Soriano, J.
- Numerical Calculation of the Temperature Distribution along a Tungsten Filament Cathode to Explain its Breakage near its Negative Terminal* Kasuya, T., Arciaga, M.
- Factor of 5 Increase in the Axial Resolution of a Confocal System Using Attosecond Laser Pulses*  
C. Blanca, G. Tapang, C. Saloma, MJ Romero
- Effects of Aluminum Dopant Concentration on Morphology and Electrical Characteristics of ZnO Varistors*  
Magdaluyo, E., Sarmago, R. Vitancol, N.
- Enhancing the axial resolution of fluorescence microscopy using non-linear excitation*  
C Blanca, B Buenaobra, C Saloma, Delica, S
- Detecting Weak Interferograms by Noise Dithering* C Blanca., C Saloma, SD Separa
- Remote image acquisition and control of a confocal microscope using a mobile handheld device*  
SD Separa, B Buenaobra, C Blanca, C Saloma, J Escay
- Project MAEROL: Microscope Access Everywhere – Remote Optics Laboratory A Web-based design and wireless architecture for Distance Learning and Research Collaboration* SD Separa, Buenaobra, B.J.
- Influence of the Oxygen Content on the Superconducting Properties of Bulk Samples of YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7-x</sub> with 0.1 < x < 0.35*  
R Sarmago, L. Dazo
- Even Harmonic Generation in YBCO with Intergranular Coupling Hysteresis Loss Peak: Weibull Based Analysis*  
J Afalla , R Sarmago, M. Uy

<i>Modeling the Profile of an Oxide-Confined p-i-n Light-Emitting Diode</i>	Samson, A., Dimamay, M
<i>Technique for Controlling Chromatic Dispersion of Full-Color Holograms</i>	Almoro, P, Balois, M.
<i>Absolute value of the intragranular harmonic susceptibility</i>	Sarmago, R., Torralba, M
<i>Numerical Method of Gravity-assisted Granular Mixing through a Pipe</i>	Saloma, C., Bantang, J, Pastor, M.
<i>A Low Threshold Nd:YAG Laser Pumped Hydrogen Raman Shifter with Capillary Waveguide</i>	
Cadatal, M. , Garcia, W., Torres, M.	
<i>Fabrication and Characterization of GaAs-based Edge-emitting lasers</i>	Salvador, A., Estacio, E., Manasan, G.
<i>Improved Image-Based Coral Reef Component Classification</i>	Soriano, M., Saloma, C, Marcos, M.S.
<i>Effect of clustering and a priori knowledge in panic dynamics</i>	Saloma, C.A., Perez, G.P.
<i>Time-response characteristics of a GaAs/AlGaAs modulation-doped Schottky photodetector</i>	
C. Alonzo, A. Garcia, A. A Somintac, A.Salvador, E Estacio	
<i>Time-resolved Photoluminescence of a GaAs/AlGaAs RCE Structure</i>	
E. Estacio, C. Alonso, J. Mateo, A. Salvador, F Ecoleto	
<i>Twin Optical Vortices in Methyl Red-doped Nematic Liquid Crystal</i>	N. Hermosa II, C. Manaois
<i>Electroluminescence of InAs dots-in-a-well (DWELL) p-i-n structure</i>	
E, Estacio, M. De Luna, A. Podpod, A. Somintac, A. Salvador, J Mateo	
<i>A Physical Model of Observed Mu-Lambda Relations In Raindrop Size Distributions</i>	
Samson, E.C., M.Lim, C. Saloma, M Romero	
<i>Elementary cellular automata of interacting populations</i>	Saloma, C, Bantang, J
<i>Variational Monte Carlo of a 2D Quantum Well System</i>	Banzon,R., Sandagon, R.
<i>Thermal Efficiency of a Quasi-One-Dimensional Conductor</i>	Villagonzalo, C., Muldera, J. E.
<i>Random deaths and chaos in a Penna model</i>	Banzon, R, C Nombres
<i>Jamming Patterns of Granular Flow through a Constriction</i>	M Litong-Palima, C Saloma, A Longjas
<i>Behavior of an Evolving Business Network in a Social Network</i>	Litong-Palima, M., Saloma, C, Legara, E.
<i>The Specific Heat of a 2DEG in a Magnetic Field</i>	Villagonzalo, C, Gammag, R
<i>Field and Temperature Dependence of the Penetration Depth and the Electrical Resistance in YBCO from Imaginary AC Susceptibility</i>	R Sarmago, B Singidas
<i>High Tc Superconductors at Low AC Fields</i>	R Sarmago
<i>Why is stochastic resonance enhancement intrinsic in biological neurons?</i>	Palima, M., Saloma C, Osma, M
<i>Dynamics of Coupled Fractional Oscillators in a Ring</i>	Agra, E, Esguerra, J.P.
<i>Thermal Conductivity in a One-dimensional Superlattice</i>	Villagonzalo, C., Dizon, J.
<i>Analysis of the AC Loss in MgB2 BAsed on the Eddy Current Model</i>	Sarmago R., Olbinado M.
<i>Analyzing Molecular Diffusion Using Detrended Fluctuation Analysis</i>	Blanca, C, Baclig, A.
<i>Molecular Discrimination Using Fluorescence Recovery After Photobleaching</i>	Blanca, C., Dungao, J.
<i>Camera Sensitivity Measurements Without a Spectroradiometer</i>	Soriano, M. , Saloma, C., Paz, A.S.
<i>Recovery of Underwater Object Reflectance from Colored Image</i>	Soriano, M.; Saloma, C, Go, M.A.

<i>Vibrational Resonance in a Time-Fractional System</i>	Coronel, R., Esguerra, J.P.
<i>New Continuum Approximations to Random Walks with Fixed and Shrinking Steps</i>	Sardane, G., Esguerra, J.P.
<i>Particle Discrimination through Diffusion Measurements</i>	G. Tapang, C. Blanca, C. Saloma, A. Araullo
<i>Pre-collision Dynamics of Short 1D Anharmonic Chains</i>	Villagonzalo, C, Parinas, R.
<i>Diffusive Thermoelectric Transport in Carbon Nanotubes</i>	Villagonzalo, C., Vasquez, L.

## APPENDIX B. OFFICIAL TRAVELS & FOREIGN POSTINGS

### B1. International

<i>Name</i>	<i>Title of Conference</i>	<i>Date</i>	<i>Place of Conference</i>	<i>Funding Agency</i>
Percival F. Almoró	Winter College of Interferometry and Applications in Modern Physics	2-13 February 2004	Trieste, Italy	
Carlo Mar Y. Blanca	Taiwan-Philippines Photonics Symposium 2004	4-7 July 2004	National Sun Yat Sen Univ. Kaohsiung, Taiwan	CSFDF P1,500 pre travel \$ 80.00 per diem
Eric A. Galapon	To undertake research at Universidad del País Vasco	31 March 2004-31 March 2005	Bilbao, Spain	CRSPUP \$252 airfare, etc. \$17,068 Res. Grant
Marisciel L. Palima	Taiwan-Philippines Photonics Symposium 2004	4-7 July 2004	National Sun Yat Sen Univ. Kaohsiung, Taiwan	CSFDF P1,500 pre travel \$ 80.00 per diem
Caesar A. Saloma	Taiwan-Philippines Photonics Symposium 2004	4-7 July 2004	National Sun Yat Sen Univ. Kaohsiung, Taiwan	CSFDF P1,500 pre travel \$ 80.00 per diem
Roland V. Sarmago	International Cryogenic Materials Conference on Materials Processing: Microstructures and Critical Current of Superconductors	10-13 February 2004	University of Wollongong, New Wales, Australia	CSFDF P1,500 pre travel
Maricor N. Soriano	Taiwan-Philippines Photonics Symposium 2004	4-7 July 2004	National Sun Yat Sen Univ. Kaohsiung, Taiwan	CSFDF P1,500 pre travel \$ 80.00 per diem

### **C3. Domestic**

Participants in the 22<sup>nd</sup> Physics Congress of the Samahang Pisika ng Pilipinas that was held in Tagbilaran City on 25-29 October 2004. Conference participation was supported by the 2004 UP Faculty Development Fund.

1. CHAN, Lorenzo Chua
2. SALOMA, Caesar Ayaay
3. RAMOS, Henry Jacala
4. SALVADOR, Arnel Angud
5. SARMAGO, Roland Villano
6. TUMLOS, Roy Bienes
7. BANZON, Ronald Sedilla
8. BLANCA, Carlo Mar Yapchiongco
9. ESGUERRA, Jose Perico Henson
10. GARCIA, Wilson Ong
11. PALIMA, Marisciel Tayam Litong
12. PALISOC, Caesar Peralta
13. SORIANO, Maricor Narvaez
14. TAPANG, Giovanni Alarkon
15. VILLAGONZALO, Cristine De Los Reyes
16. ALMORO, Percival Flavier
17. ALONZO, Carlo Amadeo Capistrano
18. ARCIAGA, Marko Estabillo
19. BANTANG, Johnrob Yap
20. CEMINE, Vernon Julius Ranario
21. DELICA, Serafin Famadico
22. HERMOSA, Nathaniel II Placido
23. JUANICO, Dranreb Earl Oracion
24. MARCOS, Ma. Sheila Angeli Crisostomo
25. OBLEFIAS, Wilma Ramilo
26. ARAULLO, Alessandra Pagaduan
27. BAUTISTA, Godofredo Sioson
28. CADATAL, MARILOU MACASIEB
29. DIMAMAY, Mariel Grace Sijo
30. GABAYNO, JACQUE LYNN FERRANCO
31. MANASAN, Gabriel Gregorio
32. MATEO, JENNETTE NABOR
33. OLBINADO, Margie Parrera
34. PEREZ, GAY JANE PEREZ
35. PONCE, Yvonne Diane Misal
36. SIBAYAN-TORRALBA, Maria Veronica Gutierrez
37. SINGIDAS, Bess Garcia
38. TORRES, Ma. Leilani Yuzon
39. VASQUEZ, LOUELLA JUDY ANTONIO
40. BUENAOBRA, Bernardino Jerez
41. NOGUERA, Virginia Rago

## APPENDIX C. RESEARCH PROJECTS IN 2004

### C1. Funded by NIP Research Funds (1 January 2004 - 31 December 2004)

Amount of Funding: PhP 48,000 (Professor), PhP42,000 (Associate Professor), PhP36,000 (Assistant Professor), PhP30,000 (Instructor)

1. Almoró, Percival F.  
*Technique for full-color reproduction of digital holograms.*
2. Arciaga, Marko E.  
*Investigation on the Temperature Profile of a Tungsten Filament as an Electron Emitter and Hot Cathode in a Gas Discharge.*
3. Bantang, Johnrob Y.  
*Emergence of chaos in coupled non-chaotic systems*
4. Banzon, Ronald S.  
*Periodicity in a Penna Model*
5. Blanca, Carlo Mar Y.  
*Shaping the point spread function of tight-focusing lenses using attosecond pulses*
6. Cemine, Vernon Julius R.  
*IC Defect Localization via Temperature Gradient Mapping Using OBIC Microscopy*
7. Chan, Lorenzo C.  
*Variational –Based Perturbation Theory in Quantum Mechanics*
8. Domingo, Herbert B.  
*Time of arrival for a particle in a nonlinear potential*
9. Esguerra, Jose Perico H.  
*Fractional Dynamical Systems with Multi-Frequency Driving*
10. Garcia, Wilson O.  
*General Application of Laser Light Produced by Stimulated Raman Scattering*
11. Hermosa II, Nathaniel P.  
*Optical Vortex Induced Defects in Nematic Liquid Crystal*
12. Magpantay, Jose A.  
*Gauge Theory and Quantization*
13. Marcos, Shiela  
*Image-Based Coral Reef Component Classification*
14. Oblefias, Wilma  
*Characterization and Implementation of Imaging Spectrometer Using Minimum Number of Colored Images*
15. Palima, Marisciel  
*Remedy of signal degradation due to noise by biological neurons*
16. Palisoc, Caesar  
 $\gamma^* + \gamma \diamond \overline{Q\overline{Q}} \left[ n^{(1)} \right] \dagger \gamma$  cross sections correlation
17. Ramos, Henry J.  
*Surface Modification of Wood Using Low Energy Ion Beams*
18. Saloma, Caesar  
*Spectral Microscopy of fluorescent biological samples*
19. Salvador, Arnel  
*Speed Characteristics of MBE-grown Hetero-Junction Photo Detector*
20. Sarmago, Roland  
*Harmonic Generation in YBCO*
21. Soriano, Maricor  
*Status of College-level physics labs in Luzon*
22. Tapang, Giovanni  
*Noise induced synchronization in the Newel-Whitehead-Segel equation using modal expansion with Gauss-Hermite modes*



23. Tumlos, Roy  
*Calometric Measurements of the Output Power of the 2.48 GHz Commercial Magnetron*
23. Villagonzalo, Cristine  
*Numerical Calculation of the heat capacity of an electron gas as a function of temperature and magnetic field*

## **C2. Research Grants from External Funding Agencies**

Research Grants Awarded to NIP in the year 2004 by the Office of the Vice-Chancellor For Research, University of the Philippines-Diliman

<i>Project Leader</i>	<i>Research Title</i>	<i>Research Type</i>	<i>Budget</i>
Roland Sarmago	Hysteresis Effects in Bi-2212 Bulk Superconductors	Project	196,000
Mariscal Palima	Detailed Statistics of Flowing -jamming Phase transition in Granular Material Flow Through a Constriction	Project	150,000
Maricor Soriano	Recovery of Spectral Signatures in Coastal Water by Color camera	Project	300,000
Giovanni Tapang	Optimization of Semiconductor laser Via Noise-Induced Synchronization of its Transverse Modes	Project	156,000
Bernardo Buenaobra	Project MAEROL: Microscopic Access Everywhere-Remote Optics Laboratory	Project	146,000
Jade Dungao	Molecular Discrimination using Fluorescence Recovery after Photobleaching (FRAP) Method	Thesis	30,000
Percival Almoró	Full Color Digital Holography	Dissertation	60,000
Marilou Cadatal	Temporal Coherence Control of a 355/532 nm Nd:YAG laser Pumped Hydrogen Raman Shifter With capillary Waveguide	Thesis	30,000
Gay Jane Perez	Investigation of herding behavior in Complex Systems	Thesis	30,000
Jacque Lynn Gubayno	Femtosecond Pulse Propagation in Photonic Crystal Fibers	Thesis	30,000
Louella Judy Vasquez	Modeling of Thermoelectric Transport Properties of Carbon Nanotubes	Thesis	30,000

Research Grants obtained in 2004 from the University of the Philippines Systems

Proponent	Title
Wilson Garcia	Generation and Application of Multicolor Laser Light Produced by Stimulated Raman Scattering in Gas and Photonic Fiber
Cesar Palisoc	Associated Production of Charmonia and Photons in ep Scattering
Caesar Saloma	Optical Beam Induced Current Generation via Two color (Two-photon) Excitation
Arnel Salvador	Phonon assisted Emission in InAs Quantum Dots
Dr. Roland Sarmago	Oriented B1-2212 Films on MgO Using a Sedimentation-Melt Texturing method
Cristine Villagonzalo	Modeling of Low Dimensional Magnetic Spin Systems

Research Grants from Intel Philippines conducted in 2004

Proponent	Title
Wilson Garcia	Detection of Femtosecond and Picosecond Optical Signals
Caesar Saloma Maricor Soriano	Infrared Emission Microscope Spectral Analysis Development
Arnel Salvador	Research on the Fundamental and Reliability Device Performance of Quantum Well Lasers and Photodetectors Through a Streak Camera

Grants obtained from the PCASTRD/DOST for the Year 2004

Proponent	Title	Budget
Wilson Garcia	PCASTRD Institutional Development Program (Fiber Optic Facility)	PhP 744,185
NIP	PCASTRD Institutional Development	PhP 4,000,000

	Program ( Equipment upgrade)	
Caesar Saloma	PCASTRD Institutional Development Program ( Optical Phase Modulator)	PhP 2,300.000
Arnel Salvador	High Speed Photodetectors Suitable for Dense Wavelength Division Demultiplexing	PhP 5,100,000

## APPENDIX D: PhD and MS GRADUATES IN 2004

### Doctor of Philosophy (1)

*as of April 25, 2004*

Armando S. Somintac

Dissertation: Growth and Device Fabrication of Indium Arsenide Quantum Dot Based Emitters

Adviser: Dr Arnel A. Salvador

### Master of Science (12)

*as of June 1, 2003 (2)*

Renante R. Violanda

Thesis: Noise in Human Hearing

Adviser: Dr. Marisciel L. Palima,

Co-Adviser: Dr. Caesar A. Saloma

Miguel L. Yambot

Thesis: Effect of Cesium Seeding on H<sup>+</sup> Ion Production in a Plasma Sputter-Type Ion Source

Adviser: Dr. Henry J. Ramos

*as of November 2, 2003 (1)*

Ma. Sheila Angeli C. Marcos

Thesis: Feature Extraction of Coral Reef Images

Adviser: Dr. Maricor N. Soriano,

Co-Adviser: Dr. Caesar A. Saloma,

*as of April 25, 2004 (9)*

Marko E. Arciaga

Thesis: Investigation on the Emission and Breakage Characteristics of Tungsten Filament Cathodes and Initial Demonstration of Tantalum Coaxial Cathode as a Promising Novel Electron-Emitter

Adviser: Dr Henry J. Ramos,

Co-Adviser: Dr. Motoi Wada, Faculty of Engineering, Doshisha University, Kyotanabe, Japan

Vernon Julius R. Cemine

Thesis: Optical Beam-induced Current Imaging with a Semiconductor Laser Feedback Confocal Microscope

Adviser: Dr. Caesar A. Saloma,

Co-Adviser: Dr. Carlo Mar Y. Blanca

Serafin F. Delica

Thesis: Angular Scatter Microscopy

Adviser: Dr. Carlo Mar Y. Blanca

Herbert B. Domingo

Thesis: Time of Arrival Quantum-Classical Correspondence in Rigged Hilbert Space

Adviser: Dr. Eric A. Galapon

Dranreb Earl O. Juanico

Thesis: Agent-Based Modeling of Self-Organized Clustering in Nature Based on Allelomimesis

Adviser: Dr. Caesar A. Saloma

Marites J. Labora-Violanda

Thesis: *Ab-initio* Structural Investigations of Fe/V (001) Multilayers

Adviser: Dr. Cristine DLR. Villagonzalo

Marienette B. Morales

Thesis: Magnetization and Anisotropy of Fe/Co (001) Multilayers: A First-Principles Calculation

Adviser: Dr. Cristine DLR. Villagonzalo

Wilma R. Oblefias

Thesis: Spectral Imaging of Fluorescent and Bioluminescent Samples

Adviser: Dr. Maricor N. Soriano

Co-Adviser: Dr. Caesar A. Saloma

Rogel Mari D. Sese

Thesis: Analytic Approximation Techniques for Polytropic Systems

Adviser: Dr. Jose Perico H. Esguerra