Annual Report for the Year 2003

National Institute of Physics
College of Science, University of the Philippines
Diliman, Quezon City 1101, Philippines

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Chapter I. Executive Summary

by *Caesar Saloma*

A. Introduction

This annual report is the first made during my second term as Director of Institute which started on June 1, 2003. The Board of Regents of the University of the Philippines re-appointed me as NIP Director until 31 May 2006 (three-year term). Being a national institute, the NIP Director is selected via a national search. Three annual reports were released in 2001, 2002 and 2003 and are available in electronic form at the official website (www.nip.upd.edu.ph) of the National Institute of Physics (NIP).

The NIP was established by President Ferdinand E. Marcos via the issuance of Executive Order 889 in 1983. It started operation as an institute on 26 May 1983 immediately after the approval of 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. At present the NIP occupies a pre-eminent place among the various schools of physics that are offering undergraduate and graduate programs in physics and applied physics in the Philippines.

Our *vision* is for NIP to become into one of the finest schools of physics in the ASEAN region by 2006. Our vision is realized when NIP researchers have the technical competence and confidence to compete at the highest level. A competitive graduate program and an environment that promotes the pursuit of academic excellence and the practice of the core values of honesty, fairness, collegiality, openness and skepticism are essential to success. *Appendix A* presents a copy of the vision statement that was submitted during the selection process for the NIP Director in March 2003.

During the school year 2003-2004, the NIP faculty consists of eight (8) full professors, two (2) associate professors, and fifteen (15) assistant professors. Out of the thirty-six (36) faculty items that are available for NIP, twenty-five or 69.4% have PhD degrees. The remaining eleven faculty items were occupied by instructors (with temporary appointments) who are also graduate students of NIP or the Material Science and Engineering Program. The NIP also employs two teaching fellows and thirteen teaching associates who are not considered regular employees of the University.

Nine faculty members representing 25% of the total number, have permanent appointments (tenured). Thirty-one faculty members (86%) were born not earlier than 1960. In the Philippines, the total number of individuals with a PhD degree in physics does not exceed seventy-five.

Between 1993 and 2003, eighty-three percent (83.4%) of all physics publications from the Philippines that appeared in scientific journals which are indexed by the Institute of Scientific Information (ISI), were produced by researchers who are affiliated with NIP. Fifty-six percent (56%) of these ISI publications were produced in the last four years (2000-2003).

In October 2003, NIP researchers published an article (Track II submission) in the *Proceedings of the National Academic of Sciences USA*. The article on the dynamics of real escape panic attracted widespread media coverage with news features appearing in *The New Scientist*, *Nature Science News Update*, *Wired* magazine and *Spektrum der Wissenschaft.* The research leader (Professor Saloma) was also interviewed on the matter in the BBC News radio and a number of daily newspapers in various countries also reported the research results.

In enrolment, a steady rise in the number of MS Physics students is noticed since SY 1999-2000 where a semester average of 30.5 students were enrolled. In SY 2003-2004, an average of 52 MS students were taking graduate courses representing an increase of nine (9) in the previous school year. In the last three academic years ending SY 2003-2004, the number of PhD students in NIP remained steady at 18.5 year.

The NIP has the largest undergraduate population among the academic units in the College of Science, UP Diliman. During the first semester of SY 2003-2004, the total number of students enrolled in our five-year BS Physics and BS Applied Physics programs is 163 and 164, respectively. Each school year, the NIP admits a maximum of sixty freshmen in each undergraduate degree program.

A total of eight (8) PhD and twenty-three (23) MS students were graduated in the last three academic years ending SY 2002-2003. During the same period, a total of twenty (20) BS Physics and forty-three (43) BS Applied Physics graduates were also produced.

I wrote an article entitled, "*Physics in the Philippines Today*," which was published in the August 2003 issue of the AAPPS Bulletin which is the official publication of the Association of the Asia Pacific Physical Societies (AAPPS). The article presents the state of physics in the Philippines focussing on the areas of human resource development, research capabilities, and research funding and incentives. It is available on-line in the AAPPS website (www.aapps.org).

Construction work of the future NIP Building along C.P. Garcia Avenue under Phase II and Phase IIA, was carried out in 2003. UP Diliman provided the funds for the construction in the amount of PhP 30M. Construction works under Phase II and Phase IIA were concentrated in the first two floors of the Research Wing and portions of the 3rd and 4th floors. The NIP has secured additional funds in the amount PhP40M (PhP20M from UP Diliman and PhP20M from UP System) for Phase III which will complete the construction of the Research Wing and portions of the Administration section. Construction works under Phase III is expected to start before May 2004.

In 2003, several 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 Marisciel Litong-Palima and Maricor Soriano are serving as the Secretary-General and First Vice President of the Samahang Pisika ng Pilipinas. Professors Jose Magpantay and Arnel Salvador are serving as faculty advisers to the Office of the UP President.

B. Personnel & Organization

In 1 June 2003, Dr. Caesar Saloma began to serve his second term as the Director of the Institute. Dr. Saloma has been ably assisted in managing the day-to-day operations of the Institute by the following Deputy Directors: Dr. Ronald Banzon (*Academic Affairs*), Dr. Luis Ma. Bo-ot (*Facilities & Resources*), and Dr. Arnel Salvador (*Research & Extension Services*). Deputy Directors serve on the basis of annual appointments. 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 2003, 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 2003: Dr Henry Ramos (Plasma), Roland Sarmago (Condensed Matter), Dr Jose Perico Esguerra (Theory), Dr Carlo Mar Blanca (Instrumentation Physics), Dr 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. It 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.

In 2003, the NIP was able to secure one additional faculty item increasing the total number in its plantilla to thirty-six (36). Fifteen (15) teaching fellows and teaching associates are also helping NIP fulfill its teaching obligations to the University which includes the offering of Physics 10 (GE course), and the service courses (Physics 71, 72 and 73 and Physics 7X.1). The NIP is also offering two undergraduate degree programs (BS Physics, BS Applied Physics) and MS and PhD

In July 2003, two faculty members (Dr C Monterola, Dr G Tapang) went on postdoctoral research. Drs Monterola and Tapang are now with the Max Planck Institute in Dresden and the University of Strathclyde, Department of Physics (Glasgow, Scotland), respectively. Dr Carlo Blanca returned to active teaching duty in January 2003 after a two-year postdoctoral leave at the Max Planck Institute in Gottingen.

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-charged 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 (the NIP administrative officer). Complete information about NIP personnel are found in: http://www.nip.upd.edu.ph/people/person_admin.html and 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 submit 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 2001-02			AY 2002-03			AY 2003-2004		
	1st Sem	2nd Sem.	Sum	1st Sem	2nd Sem	Sum	1st Sem	2nd Sem	Sum
Ph.D. Physics	21(3)	16(3)	3		19(2)			18	
M.S. Physics	37(4)	36(4)	10(4)		43(8)			52	
M.A. Physics	4	2	-	2					
B.S. Physics	148(1)	142(3)	104	165	157 (11)		174	169	
B.S. Applied Physics	167(3)	156(12)	108	164	162 (11)		159	151	

Figure 1. NIP student population per academic year

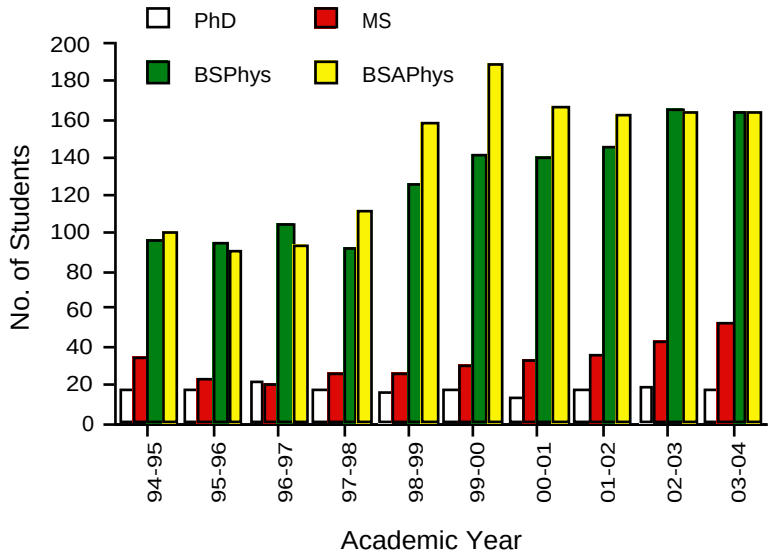
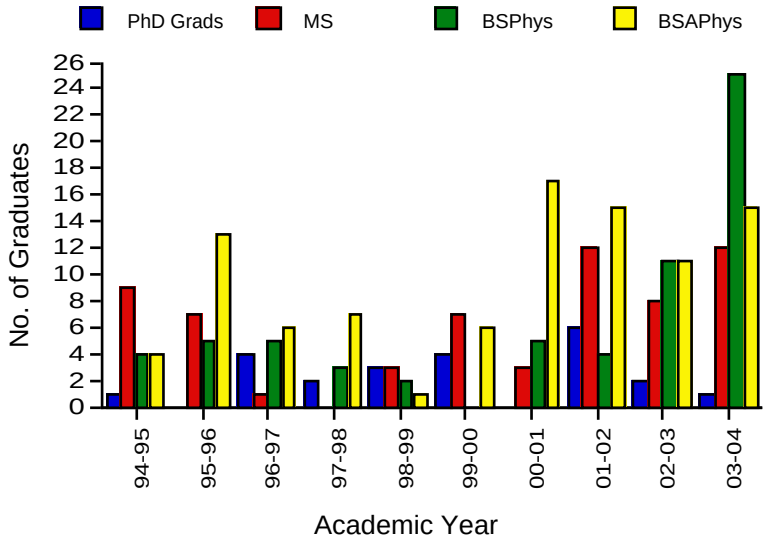


Figure 2. Number of NIP graduates per academic year



The table together with Figures 1 and 2 indicates: 1) Stabilizing enrollment population for the BS Physics and BS Applied Physics programs of NIP, 2) Increasing MS Physics enrollment, 3) PhD enrolment that has remained essentially flat, 4) Decreasing number of PhD students graduated in the last three academic years, and 5) Increasing number of BS Applied Physics graduates in the last three academic years.

The NIP has always aimed to improve the quality of teaching in the general physics courses and to maintain the passing rate of its general physics classes (Physics 71, 72, and 73) to around 75% or better. The goal is to be achieved without compromising the quality of physics instruction and the academic freedom of instructors. 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

Dr Ronald Banzon presents in Chapter II, the pass/fail statistics of enrollees in the general physics courses. The data have been compiled with the aid of General Physics Committee which is composed of the course group leaders. In the 2nd semester, SY 2002-2003, the average passing rate was 82.33% for all students enrolled in Physics 71, 72 and 73. In the 2nd semester, SY 2002-2003, the average passing rate was 62% for all students enrolled in Physics 71, 72 and 73.

D. Infrastructure and Facilities Development

The Phase II construction project of the future NIP building along CP Garcia Avenue was completed in 2003. It started in late November 2002 with a total budget of PhP30M. The Phase II project concerns the completion of the first two floors of the Research Wing of the new NIP Building along CP Garcia Avenue. The Research Wing consists of four floors with a total floor area of almost 6000 square meters which is already 1.5 times larger than the current NIP building. It houses not only the NIP research laboratories but also all the teaching laboratories in the two BS programs and the service courses. Completion of construction works under the Phase II project is expected in September 2003.

The space that is allotted for teaching laboratories in the first two floors of the Research Wing will enable NIP to offer two simultaneous sections of the three Physics 7X.1 classes. This means doubling the capacity of NIP to absorb the present student demand in the said courses. The same increase in capacity is expected in the laboratory courses in the BS Physics and Applied Physics programs. Currently in the old NIP building, two laboratory rooms are shared by Physics 181/182, 185/186 and 191/192 students.

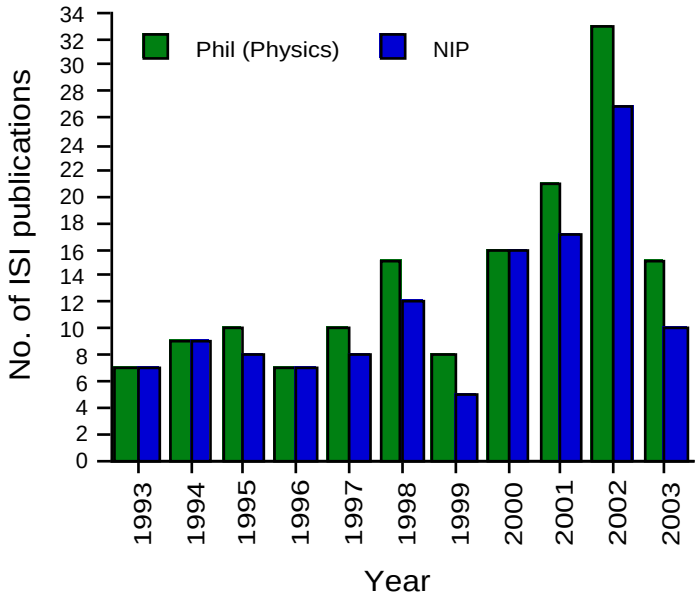
In 2003, the University allotted another PhP40M to continue the construction (Phase III) of the future NIP building. Phase III construction is expected to start in the first quarter of 2004 before the election ban (11 May 2004 elections) takes effect.

E. Research Highlights

The NIP is the leading research center of physics and applied physics in the country. In 2003, NIP researchers published ten (10) papers in ISI-abstracted journals out of the fifteen (15) physics papers that were published from the Philippines. List of ISI publications of NIP in 2002 is presented in Appendix B. In 2003, NIP scientists were able to publish a paper in the *Proceedings of the National Academy of Sciences USA* . The findings in the PNAS paper was featured in several science magazines, radio and TV programs in various countries particularly Germany.

Figure 3 plots the yearly number of physics publications in ISI journals since 1993 for NIP and the Philippines. Between 1993 and 2003, NIP has produced 78% of all ISI papers in physics.

Figure 3. Annual number of ISI publications



NIP researchers also gave 86 technical presentations (58% of total) in the 21st Physics Congress of the Samahang Pisika ng Pilipinas which was held in University of San Carlos in Talamban, Cebu City on 22-25 October 2003. Appendix D presents a listing the international conferences attended by NIP faculty in the year 2000.

The following NIP students received academic awards during the Recognition Program of the College of Science on 27 April 2003:

Most Outstanding PhD Graduate
May T. Lim

Most Outstanding MS Graduate
Jonathan A. Palero

Most Outstanding BS Physics Graduate
John Paul D.G. Pampolina

Most Outstanding BS Applied Physics Graduate
Patricia Arielle A. Castro

Best Thesis (BS Physics)
Jelda Jane C. Miranda

BestThesis (BS Applied Physics)
Gay Jane P. Perez

In 2003, Intel Philippines funded three research projects (< PhP500,000 each) on spectral infrared emission microscopy (Dr Caesar Saloma & Dr Maricor Soriano), high-speed characterization of GaAs/AlGaAs optoelectronic devices (Dr Arnel Salvador), and detection of femtosecond/picosecond optical signals (Dr Wilson Garcia). The Intel support reflects the

maturing capability of NIP researchers to solve technical problems which are of immediate importance to the private sector

The NIP received an *Optoscope* streak camera (spectral range: 350 to 950 nm; temporal resolution : < 2 picosec; cost: about 150,000 Euros) from Intel Philippines. The streak camera will allow NIP researchers to carry-out femtosecond time-resolved spectroscopy and imaging with the femtosecond laser facility (*Millenia* VS - Diode Pumped CW Visible laser 5 Watts at 532 nm; *Tsunami* mode locked Ti:Sapphire Laser 705 to 985 nm, 52 fs and 0.9 Watts at 790 nm; Model 3980-4S Frequency Doubler 360 to 450 nm)

In 2003, a number of NIP researchers received awards and recognition from various academic bodies and government agencies. The following NIP personnel were recipients of the Gawad Chanselor in February 2003:

Pinakamahusay ng Estudyante (Antas Gradwado)
May Lim

Pinakamahusay na Imbensiyon at Inobasyon
Dr. Vincent Ricardo Daria, Dr. Caesar Saloma, and Jelda Jayne Miranda - Techniques for generating three-dimensional distribution of defects in integrated circuits

The following personnel from NIP emerged winners in the 2003 PCASTRD Research & Development Awards (December 2003):

1st Place: Henry Ramos and Rainier Awayan
Nitride formation using a magnetized sheet plasma source

3rd Place: Caesar Saloma
Multidimensional microscopy of defects in integrated circuits

Outstanding PhD Dissertation
1st Place: May Lim
Measurements of nonlinear phenomena in complex physical systems

2nd Place: Christopher Monterola
Neural Networks: New insights and applications

Outstanding MS Thesis
1st Place: Carlo Amadeo Alonzo
Comparison of pulse-retrieval algorithms applied to simulated frequency-resolved optical gating (FROG) spectrograms

F. Extension Efforts & Alumni Relations

The voluntary services of NIP scientists have been crucial for the continued growth of the *Samahang Pisika ng Pilipinas*. Dr Marisciel Litong-Palima assumed the position of SPP Secretary-General on 1 January 2003. As its current First Vice-President, Dr Maricor Soriano is the President-Elect of SPP. Professor Zenaida Domingo chaired (term: one year) of the Physics Division of the National Research Council of the Philippines in 2002.

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 2003. The Intel Scholarship program for NIP students is also handled by the PFPI.

The NIP 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 2001: 1) Physics Week (January), UPPAgibig (February), 3) Freshman Orientation Program (May), 4) CHAOS & Bingo (September), and 5) Lantern Parade (December).

G. Prospects for 2004

Our vision for NIP has been clearly defined and the indicators for assessing whether the vision is achieved in 2006, have also been destermined. The challenge in 2004 is to sustain the improvements in the last three years in research, physics instruction and extension services. The realization of the NIP vision strongly depends on the ability of the NIP community to secure incremental but steady improvements in research which drives its graduate programs.

In 2004, the NIP hopes to see increases in the number of BS Physics and Applied Physics graduates that is being produced, as result of the number of measures that has been implemented by the Office of the NIP Director in the past two years.

Construction of the new NIP building is expected to continue in 2004 with the availability of fresh funds from the Office of the UPD Chancellor, Office of the UP President and hopefully, even from sympathetic legislators.

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. This objective is achieved if NIP can package research proposals which are consistent with the objectives of these funding agencies which are often specific.

Chapter 2. Report of the Deputy Director for Academic Affairs

by Dr Ronald Banzon

2.1 Curricular Proposals

A major revision of the Applied Physics (Instrumentation Physics) curriculum is currently being evaluated at the Institute. The details of the proposal may be found in Appendix 2.A.

In brief, the proposal seeks to introduce courses: Applied Physics 156 (Computer Methods in Physics II), Physics 166 (Optical Physics II), Applied Physics 183 (Control systems approach to physics modelling), Applied Physics 187 (Applied Optics Instrumentation). Their introduction eliminates the need for EEE courses that are required in the current curriculum. The proposal also includes the replacement of Physics 105 (Modern Physics II) by Physics 141 (Quantum Physics I) as a required course.

2.2 Developments in the Implementation of Undergraduate Programs

2.2.1 Recitation/Problem Solving Sessions for Physics 10X

The Institute continues to have recitation sessions for Physics 101, 102, 103, 104, and 105. The spirit of the implementation is to familiarize students with problem solving techniques.

2.2.2 Retention Rules

As of the moment the Secretary's Office of the College of Science do not yet have a convenient way of applying the rules for the determination of students to be retained in the undergraduate programs of the Institute. A movement to computerize student records at the College is still ongoing. In the mean time, it will be left for the advisers to determine and report students who do not meet the requirements for retention.

2.2.3 Applied Physics 195/195A

The Institute entered its third 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.

Particulars of the courses have been submitted to the EEE department of the College of Engineering and have been accepted as sufficient substitute courses.

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.

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 second 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.

No applications were received this year.

2.3 Undergraduate Thesis

The undergraduate thesis presentation continues to follow the format of the past three 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 twenty-nine (29) presentations were made during the year. An increase of six (6) presentations from that of the previous year, and an increase of eleven (11) presentations from two years earlier. The increasing trend in the number of undergraduate thesis presentations is expected to continue in the immediate future.

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 2003 and (2002 : 2001)

Degree Course	Second Semester 2001-2002	Summer 2002	First Semester 2002-2003	Total
BS Physics	4 (4 : 2)	6 (3 : 1)	3 (3 : 0)	13 (10 : 3)
BS Applied Physics	11 (11 : 10)	4 (1 : 0)	1 (1 : 5)	16 (13 : 15)

Following were the presentations made during the academic year.

Second Semester AY 2002-2003
The Undergraduate Thesis Presentations for the Second Semester AY 2002-2003 was held on Wednesday, 19 March 2003 and Saturday, 22 March 2003 at the NIP AVR. Following was the schedule of presentations

DAY 1: Wednesday, 19 March 2003
09:00 AM
Arangcon, Rutsy B. (BS Physics)
"Associative Memory and Learning in a Y-cut Fe:LiNbO3 Crystal"
Adviser: Mr. Percival Almoro
Panel: Ms. May Lim, Dr. Maricor Soriano

10:00 AM
Araullo, Alessandra (BS Applied Physics)
"Curve Spreads: Front-view Gait as a Biometric"
Adviser: Dr. Maricor Soriano

Co-adviser: Dr. Caesar Saloma
Panel: Mr. Percival Almoro, Dr. Perry Esguerra

11:00 AM
Barrera, Emmanuel Jan (BS Applied Physics)
"Explorations on the Dynamics of a Double-swinging Atwood's Machine"
Adviser: Dr. Jose Perico Esguerra
Panel: Dr. Eric Galapon, Dr. Caesar Palisoc

01:00 PM
Casco, Ma. Frantessa T. (BS Applied Physics)
"Liquid Phase Epitaxial Growth of InGaAs on GaAs Substrate"
Adviser: Dr. Arnel Salvador
Panel: Dr. Henry Ramos, Mr. Armando Somintac

02:00 PM
Castro, Patricia Arielle A. (BS Applied Physics)
"Foreign Exchange Rates: Dynamics and Predictability"
Adviser: Dr. Caesar Saloma
Panel: Mr. Carlo Alonzo, Dr. Luis Bo-ot

03:00 PM
Dagum, Laurice Janette (BS Applied Physics)
"Investigations of Two Dynamical Systems with Delay"
Adviser: Dr. Jose Perico Esguerra
Panel: Mr. Kim Gargar, Dr. Christopher Monterola

04:00 PM
Daquido, Fema Joy A. (BS Applied Physics)
"Pulsed Color Digital Holography Using the Hydrogen Raman Shifter"
Adviser: Mr. Percival Almoro
Panel: Dr. Maricor Soriano, Dr. Giovanni Tapang

DAY 2: Saturday, 22 March 2003
09:00 AM
Ibaretta, Rodelio S. (BS Applied Physics)
"Frequency Conversion of a 532 nm Nd:YAG Laser by
Stimulated Raman Scattering in Hydrogen Gas"
Adviser: Dr. Wilson O. Garcia
Co-adviser: Mr. Jonathan A. Palero
Panel: Mr. Johnrob Bantang, Dr. Carlo Blanca

10:00 AM
Mateo, Jennette N. (BS Physics)
"Calculation of Absorption Coefficient of Strained MBE-grown InGaAs/GaAs Multiple Quantum Well by Transmission Spectroscopy"
Adviser: Dr. Arnel Salvador
Panel: Dr. Carlo Blanca, Dr. Henry Ramos

11:00 AM
Miranda, Jelda Jayne C. (BS Physics)
"Three-dimensional Imaging of Semiconductor Devices by One-photon Optical Beam-induced Current Imaging and Confocal Reflectance Microscopy"
Adviser: Dr. Caesar Saloma
Panel: Dr. Arnel Salvador, Dr. Cristine Villagonzalo

01:00 PM
Pampolina, John Paul (BS Physics)
"Spin Wave Processes in High-Temperature Superconductors"
Adviser: Dr. Danilo Yanga
Panel: Dr. Jose Magpantay, Dr. Roland Sarmago

02:00 PM
Perez, Gay Jane (BS Applied Physics)

"Investigation of Escape Panic Dynamics in Real Systems"
Adviser: Dr. Caesar Saloma
Panel: Dr. Eric Galapon, Dr. Cristine Villagonzalo

03:00 PM
Romallosa, Kristine Marie (BS Applied Physics)
"Analysis on the High-NA Focusing of Ultrashort Pulsed Gaussian Light Sources"
Adviser: Dr. Caesar Saloma
Panel: Mr. Nathaniel Hermosa Dr. Roy Tumlos

04:00 PM
Roxas, Ranzivelle Marianne Laygo (BS Applied Physics)
"Human Chromosome Analysis Using Grayscale and Color Techniques"
Adviser: Dr. Maricor Soriano
Co-adviser: Dr. Caesar Saloma
Panel: Dr. Ronald Banzon, Dr. Cynthia Palmes-Saloma

05:00 PM
Vasquez, Louella Judy (BS Applied Physics)
"Display Properties of Bistable Cholesteric LIquid Crystal (B-CLC) on Different Surface Alignments"
Adviser: Dr. Zenaida Domingo
Panel: Dr. Ronald S. Banzon, Dr. Marisciel Litong-Palima

Summer 2003
The Undergraduate Thesis Presentations for Summer 2003 was held on Wednesday, 28 May and Saturday 31 May, 2003 at the NIP AVR. Following was the schedule of presentations

Day 1: Wednesday, 28 May 2003
9:00 AM
Analiza B. Afable (BS Applied Physics)
"Investigation on the Effect of Polymer Concentration on the Viewing Angle Characteristics of Polymer Dispersed Cholesteric Liquid Crystals"
Adviser: Dr. Zenaida Domingo
Panel: Dr. Ronald Banzon, Dr. Henry Ramos

10:00 AM
Aaron Paul C. dela Cruz (BS Physics)
"Double Sign Reversal of the Hall Voltage in a Bi-2212 Thin Film"
Adviser: Dr. Roland Sarmago
Panel: Dr. Arnel Salvador, Dr. Jose Perico Esguerra

11:00 AM
Rhona Hectora Dulay (BS Physics)
"Fluorescence Spectroscopy and Thermogram Analyses of the Liquid Crystalline Properties During Suspended Animation of Tetrahymena in Cryogenic Temperature"
Adviser: Dr. Zenaida Domingo
Co-adviser: Mr. Custer Deocaris
Panel: Dr. Cristine Villagonzalo, Dr. Lorenzo Chan

1:00 PM
Francisco G. Escario Jr. (BS Physics)
"Effect of TM74A on the Performance of E7-based Twisted Nematic Liquid Crystal Cell (TNLC)"
Adviser: Dr. Zenaida Domingo
Panel: Dr. Ronald Banzon, Dr. Roy Tumlos

2:00 PM
Ervin Jon Hinojales (BS Applied Physics)
"Superconducting Fluctuations in the Transition Region of a BSCCO Thin Film grown by Liquid Phase Epitaxy (LPE): Magnetic Field and Temperature Dependence"
Adviser: Dr. Roland Sarmago
Panel: Dr. Arnel Salvador, Dr. Luis Ma. Bo-ot

3:00 PM
Julius Federico Jecong (BS Applied Physics)

"Inline Interferometer in an Optical-feedback Semiconductor Laser"
Adviser: Mr. Percival Almoro
Co-adviser: Mr. Alvarado Tarun
Panel: Mr. Carlo Alonzo, Mr. Johnrob Bantang

4:00 PM
Sarah C. Johnson (BS Physics)
"Investigations of Colloidal Ordering in E48:Castor Oil Mixtures"
Adviser: Dr. Zenaida Domingo
Panel: Dr. Cristine Villagonzalo, Dr. Lorenzo Chan

Day 2: Saturday, 31 May 2003
9:00 AM
Ma. Teresa L. Palamine (BS Physics)
Adviser: Dr. Zenaida Domingo
"Physical Characterization of the Lyotropic Lamellar Liquid Crystalline State of Rabid Dog Brain Lipid and Cell Membrane Systems"
Adviser: Dr. Zenaida Domingo
Co-adviser: Mr. Custer Deocaris
Panel: Dr. Maricor Soriano, Dr. Cristine Villagonzalo

10:00 AM
Judel A. Roman (BS Applied Physics)
"Description of Liquid Crystalline Phases in Prostatic Tumor Membranes"
Adviser: Dr. Zenaida Domingo
Co-adviser: Mr. Custer Deocaris
Panel: Dr. Ronald Banzon, Dr. Roy Tumlos

11:00 AM
Arvie D. Ubarro (BS Physics)
"Investigation of Varying Argon-Hydrogen Gas Mixture in the Production and Extraction in a Plasma Sputter-type Negative Ion Source with Zirconium Target"
Adviser: Dr. Henry Ramos
Panel: Dr. Arnel Salvador, Dr. Luis Ma. Bo-ot

First Semester AY 2003-2004
The Undergraduate Thesis Presentations for the First Semester AY 2003-2004 was held on Wednesday, 24 September 2003 at the NIP AVR. Following was the schedule of presentations.

01:00 PM
Ambanta, Ivan-Ronald (BS Physics)
"C-axis Oriented BSCCO (2212) Thin Film from Powder Deposition through a Suspension in a Liquid Medium and Growth by Partial Melting"
Adviser: Dr. Roland V. Sarmago
Suggested Panel: Dr. Carlo Blanca, Dr. Cristine Villagonzalo

02:00 PM
Bernaldez, Fe Loraine A. (BS Physics)
"Investigation of the Meissner Transition of Bulk BSCCO (Bi-2212) in an AC Magnetic Field"
Adviser: Dr. Roland V. Sarmago
Suggested Panel: Dr. Luis Ma. Bo-ot, Dr. Ronald S. Banzon

03:00 PM
Cueto, Adrel Voltaire (BS Applied Physics)
"Epitaxial Growth of BSCCO Superconducting Film on MgO by the Combined Method of Powder Deposition and Liquid Phase Sintering and Annealing Technique"
Adviser: Dr. Roland V. Sarmago
Suggested Panel: Dr. Arnel Salvador, Dr. Henry Ramos

04:00 PM
Rara, Bhazel Anne H. (BS Physics)
"Fractional Dynamics of One Dimensional Linear Chains"
Adviser: Dr. Jose Perico Esguerra
Suggested Panel: Dr. Jose Magpantay, Dr. Eric Galapon

2.4 Undergraduate Program Student Profile

The NIP continues to have the largest undergraduate student population in the College of Science for the third year in a row. 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 333 for the first semester , and 320 for the second semester for AY 2003-2004.

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 2003-2004 and for AY 2002-2004 enclosed in parentheses.

Table 2: Total Enrolment - First Semester AY 2003-2004 & [2002-2003]

Course	1st year	2nd year	3rd year	4th year	5th year	6th year	7-9th year	Total
BS Applied Physics	36 [47]	47 [39]	27 [25]	15 [26]	22 [15]	8 [10]	4 [2]	159 [164]
BS Physics	50 [57]	41 [39]	28 [22]	18 [21]	21 [14]	7 [8]	8 [4]	174 [165]
Total	86 [104]	88 [78]	55 [47]	33 [47]	43 [29]	15[18]	12 [6]	333 [329]

Table 3: Total Enrolment - Second Semester AY 2003-2004 &(2002-2003)

Course	1st year	2nd year	3rd year	4th year	5th year	6th year	7-9th year	Total
BS Applied Physics	33 [48]	48 [37]	28 [26]	13 [26]	21 [13]	7 [9]	1 [3]	151 [162]
BS Physics	50 [53]	37 [38]	25 [21]	20 [20]	22 [14]	8 [6]	7 [5]	169 [157]
Total	83 [101]	85 [75]	53 [47]	33 [46]	43 [27]	15 [15]	8 [8]	320 [319]

The total number of third year standing students (3rd and 4th year by year of admission) continues to be large, prompting a continued offering of a larger class size for third year level courses. 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 fourth 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 parentheses.

Table 4: Total Freshman Enrolment for the First Semester and Number of Graduates for the Academic Years Starting 1998-2002

Course	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003
BS Applied Physics	67 (7)	69 (6)	41 (17)	45 (15)	36 [12]
BS Physics	67 (9)	60 (0)	42 (05)	53 (04)	50 [11]
Total	134 (16)	129(6)	83 (22)	98 (19)	86 [23]

As noted in last year's report, the number of graduates of the academic year (2001-2002) shows a slight decrease in number, which was not expected to be representative of a trend since the number of students retained beyond the third year has been shown to increase. The recently concluded academic year is the largest in the past five years.

As indicated earlier, from the sum of third and fourth year students remaining at the same level in the past four years, we are expecting a large number of graduates at the conclusion of the current academic year.

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.

As reported last year the acquisition of more review copies of the physics text by Resnick and Halliday, through C&E Publishing, Inc. , has been made and distributed to the different course groups. C & E Publishing, Inc. is also currently making available the latest editions of the text by Tipler and that of Young for consideration as soon as they are made available.

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 third academic year.

A summary of data reported by Mr. Percival Almoro, chair of the General Physics Committee, for the student performance in Physics 7x and Physics 7x.1 courses is shown in Tables 6 and 7.

The target passing-rate of at least 75% was achieved for all courses during the Second Semester AY 2002-2003, as shown in the last column of Table 6. As was achieved for the first time in the previous academic year.

Table 6: Student Performance Second Semester AY 2002-2003 and [AY 2001-2002]

Course	Number of Students	Pass	Fail	"4.0"	Drop	INC	Percent Passed
Physics 71	609 [711]	[539]	66 [81]	47 [68]	[19]	0 [4]	78 [76]
Physics 72	526 [562]	[425]	79 [52]	64 [59]	[26]	0 [0]	74 [76]
Physics 73	305 [341]	[264]	6 [24]	8 [43]	[6]	0 [4]	95 [77]
Physics 71.1	[472]	[424]	[22]	[4]	[20]	[2]	[90]
Physics 72.1	[355]	[332]	[7]	[5]	[7]	[4]	[94]
Physics 73.1	[257]	[240]	[12]	[2]	[2]	[1]	[93]
Total	[2698]	[2224]	[198]	[185]	[80]	[15]	[82]

Table 7: Student Performance First Semester AY 2003-2004 and First Semester AY [2002-2003] and (2001-2002)

Course	Number of Students	Pass	Fail	"4.0"	Drop	INC	Percent Passed
Physics 71	606 [628] (623)	[519] (467)	101 [49] (60)	94 [47] (75)	[11] (15)	0 [2] (6)	67 [82.64] (74.96)
Physics 72	469 [592] (669)	[413] (402)	70 [96] (121)	55 [61] (102)	[15] (40)	3 [4] (2)	72 [69.76] (60.09)
Physics 73	222 [195] (271)	[167] (236)	41 [14] (12)	27 [13] (22)	[1] (1)	0 [0] (2)	47 [85.64] (87.08)
Physics 71.1	[486] (575)	[402] (461)	[29] (31)	[12] (5)	[29] (34)	[7] (35)	[82.72] (80.17)
Physics 72.1	[377] (375)	[344] (342)	[12] (16)	[5] (7)	[12] (6)	[0] (4)	[91.24] (91.20)
Physics 73.1	[231] (263)	[197] (235)	[12] (5)	[4] (4)	[12] (11)	[2] (8)	[85.28] (89.35)
Total	[2509] (2776)	[2042] (2143)	[212] (245)	[142] (215)	[80] (107)	[15] (57)	[81.38] (77.20)

Consideration of the total number of students enlisted in Physics 71, 72, and 73, we observe a general reduction in enlistment for these service courses. This may be due also to the same trend in the College of Science, where practically all institutes/departments had a lower number of majors.

2.5.3 Physics 103 and Physics 104 for College of Engineering Students

The observation of having a reduced number of students has been noted previously for the past few years in Physics 103 and Physics 104 for engineering students. It was commented that it is possible to offer a single section in the next academic year. Instead of this, it was also suggested to request for the utilization of rooms in the EEE department. This will free-up the 5:30-7:30 PM slot for other courses.

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.

Curricular Proposals
Applied Physics (Instrumentation Physics)

Proposed Revision of the B.S. Applied Physics (Instrumentation Physics) Curriculum

I. Background

The B.S. Applied Physics (Instrumentation Physics) Curriculum is being revised for the following reasons:

A. To modernize the course offerings making the curriculum relevant and responsive to current technologies.
B. To optimize the course sequences, removing redundancies and expanding key courses.
C. To ensure that BS Applied Physics Majors will acquire the necessary skills for research.

The current BS Applied Physics Instrumentation Curriculum is more than a decade old. From years of offering the program and from the experience of generations of BS Applied Physics majors, the staff of the Instrumentation Physics Lab have gained insights on the limitations of the curriculum. For example, Quantum Mechanics which is the foundation of all semiconductor technology is not currently included. Certain courses are redundant while some key courses are too compressed for one semester. The new curriculum eliminates these limitations by removing redundant subjects, introducing new courses and redefining existing ones. With the proposed curriculum, the program aims to produce graduates with skills and competencies in independent research for a career in industry or for higher studies.

II. Summary of the subjects to be removed from and added to the B.S. Applied Physics (Instrumentation Physics) curriculum

Year	*Sem*	*Removed Subjects*	*Units*	*Replacement*	*Units*
3rd	1	EE 6	-4	GE (Arts and Humanities)	3
	2	EE 7	-3	GE (Social Sciences & Philosophy)	3
		Physics 105 (Modern Physics II)	-3	Physics 141 (Quantum Physics I)	3
				Physics 151 (Statistical Physics I)	3
4th	1	EE 131 (ECE 101)	-3	Applied Physics 156 (Comp. Methods in Physics II)	4
	2	EE 132 (ECE 135)	-3	Physics 166 (Optical Physics II)	3
		GE (Arts and Humanities)	-3	Applied Physics 183 (Control Systems Approach to Physics Modeling)	3
5th	1	GE (Social Science & Philosophy)	-3	Applied Physics 187 (Photonics)	4
		TOTAL	-22	TOTAL	26

III. Institution of Courses

1. Applied Physics 156 : Computer Methods in Physics II

Prereq : AP 155 6 h (3 lec, 3 lab) 4 units

Course Description Advanced computer programming methods; numerical modeling and simulations; discrete models; stochastic methods; current approaches in numerical modeling.

Justification: Students require sufficient introduction to computer methods and numerical analysis before they can tackle applications independently. Applied Physics 155 alone cannot accomodate all the relevant topics. Offering another course on advanced topics is essential for their future courses and research.

9. Physics 166 : Optical Physics II

Course Description: Coherence theory; Fourier optics and imaging; basic microscopy; spectroscopy; nonlinear optics;

Justification : Physics 165 alone cannot accommodate all the relevant topics in optics. Spectroscopy, imaging and nonlinear optics are fundamental tools in theoretical and experimental research.

10. Applied Physics 183 : Control systems approach to physics modeling.

Prereq: Physics 121;

Course Description: Linear and nonlinear systems; analog and digital control systems; time-domain modeling; frequency-domain modeling; transient response, stability analysis, steady-state error; control system design.

Justification: Physical modeling employing a control systems perspective is relevant in both theoretical and experimental research. This course provides a foundation to systems analysis and instrumentation design. Replaces EE 101.

11. Applied Physics 187 : Photonics

Prereq : AP 185, Phys 166, 6h. , Coreq: AP 186 (3 lec, 3 lab) 4 u. [2nd semester]

Course Description: Design of Data Acquisition Systems (DAQ)/Digital Signal Processing (DSP) -based instrumentation systems; Current topics and techniques for engineering optical instruments; Non-destructive testing/ measurement using optical methods; interferometry;

Justification : Majors must be able to design, integrate and construct optical and electronic systems for specific research applications. This course integrates previously acquired skills in optics, instrumentation, and signal processing.

IV. Revision of Courses
A. Change in Course Title

From : Applied Physics 155 : Computer Methods in Physics
To : Applied Physics 155 : Computer Methods in Physics I
Justification : There will be an Applied Physics 156 : Computer Methods in Physics II.

From : Physics 165 : Optical Physics
To : Physics 165 : Optical Physics I
Justification : There will be a Physics 166 : Optical Physics II.

B. Change in Course Description

Physics 165 : Optical Physics I
From : Optics of planar surfaces, paraxial & non-paraxial optics, interference, far-field diffraction, Fourier optics, image formation, temporal and spatial coherence, polarization
To : Wave theory, Geometrical Optics, Polarization, Interference and Diffraction
Justification: Physics 165 has too many topics to fit in one semester. Fourier optics, image formation and coherence are moved to Physics 166. The revised course description is more concise.

Applied Physics 185 : Instrumentation Physics I
From: Sensors, transducers, & measurement techniques for various physical variables; design of microprocessor-based instrumentation systems for spectroscopic and other applications; sampling theory & reliability of data.
To : Sensors, transducers, & measurement techniques for various physical variables; signal conditioning, digitization and sampling; signal processing & reliability of data.
Justification : Applied Physics 185 currently has too many topics to fit in one semester. The topic “design of microprocessor-based instrumentation systems” is moved to Applied Physics 187. Signal processing is essential to measurement.

Applied Physics 186 : Instrumentation Physics II
From: Non-destructive testing/ measurement using optical methods; interferometry; communication theory; image formation and imaging systems, 2- & 3-dimensional detection techniques; post-detection signal/image processing
To: Imaging systems and image processing, multidimensional detection techniques; pattern recognition.
Justification: Applied Physics 186 currently has too many topics to fit in one semester . The topics “Non-destructive testing/ measurement using optical methods; interferometry” are moved to Applied Physics 187 where it is comprehensively treated. One-dimensional signal processing is already covered in Applied Physics 185. The new description focuses on imaging and higher-dimensional signal processing.

V. Change in Program Requirements
A. Deletion of Courses
Physics 105 Modern Physics II
Justification: The course is replaced by Quantum Mechanics which is a more indepth treatment of modern physics.

EE 6 Essentials of Electrical Engineering I
Justification: The topics in this course are already covered in Applied Physics 181 (Physical Electronics I).

EE 7 Essentials of Electrical Engineering II
Justification: The topics in this course are already covered in Applied Physics 182.

EE 131 (ECE 101)
Justification: The topics in this course are covered in Applied Physics 183 (Control Systems Approach to Physics Modeling).

EE 132 (ECE 135)
Justification: The topics in this course are covered in Applied Physics 183, 185 and 187.

B. Addition of Courses

Physics 141 Quantum Physics I
Justification: Quantum Mechanics is the foundation of all semiconductor technologies and is a core course in any applied physics curriculum around the world. Replaces Physics 105.

Physics 151 Statistical Physics
Justification: The tools and concepts learned in Statistical Physics prepares the student for numerical simulations and experimentation of, for example, fluids, gases and molecules by presenting physics in the ensemble point of view.

C. Resequencing of Courses

Please see curriculum checklist.
J*ustification* : The proposed resequencing balances the distribution of units across the curriculum considering sequences of prerequisites, as well as difficulty of courses, emotional and mathematical maturity required of students.

D. Change in Total Number of Units
From: 174-176 units
To: 178 units

Checklist of Existing and Proposed Curricula

EXISTING CURRICULUM		PROPOSED CURRICULUM	
First Year, First Semester			
Math 14 (Plane Trigonometry)	3	Math 14 (Plane Trigonometry)	3
Math 53 (Elem Analysis I)	5	Math 53 (Elem Analysis I)	5
GE (Social Science & Philosophy)	3	GE (Social Science & Philosophy)	3
GE (Social Science & Philosophy)	3	GE (Social Science & Philosophy)	3
GE (Arts & Humanities)	3	GE (Arts & Humanities)	3
CMT	(1.5)	CMT	(1.5)
PE	(2)	PE	(2)
	17		17
First Year, Second Semester			
Physics 101 (Fundamental Physics I)	4	Physics 101 (Fundamental Physics I)	4
Physics 101.1 (Fundamental Physics Lab I)	1	Physics 101.1 (Fundamental Physics Lab I)	1
Math 54 (Elem Analysis II)	5	Math 54 (Elem Analysis II)	5
Geology 11 (Principles of Geology)	3	Geology 11 (Principles of Geology)	3
Geology 11.1 (Lab in Principles of Geology)	1	Geology 11.1 (Lab in Principles of Geology)	1
GE (Arts & Humanities)	3	GE (Arts & Humanities)	3
CMT	(1.5)	CMT	(1.5)
PE	(2)	PE	(2)
	17		17
Second Year, First Semester			
Physics 102 (Fundamental Physics II)	4	Physics 102 (Fundamental Physics II)	4
Physics 102.1 (Fundamental Physics Lab II)	1	Physics 102.1 (Fundamental Physics Lab II)	1
Physics III (Mathematical Physics I)	3	Physics III (Mathematical Physics I)	3
Math 55 (Elem Analysis III)	3	Math 55 (Elem Analysis III)	3
Chemistry 16 (General Chemistry I)	5	Chemistry 16 (General Chemistry I)	5
GE (Arts & Humanities)	3	GE (Arts & Humanities)	3
CMT	(1.5)	CMT	(1.5)
PE	(2)	PE	(2)
	19		19
Second Year, Second Semester			
Physics 103 (Fundamental Physics III)	4	Physics 103 (Fundamental Physics III)	4
Physics 103.1 (Fund. Physics III Lab)	1	Physics 103.1 (Fund. Physics III Lab)	1
Physics 112 (Mathematical Physics II)	3	Physics 112 (Mathematical Physics II)	3
Math 121.1 (Elem. Diff. Equations)	3	Math 121.1 (Elem. Diff. Equations)	3
Chemistry 17 (General Chemistry II)	5	Chemistry 17 (General Chemistry II)	5
GE (Social Science & Philosophy)	3	GE (Social Science & Philosophy)	3
CMT	(1.5)	CMT	(1.5)
PE	(2)	PE	(2)
	19		19
Third Year, First Semester			
Physics 104 (Modern Physics I)	4	Physics 104 (Modern Physics I)	4
Physics 104.1 (Modern Physics I Lab)	1	Physics 104.1 (Modern Physics I Lab)	1
Physics 113 (Mathematical Physics III)	3	Physics 113 (Mathematical Physics III)	3
Physics 121 (Theoretical Mechanics I)	3	Physics 121 (Theoretical Mechanics I)	3
Physics 131 (Electromagnetic Theory I)	3	Physics 131 (Electromagnetic Theory I	3
EEE 6 (Essentials of Electrical Engineering)	4	G.E. (Arts and Humanities)	3
	18		17
Third Year, Second Sem			
Physics 105 (Modern Physics II)	3	Physics 141 (Quantum Physics I)	3
App Physics 155 (Computational Methods in Physics)	4	App Physics 155 (Computational Methods in Physics I)	4
App Physics 181 (Physical Electronics I)	4	App Physics 181 (Physical Electronics I)	4
Physics 132 (Electromagnetic Theory II)	3	Physics 132 (Electromagnetic Theory)	3

EXISTING CURRICULUM		PROPOSED CURRICULUM	
EEE 7 (Essentials of Electrical Engineering II)	3	G.E. (Social Science and Philosophy)	3
		App Physics 151 (Statistical Physics I)	3
	17		20
Fourth Year, First Sem			
App Physics 173 (Solid State Physics)	3	App Physics 173 (Solid State Physics)	3
App Physics 182 (Physical Electronics II)	4	App Physics 182 (Physical Electronics II)	4
Physics 165 (Optical Physics)	3	Physics 165 (Optical Physics I)	3
Physics 191 (Experimental Physics I)	4	Physics 191 (Experimental Physics I)	4
EEE 101 (Control Systems Theory)	3	App Physics 156 (Computational Methods in Physics II)	4
	17		18
Fourth Year, Second Sem			
Biology 11 (Fundamentals of Biology I)	5	Biology 11 (Fundamentals of Biology I)	5
App Physics 185 (Instrumentation Physics I)	4	App Physics 185 (Instrumentation Physics I)	4
Physics 192 (Experimental Physics II)	3	Physics 192 (Experimental Physics II)	3
ECE 123 (Digital Instrumentation & Control Techniques)	3	Physics 166 (Optical Physics II)	3
G.E. (Arts and Humanities)	3	App Physics 183 (Control Systems Approach to Physics Modeling)	3
	18		18
Fifth Year, First Semester			
Physics 161 (Introductory Laser Physics)	3	Physics 161 (Introductory Laser Physics)	3
App Physics 186 (Instrumentation Physics II)	4	App Physics 186 (Instrumentation Physics II)	4
App Physics 199 (Undergraduate Research)	3	App Physics 199 (Undergraduate Research)	3
G.E. (Math, Science and Technology)	3	G.E. (Math, Science and Technology)	3
G.E. (Social Science and Philosophy)	3	App Physics 187 (Photonics)	4
	16		17
Fifth Year, Second Semester			
Physics 196 (Undergraduate Seminar)	1	Physics 196 (Undergraduate Seminar)	1
App Physics 200 (Undergraduate Thesis)	3	App Physics 200 (Undergraduate Thesis)	3
GE (Arts & Humanities)	3	GE (Arts & Humanities)	3
GE (Social Science & Philosophy)	3	GE (Social Science & Philosophy)	3
GE (Math, Science & Technology)	3	GE (Math, Science & Technology)	3
P.I. 100	3	P.I. 100	3
	16		16

Total Number of Units
Existing Curriculum = 174
Proposed Curriculum = 178

Applied Physics 156: COMPUTER METHODS IN PHYSICS II
Prereq: App. Phys. 155. **Course Duration:** 1 sem (48 hrs lecture, 48 hrs lab) [1st Semester] **Credit:** 4 units
Course Description: Advanced computer programming methods; numerical modeling and simulations of stochastic phenomena, chaos, and other complex systems; finite difference time domain; cellular automata and other current approaches in numerical modeling;

Course Outline

D. Random number generation
   E. Uniform deviates
   F. Transformation method: exponential and normal devites
   G. Rejection method: Poisson and binomial deviates
   H. Monte Carlo integration

I. Noise and stochastic phenomena
   J. Stochastic resonance
   K. Population dynamics
   L. Simulated annealing

M. Chaotic systems
   N. Logistic equation and other chaotic systems
   O. Liapunov exponent and other measures of chaos
   P. Phase space and the Poncaire section

Q. Finite difference
   R. Difference equations
   S. Heat equation and heat diffusion
   T. Wave equation
   U. Schrödinger equation

V. Cellular automata
   W. One dimensional cellular automaton
   X. Sand-pile model

Y. Agent-based approach models

References

2. William H. Press, et al. **Numerical recipes in C: The art of scientific computing**. 2nd Ed. (Cambridge University Press, Cambridge) *Available Online.*
3. Franz Vesely. **Computational Physis – an Introduction** (Plenum Press, New York) 2001
4. A. Garcia. **Numerical Methods for Physics.** 2nd Ed (Prentice Hall) 1999

Requirements

Laboratory exercises (>10)	30%	
Lecture class exams (>2)		30%
Problem sets/Projects (5)	30%	
Participation, Quizzes	10%	

Physics 166 : OPTICAL PHYSICS II

Prereq: Physics 165 **Course Duration:** 1 sem (48 hrs) [2nd semester] **Credit:** 3.0 units
Course Description: Coherence theory; Fourier optics; basic microscopy; spectroscopy; nonlinear optics.
Course Goal: A continuation of Physics 165 focusing on modern research areas relevant to the field of optics.

Course Content:
Z. Coherence Theory **– 6 hrs**
Basic Theory, Visibility, Mutual Coherence Function, Degree of Coherence
AA. Fourier Optics – **6 hrs**
Basic Theory, Fourier Transforms and Fourier Transform Spectroscopy, Image Formation, Optical Applications
BB. Basic microscopy – **12 hrs**
Image formation theory, Anatomy of optical microscope, Contrast enhancement techniques (widefield, polarization, differential interference, darkfield, fluorescence), Advanced techniques
CC. Basic spectroscopy – **12 hrs**
Fluorescence spectroscopy, Instrumentation, Lifetime measurements, Fluorophores, Raman and Stimulated emission
DD. Nonlinear Optics – **12 hrs**

Linear and non-linear dielectric response, Principles of nonlinear wave interaction : second harmonic generation and four wave mixing, Inelastic scattering : stimulated raman and brillouin scattering, Self-induced transparency, Optical interactions in magnetic materials : kerr effect, pockels effect and bragg cell.

References
5. Optical microscopy by Davidson and Abramowitz
6. Principles of fluorescence spectroscopy by J Lackowicz
7. Optics 4th Edition, Eugene Hecht
8. Handbook of nonlinear optics by R Sutherland
9. Nonlinear Optics : basic concepts by D.L. Mills

Requirements
Long Examinations, Finals
Problem Sets and Quizzes

Grading System*	
$X \geq 90$	1.00
$90 > X \geq 85$	1.25
$85 > X \geq 80$	1.50
$80 > X \geq 75$	1.75
$75 > X \geq 70$	2.00
$70 > X \geq 65$	2.25
$65 > X \geq 60$	2.50
$60 > X \geq 55$	2.75
$55 > X \geq 50$	3.00
$50 > X \geq 45$	4.00
$45 > X$	5.00

*Followed by all new courses to be instituted.

Applied Physics 183: CONTROL SYSTEMS APPROACH TO PHYSICS MODELING
Prereq: AP 181. **Course Duration:** 1 sem (48 hrs) [1st semester] **Credit:** 3 units
Course Description: Linear and nonlinear systems. Analog and digital control systems; Time domain modeling; Frequency domain modeling; transient response, stability analysis, steady-state error. Control system design
Course Goals: At the end of the course, the student will be able to:
10. Derive the differential equation describing a system given its schematic diagram.
11. Derive the transfer function of a system from its differential equation.
12. Analyze the stability of a system using time and frequency response techniques.
13. Approximate nonlinear system characteristics using simulation.

Course Content:
LINEAR SYSTEMS (16 hrs)
EE. Linear systems : Definitions and Properties
FF. Transfer functions Impulse Response and convolution
GG. Laplace transform, Block diagram reduction
HH. State space representation, signal flow graphs
II. Mason-gain formula
JJ. Stability and steady-state errors in continupus-time systems
KK. Routh-Hurwitz Criterion
LL. Root Locus Methods
MM. Bode Diagrams
NN. Nyquist Plots and Nyquist Stability Criterion
First Long Exam (2 hours)
DISCRETE-TIME and DIGITAL SYSTEMS (14 hrs)
OO. Discrete-time systems, Sampled Data and the Ideal Sampler,
PP. z-transform, transfer functions and block diagram reduction
QQ. Transient Response on the z- and s-plane and Gain Design
RR. Open and closed loop analog and discrete time systems
SS. Stability and steady-state errors in discrete systems
TT. Data reconstruction and the Pulse Transfer Function
Second Long Exam (2 hours)
NONLINEAR SYSTEMS (14 hours)
UU. Nonlinear System Definitions and Properties
VV. Describing Functions
WW. Stability of Limit Cycles
XX. Equilibrium States and Lyapunov Stability
YY. State Plane Analysis
ZZ. Method of isoclines
Third Long Exam (2 hours)

References
Nise, Control Systems and Engineering 2nd Ed. (Addison-Wesley 1995)
Shinners, Modern Control Systems Theory and Design (John Wiley & Sons, 1992)
Ogata, Modern Control Engineering, 4th Ed. (Prentice-Hall 2002)
Philips & Habor, Feedback Control Systems, 2nd Ed. (Prentice-Hall)

Course requirements
Daily seatwork – 20%
3 long exams – 60%
programming work – 20%

Applied Physics 187: PHOTONICS

Prereq: Physics 166 **Course Duration**: 1 sem (48 hrs lec 48hrs lab) [2nd semester]
Credit: 4 units
Course Description: Design of Data Acquisition Systems (DAQ)/Digital Signal Processing (DSP)-based instrumentation systems; current topics and techniques for engineering optical instruments; non-destructive testing/measurement using optical methods; interferometry.
Course Goals:

14. Enable students to design custom graphical user interfaces using LabVIEW ® for experimental work in applied physics.
15. Provide hands-on experience in the design of DAQ systems.
16. Discuss basic engineering considerations for circuit design, noise, grounding and shielding of measurement hardware.
17. Design digital filters and apply DSP algorithms in real-time hardware to optical experiments.

Course Content
OPTICS COMPONENT:
AAA. Interferometry
Constructing the interferometer (Michelson, Mach-Zender, Sagnac), Cyclical shearing interferometer, thermal gradient, wavemeter, displacement sensor, white light interferometry
BBB. Spectrometry
Constructing and calibrating the spectrometer, parametric effects (slit size, number of gratings), emission spectrometry using flash lamps, absorption spectrometry
CCC. Fluorescence microscopy
Constructing the microscope, fluorophore preparation, data acquisition techniques: photodetectors, chopper and lock-in amplification
OPTIONAL:
DDD. Fiber Optics
Basics of fiber optics, handling fibers : numerical aperture, fiber attenuation, single-mode fibers, coupling fibers to sources, single-mode interferometric sensors

DAQ & DSP:

12. Engineering measurements in instrumentation
13. Introduction of graphical programming and LabVIEW
14. LabVIEW panels and function palletes
15. LabVIEW loops and charts
16. LabVIEW arrays and graphs
17. LabVIEW strings
18. Introduction to instrument control using LabVIEW
19. LabVIEW local and global variables
20. LabVIEW file i/o
21. Using DAQ Designer
22. Introduction to Data Acquisition : Analog i/o
23. Introduction to Data Acquisition : Digital i/o, counters and timers
24. Development of DSP
25. DSP Microprocessors and embedded systems
26. Embedded C fundamentals for real-time DSP
27. Sequences, LTI operators
28. Digital filter designer
29. Introduction to adaptive filter (Weiner filter)
30. Real-time FFT

References

1. LabVIEW supplied manuals
2. LabVIEW Signal Processing by M. Chugani, A. Samant, M. Cerna (Prentice-Hall)
3. LabVIEW Graphical Programming by G. Johnson, R. Jennings (McGraw-Hill)
4. C-Algorithms for Real-Time DSP by P. Embref
5. Digital Signal Processing: A Practical Approach E, Ifeachor, B. Jervis (Prentice-Hall)

Requirements

Long Exams, Experiments, Projects

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

Contributed Dr Arnel Salvador

SUMMARY OF RESEARCH PROJECTS 2003

Condensed Matter Physics Laboratory

Program Coordinator: Dr Roland Sarmago

Loss Behavior of YBCO in Low AC Magnetic Fields

This study investigates the intergranular coupling characteristics of polycrystalline YBCO in the Meissner region. Data indicates that inclusionof flux and vortex dynamics in the model is not necessary to explain theappearance of a peak in the out-of phase signal. It is shown that a simple consideration of eddy currents accounts for all the observed characteristics of the signals.
R. V. Sarmago, Ma. V. S. Torralba , B. Singidas ,J. Afalla, .M. Uy
Funding: "Hysteresis effects in Bi 2212 superconductors", OVCRD/UP (R.V. Sarmago, Principal Investigator).

Magnetic Susceptibility of MgB2

This study aims to establish a definite shape for the magnetic susceptibility of MgB2. Data indicates that the degree of assymmetry in the out-of-phase susceptibility is very small. Some published data show a very large assymmetry for the loss peak.
R. V. Sarmago, M. Olbinado, D. Ramos
Funding: UP Systems Research Grant (R.V. Sarmago, Principal Investigator).

Magnetic Properties of BSCCO

This study investigates the magnetic characteristics of BSCCO at low magnetic fields. The occurence of intergrowth in these materials is of particular interest. The interference of the signals from the various phases are currently being investigated.
R. V. Sarmago, J. Bugante, S. Pigarowa, D. Espina, P. Mendoza

BSCCO Thin Films

This study investigates the growth of BSCCO thin films via sedimentation and melting. It is hoped that due to the ease with which films can be fabricated using this technique, superconducting devices may be fabricated in the laboratory soon.
R. V. Sarmago, G. Pascua, I. Yanson, G. Blanca, G. Dumlao, R. Manahan,J. Ronulo, R. Sarmiento

BSCCO Single Crystals

This study aims to produce single crystals for basic physical study.
R. V. Sarmago, H.Rillera,R Sioson

Investigation of strain induced electric fields in InAs/GaAs quantum dots

The electtroluminesnce and photocurrent spectrum of InAs quantum dots directly grown in GaAs and in an InGaAs quantum well are compared . Discrepancies between the two are investigated in the light of strain induced electric fields.
A. Salvador, E. Estacio, A. Somintac, A. Garcia , A. Podpod
Funding: OVCRD/UP (A. Salvador, Principal Investigator).

Growth and fabrication of InAs quantum dots for optoelectronic devices

The use of InAs quantum dots as the active layer in lasers is pursued because it promises to be a viable candidate for wavelength emission at 1.3 micron. Raman scattering and Photoluminescence spectroscopy were used to investigate the properties of these dots as they undergo insitu annealing under a GaAs or AlAs

overgrowth. Various structures such as growing the InAs in an InGaAs well , use of longer growth times for InAs dots and the use of an InGaAs strained quantum well as a pre layer were employed to shift the emission to 1.3 micron.
A. Salvador, A. Somintac, J. de Luna, E. Estacio, J. Mateo, A. Garcia
Funding: "Project 1: Program for the development of III-V optoelectronic devices". PCASTRD/DOST (A. Salvador, Principal Investigator).

Growth of InGaAs/InP films

InGaAs latticed match to InP were grown by molecular beam epitaxy. These films are intended for optical emission in the 1.5 and 1.3 micron range.
A . Salvador, A. Podpod, K. Bautista
Funding: "Project 2: Program for the development of III-V optoelectronic devices". PCASTRD/DOST (A. Salvador, Principal Investigator).

Fabrication GaAs and InGaAs optoelectronic devices

GaAs quantum well lasers and photodetectors were grown by Molecular beam epitaxy . Edge emitting lasers and vertical emitting lasers (VCSEL) were fabricated from the grown epilayers and their device properties investigated. Lasing at 0.98 micron and 0.84 micron were obtained for the InGaAs and GaAs quantum well edge emitting lasers respectively. Oxide confinement was used in the fabrication of the VCSEL which showed lasing at current threshold of 300 A/cm^2. Resonant cavity enhanced photodetectors were fabricated with wavelength selectivity suited for 0.84 micron detection.
A. Salvador, A. Somintac, E. Estacio, F. Agra, J. Reyes, A. Garcia, J. Sy, M. Dimamay, C. Hintay, G. Manasan, A.Samson

Instrumentation Physics Laboratory

Program Coordinator: Dr Carlo Mar Blanca

Development of a beam-scanning two-photon excitation microscope for biomedical researchers and materials scientists

Our proposal is about the construction of a beam-scanning 2PE microscope that will be used to investigate biological as well as semiconductor samples. Its potential applications will be in the 3D imaging internal organs in embryos (biotechnology) and defects in multi-layers integrated circuits (materials science). Failure analysis is bound to assume an increasingly critical role in the semiconductor industry as the transistor number density in commercially-available integrated circuits (IC) increases to approach the limit set by the atomic size. A particular concern in failure analysis is the accurate, rapid, and inexpensive isolation of device defects since the capability would lead to considerable savings during device design, testing and manufacture.The same is true with biomedicine and biotechnology where the development of effective approaches to the treatment of diseases.
C. Saloma, C. Blanca, B. Buenaobra, G. Bautista, C. Samson , J. Miranda
Funding: PCASTRD/DOST "Development of a beam-scanning two-photon excitation microscope for biomedical researchers and materials scientists" (C. Saloma, Principal Investigator)

Three-dimensional optical characterization and spatial localization of deep-site defects in multi-layer semiconductor microchips
We shall implement a non-invasive optical protocol for generating high-contrast, three-dimensional images of defects in an integrated circuit (IC) via an imaging technique that combines confocal reflectance microscopy with one-photon optical beam-induced current (1P-OBIC) imaging. When a focused beam with photon energy exceeding the semiconductor bandgap is scanned across the IC surface, a two-dimensional map of induced currents is obtained containing information on any anomalies on the semiconductor elements on the microchip. Because the 1P-OBIC is linear with the excitation beam intensity it possesses no vertical resolution and the method alone is not sufficient for modern multi-layer microchips. If an equivalent confocal reflectance image is acquired and its image product with the 1P-OBIC image taken, then a high-contrast semiconductor image at a specified axial position can be generated. This relatively simple but effective approach can be utilized to localize and analyze semiconductor damage caused by electrical overstress (decrease in OBIC current) and unwanted formation of generation centers (increase in OBIC current), features that are difficult to isolate with confocal or 1P-OBIC imaging alone.
C. M. Blanca, B. Buenaobra, C Samson
Funding : UP/OVCRD (C. Blanca, Principal Investigator).

Three-dimensional optical characterization and spatial localization of deep-site semiconductor defects
C. Blanca
Funding : Philippine Foundation for Physics, Inc(Counterpart funding of the OVCRD grant).

Biometric from front view gait,
M. Soriano, J. Balista, A. Araullo
Funding: UP/OVCRD (M. Soriano, Principal Invesitgator).

Complex Systems
M.Lim, P.Castro, G. Perez, J. Bantang, S. Marcos, K. Ramollosa, R. Roxas, E. Juanico

Photonics Research Laboratory
Program Coordinator: Dr Wilson Garcia

Dye Doped Liquid Crystals
Methyl red doped nematic liquid crystal (MR:NLC) is an extremely sensitive and highly nonlinear optical material. Our Group studies light-induced processes such as photovoltaic effect, photoisomerization and photothermal effects that contribute to the refractive index change of MR:NLC. Future activities will explore applications such as optical data processing and storage in MR:NLC and other dye-doped liquid crystals.
N. P. Hermosa II , K. D. Guto, C. O. Manaois
Funding: "Degenerate Four-wave Mixing in Methyl Red-doped Nematic Liquid Crystal", UP Diliman (N. Hermosa, Principal Investigator)

Photorefractive Crystals
Photorefractive effect refers to light induced change in the refractive index of a media. This method could very well be used in the next generation of data storage devices. In our Group, lasers of different wavelengths are used to record and read 2-D and 3-D information in photorefractive crystals. We are currently working on applications using $LiNbO_3$ and BSO crystals.
R. A. Guerrero, L. G. Senatin

Holography
The ability to freeze an instant of time makes holography a useful technique in studying dynamic objects. The current thrusts of our group are optical pattern recognition, pulsed multicolor digital holography, detection of sub-surface defects inplastics and strain analysis in biomedical specimens
P. F. Almoro, Ma. A P. Manuel, S. C. Ledesma, M. V. C. Balaois,
Funding: "Development of a 635 nm Laser Diode with Feedback", PCASTRD/DOST(P. Almoro , Principal Investigator)

Laser Pulse Propagation in Optical Fiber
Our Group investigates the propagation of ultra short (femtosecond) laser pulses in optical fibers.
W. Garcia, J. F. Gabayno, B,D. Maraña, F. I. Catalan

Laser Produced Plasma

At a sufficiently high intensity, an incident pulsed laser beam will convert matter into plasma. Our Group is interested in understanding the kinetics and dynamics of the interactions between laser, matter and plasma, including the expansion of the plasma into the environment. Our main research activities involve developing and implementing in-situ spatially and temporally resolved plasma diagnostic techniques; laser induced plasma spectroscopy and pulsed laser deposition.
W. Garcia, R. S. Ibarreta.

Geneneration and Application of Laser light via SRS

Our Group investigates the generation of laser light via stimulated Raman scattering in gases. We also investigate its application in the areas of signal amplication, multi-color and multi-photon phenomena such as fluorescence and laser induced current.
W. Garcia, C. A. Alonzo, M. M. Cadatal, M. Y. Torres, F. P. Pataleta Jr., G. G. Manahan
Funding: "Weak Optical Signal Detection via a Stimulated Raman Amplifier" PCASTRD,.(W. Garcia, Principal Investigator)

Plasma Physics Laboratory

Program Coordinator: Dr Henry Ramos

Prototype plasma devices for industrial applications;
Funding : DOST GIA (H.Ramos, Principal Investigator)

Development of Plasma-Sputter Type Negative Ion Source (PSTNIS)
High grade coatings of zirconium mononitride (ZrN) are deposited on copper substrates using a multicusp plasma sputter-type negative ion source. The ion source was operated in its target/gas mode with zirconium as target metal, argon as sputtering gas and nitrogen as reactive gas. Optimum conditions for the synthesis of ZrN for a number of process parameters like volume ratio of gases, discharge conditions, substrate bias and deposition time were determined. Deposited films exhibited the (111). (200) and (222) peaks of ZrN as shown from x-ray diffractograms and energy dispersive spectroscopy. Film thickness measurements from focused ion beam indicated the deposition rate between 17 nm/min to 36 nm/min.The ion bean energy characteristics of cesiated and uncesiated targets in the production of H- ions were also investigated . A tenfold increase in the extracted H^- ion beam current is attributed to the addition of cesium vapor to the plasma

Development of Sheet Plasma Negative Ion Source (SPNIS)
A sheet plasma of several millimeters produced by a combination of a pair of strong dipole magnets with opposing fields and a pair of Helmholtz coils producing a magnetic mirror field was used in the deposition of titanium nitride (TiN). Plasma limiters encasing a ferrite magnet and a coreless magnetic coil add to the mirror field, enhancing quiescence in the plasma. Deposition times were relatively short from 10 to 20 min. Excellent films exhibiting the stoichiometric TiN (200) and Ti_2N(220) phases were synthesized.
The SPNIS facility also served as test bed for the characterization of a developed ExB probe in the extraction of H^- ions. An ExB probe is characterized by investigating its two parameters, namely extraction voltage (V_{ext}) and lens voltage (V_{lens}). The effects of V_{ext} and V_{lens} on the extracted H^- ion current were examined The facility also served as source of He^+ ions. Plasma temperatures like electron temperature, electron density and extracted ion current were analyzed vis-à-vis a modified Saha population density equation of the collisional radiative model. The numerical calculations show that at low discharge currents and in the hot electron region of the sheet plasma, relative densities of He^+ ions show some degree of correlation with ion current profiles established experimentally using the ExB probe

Development of Plasma-Enhanced Chemical Vapor Deposition (PECVD)
Diamond and diamond like carbon (DLC) films were deposited on silicon wafer at relatively low substrate temperatures ranging from 175C to 275C by d.c. plasma chemical vapor deposition Raman spectroscopy, X-ray diffraction (XRD), and scanning electron microscopy confirmed the produced films. The Raman and XRD results indicating the transition from DLC to diamond film under certain deposition conditions conform to a model involving the reaction of hydrogen in the growth process of these films.

Development of ECR facility
A compact electron-cyclotron resonance (ECR) ion source is being developed using a commercial 2.45 GHz magnetron as microwave source. Using an array of six Sm-Co permanent magnets and two solenoid coils about the plasma chamber, the ECR effect
will be used to efficiently induce high density ions in the plasma. Initial tests on the source have been conducted.

Development of compact gas discharge in source;
The characteristics of a new compact gas discharge ion source (GDIS) are studied in terms of the produced unfocused positive hydrogen ion beams. Emittance, brightness and perveance as causes of deterioration of the beam and its quality are considered. A new mass analyzer with a broader range of detection and higher resolving power was also constructed as diagnostic tool for the GDIS.

Industrial plasma technology
Under the best conditions of coating TiN on sample stainless steel substrates in project A.1.b.1, several drill bits (M10x1.5 and M8x1.25) were immersed in the N_2/Ar sheet plasma. The developed process allowed for a thin layer of TiN to be diffused into the tool surface demonstrating the capacity of the SPNIS for the synthesis of TiN on industrial tools

Structure and Dynamics Research Group
Program Coordinator: Dr Cristine Villagonzalo

The Penna Model with Bitstrings
The Penna model of biological aging with a relatively long bitstring has been demonstrated to yield chaotic dynamics. The shorter bitstring investigation seeks to determine is similar chaotic dynamics may be obtained. A modification of the implementation of random death occurrences in the original model, as suggested in the literature, was also incorporated into the investigation. Instead of death occurences at any age due to environmental constraints, it was limited to newborns only.This implementation is biologically more acceptable in the sense that the newborn is less adapted to external variations. The variation of the random death implementation necessitated a reinterpretation of the common framework - the logistic equation, in which the Penna model results are interpreted.
R. Banzon , C.Nombres, E. Obias

Microscopic Calculation of the D.C. Conductivity and Thermopower of One-Dimensional Systems
With the development of carbon nanotubes and quantum wires there is a revival of interest in the one-dimensional transport properties. A Green's function recursion algorithm based on a linear response method was used to calculated kinetic coefficients in long wires. From the kinetic coefficients, we observe a Lorentzian-like distribution for the thermopower. This distribution is found to be modified in the presence of inelastic scattering.
C. Villagonzalo

Fe-based Superlattices: Influence of Structure on its Magnetic Properties
A ferromagnetic iron (Fe) in bulk loses its magnetization when grown as a monolayer film and sandwiched in non-magnetic vanadium (V) layers. This is a phenomenon verified in this work using numerical simulation. In this project, the interfacial structure of Fe/V multilayers are studied using a base geometry of muffin-tin spheres representing ion cores in the solid and the interstitial region in between the spheres. With no assumption on the shape of the potential and charge density and using local density approximation methods, the Fe/V multilayers' total energy and density were calculated rigorously.

Presently, atomic force calculations are on-going to obtain the equilibrium structure of different combination of layers of Fe and V.
C. Villagonzalo, M. Labora
Funding :U.P. System Creative and Research Scholarship Fund (C. Villagonzalo, Principal Investigator)

Thermal Conduction of Multilayer Structures
Heat tolerance and control of heat dissipation are significant considerations in the design of magnetic multilayer devices. Hence, it is important to investigate the thermal transport properties of multilayers and how they are affected with the structure of the layered films. Using the semiclassical theory of conduction in metals we calculate the transport properties such as the electric conductivity, thermoelectric power, thermal conductivity and the figure of merit. In this research, the main goal is to combine a method in calculating transport properties with an external temperature gradient to a first principles simulation technique in studying structure of metallic layers.
C. Villagonzalo, S. Johnson, J. Muldera, J. Dizon, R. Gammag
Funding: Office of the Vice Chancellor for Research Development, U.P. Diliman (C. Villagonzalo, Principal Investigator)

Interfacial Structural Studies of Co-based magnetic multilayers
This project is to numerically resolve the magnetic properties of cobalt (Co)/X multilayers through first principles. The metal layer X can either be iron (Fe) or rhenium (Re). Our results yield that the Fe layer at the interface of Fe and Co showed enhancement of its magnetization in the body-centered-cubic structured Co/Fe metallic multilayers. This is similar to the experimentally observed enhancement of magnetization in Fe-Co alloys. Energy changes due to magnetic anisotropy in the layers have also been numerically obtained. Investigations on the hexagonal-close-packed structured Co/Re multilayers are underway whether a similar magnetic enhancement and anisotropy will be observed.
C. Villagonzalo, M. Morales
Funding: DJ Faculty Grant, College of Science, U.P. Diliman (C. Villagonzalo, Principal Investigator)

Investigation of Heat Conduction in Multilayer Structures
The goal of this project is to model heat conduction in superlattices. Benchmark work for this project was made by obtaining the equilibrium structure of cobalt/copper (Co/Cu) multilayers. We find that face-centered cubic structured Co/Cu is lowest in total energy in the (111) crystallographic orientation than in the (001) and (110) texture. This is in agreement from experiments in literature that Co/Cu (111) is easier to grow since it is closed-packed in vacuum. The next step is to develop an algorithm which takes into account the semiclassical theory of heat conduction in metals in the Co/Cu superlattice.
C. Villagonzalo
Funding: Philippine Foundation for Physics, Inc

Theoretical Physics Group

Program Coordinator: Dr Jose Perico Esguerra

Associated Production of Bottomnia and Neutral MSSM Higgs Boson
Numerical results appropriate for the Fermilab Tevatron were obtained for the hadron production of χ_{C1} and χ_{C2} mesons and their subsequent decay
Funding Agency: OVCRD/UP
C. Palisoc

Perturbation Inspired Variational Technique
A new approximation scheme which outperform standard techniques for obtaining eigenvalues of quantum systems - the perturbation inspired variational technique - was developed and used to study the quantum double well, quartic anharmonic oscillator, and Bose-Einstein condensates
L. Chan, M. Manding , A. Villanueva , J. J. Vequizo

Spin Polaron Theory as a Microscopic Mechanism for High Temperature Superconductivity Theory
The finite temperature Green's function method was used to obtain higher order corrections to the hole spectral function, and to develop a strong coupling theory for high temperature superconductors.
D. M. Yanga, J. P. Pampolina , A. Francia , E. Navarro

Mathematical Foundations of Quantum Mechanics
Analytical expressions for the eigenvalues of eigenvectors of periodic confined time of arrival operators and a modification of the time-kernel equation that eliminates the assumptions of the transfer principle were obtained.
E.A. Galapon, J. S. Siclon , R. Bahague Jr., H. Pilapil , H.Domingo , R. Perez , R.Caballar

Fractional Dynamics of Nonlinear Systems
Exact results for piecewise linear and time-fractional dynamical systems were obtained.
J. P. Esguerra, B. A. Rara ,F. N. Paraan , R. Coronel, N. Caidic , E.S. Agra A. Pelicano , A. Calamba

Statistical Mechanics of Self-Gravitating Systems
Analytical approximation schemes were used to study self-gravitating systems such as spherical polytropic systems and colliding galaxies and were found to be in agreement with exact results in the appropriate limit. Exact results for piecewise linear and time-fractional dynamical systems were obtained.
J. P. Esguerra,R. M. Sese , M. Solis , B. Babang , G. Sardane , A. Alarcon , M. S. Sereno

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

by Dr Luis Ma. Bo-ot

In 2003, the duties and functions of the Deputy Director for Resources and Facilities (DDFR) were assigned to Dr. Luis Ma. T. Bo-ot . The main activity of the DDFR centered on the construction of Phase 2 and Phase 2a of the NIP Building along C.P.Garcia Street. When Phase 2 was bidded out September 2002, some savings were incurred due to the relatively low price index used by the winning bidder Newco Builders and Construction Corp.

The Office of the Chancellor allotted a budget of P 30,200,326. Phase 2 was bidded for P 21,614,326.00 resulting in some P 8,586,000.00 savings. In January 2003, the NIP requested the amount be used as additional work labeled as Phase 2a. Technically, the contract for Phase 2 ended in September 2003, but upon approval of the request for the additional works and the good performance of Newco, Phase 2a was immediately started and will be finished by January 2004. The scope of the respective phases are: Phase 2 - ground and 2nd floors of the Research Wing; Phase 2a - 3 rd floor ceiling slab and partial columns for the 4 th floor of the Research Wing

In June, NIP requested for a budget for initial furnishings of Phase 2 from the Office of the Chancellor and an amount of P 3,000,000.00 has been set aside for this purpose. The main use of the fund will be for aircons, student™s desks and blackboards. The NIP will still be using and transferring its furniture from its current location but the new building has the capacity to handle more students and additional furniture will be necessary.

Finally, the NIP was also able to secure the continuance of the construction of the NIP Building along C.P. Garcia by requesting an additional P 38,700,000.00 from the Office of the President and the Office of the Chancellor to start Phase 3 in the early part of 2004.

In May and June 2003, the Dep. Dir. for Resources and Facilities held a series of meetings with the coordinators of the corresponding research laboratories to be housed on the 3 rd and 4 th floors of the Research Wing in order to finalize the space assignments, equipment type and their space requirements allocations. These were then relayed to Architect Francisco Nakpil in the preparation of the building plans which Phase 3. By the last quarter of 2003, the plans have already been completely finished and are ready for bidding in early 2004.

The scope of Phase 3 is the completion of the 4-storey Research Wing of the NIP Building along C.P. Garcia St. The wing will house all NIP research and teaching laboratories including the femtosecond laser facility. The wing will also have 2 classrooms, the machine shop and a temporary faculty area. Part of the site will also be developed for parking and access. The site development to be included in Phase 3 is to be the Service Entry and Staff Parking once the building is completed.

During the construction of Phases 2 and 2a, the Dep. Dir. represented NIP in the weekly construction meetings held at the site. In this way, issues and problems were addressed systematically and swiftly. Items like the Meralco service connection and security during the holidays were immediately acted upon. Such a system will be continued all throughout the succeeding phases of the construction of the NIP. It is already planned that an inauguration of the Research Wing be held in early 2005 with the start of operations during the summer session that will follow.

Part of the preparations for the operation of the future NIP building will be its voice and data lines. In 2003, the NIP also has made representation to the Computer Center and had consultation concerning the network connection. NIP decided however that the network be

placed initially for the entire Research Wing. Such an activity will then again be revived once Phase 3 begins.

A model of the entire NIP Building can be viewed at the present address of the NIP. The model was a gift of the Philippine Physics Foundation. Maintenance and upkeep continued in the present NIP. The entrance was repainted; laboratory tables were refurbished with tile tops to avoid the effect of heat during some experiments done on the former painted wooden tops. Aircons were serviced, requests for shelves or benches from the research labs were acted upon, etc. A request for the re-asphalting of the NIP driveway was also forwarded to CMO.

The Dep. Dir. for Resources and Facilities was also assigned to represent the NIP in the CS Landscaping Committee headed by Prof. E Gomez of MSI. With the concept of developing the entire UPD CS Science Complex into a showcase of Philippine indigenous plants, the CS Landscaping Committee met several times during the past year and already implemented the first steps towards the goal with the planting of bougainvillea and dau seedlings along C.P. Garcia Street. Since the future NIP building will be quite visible upon entrance to UP Diliman from Katipunan Avenue, NIP is taking a serious position with respect to the landscaping of the Science Complex. It has been cooperating and supporting the Committee™s plans and actions.

On the much lighter side, the Dep. Dir. for Resources and Facilities was the adviser for the UP Physics Association. Support for the various UPPA activities was carried out and this culminated in the UPPA garnering the award of *Most Resourceful Lantern* during the Lantern Parade of 2003.

APPENDIX A. VISION STATEMENT OF PROFESSOR SALOMA

To be one of ASEAN's finest
By Caesar Saloma
24 March 2003

My vision is for the National Institute of Physics to become into one of the finest schools of physics in the ASEAN region by 2005. I believe that this dream is also shared by many – NIP faculty, staff, students, & alumni, University officials, and NIP friends in the government and private sector [1].

I express deep interest to continue serving as the Director of Institute after my current term ends on 31 May 2003. To sustain the advances that have been made, the Institute must dare to scale new heights and becoming one of ASEAN's best is a worthy objective. I offer to lead the Institute in its climb over an *uncharted* course.

The NIP has generated a significant amount of goodwill and support in the last 2.8 years that I have been its chief executive officer. Construction has resumed for the new NIP building with an initial PhP30M budget from UP Diliman, at least PhP30M worth of state-of-the-art equipment were acquired, and new research grants, incentives, academic scholarships and postdoctoral fellowships were secured [2 - 4]. These accomplishments were made possible through the generous assistance of many supporters but I count on the unwavering commitment of UP President Francisco Nemenzo and UP Diliman Chancellor Emerlinda Roman as the most crucial especially at this juncture when resources are scarcer.

The NIP is one of the most admired academic units in the country today. Its position as the best school of physics in the Philippines is undisputed and the national physics community is happy about it. The NIP is an inspiration to many colleagues in other physics departments around the country. To them, the NIP is a model for achieving research excellence in a difficult environment where scientific tradition is still emerging.

The realisation of our dream would depend heavily on the ability of the NIP graduate school to attract the best and brightest, and of the members of the NIP community to uphold without fail, the core values of *honesty*, *openness*, *fairness*, and *collegiality* in the conduct of their professional life. A strong scientific tradition is not only manifested in technical competence but more importantly, in the ability of a science community to regulate itself. It is difficult to imagine how world-class technical expertise could develop in a science department that functions like an old boys' club or a bucket of scampering crustaceans. Such a desolate place only drives away the most talented and productive.

The Graduate School. The reputation of a university physics department is built around its graduate program. A well-regarded program would have highly-motivated and talented students working under the tutelage of competent faculty supervisors. Time has shown that this combination is key to producing groundbreaking scientific discoveries.

The standard strategy for building a world-class physics department is to hire as faculty members those who were trained in the great academic and research institutions of the West. The usual argument is that these professors will in turn, attract the best graduate students. This strategy which is adapted by Singapore, yields tenable results quickly but it is very costly. Even if it wishes to, the University can not afford to finance the cost of recruitment and the attendant build-up of support infrastructure. The local situation demands for a alternative approach which is one that relies heavily on the capability of '*home grown*' researchers.

In the past few years, a noticeable improvement has been achieved in the quantity and quality of scientific output that is generated by NIP researchers. The NIP produced the most number of ISI publications among the various academic units of the UP College of Science in the last three years ending in 2002 [5]. Its research

performance (Figure 1) defies the dismal statistics of the Philippines in combined ISI publication output from all areas of science and technology (Figure 2) [6].

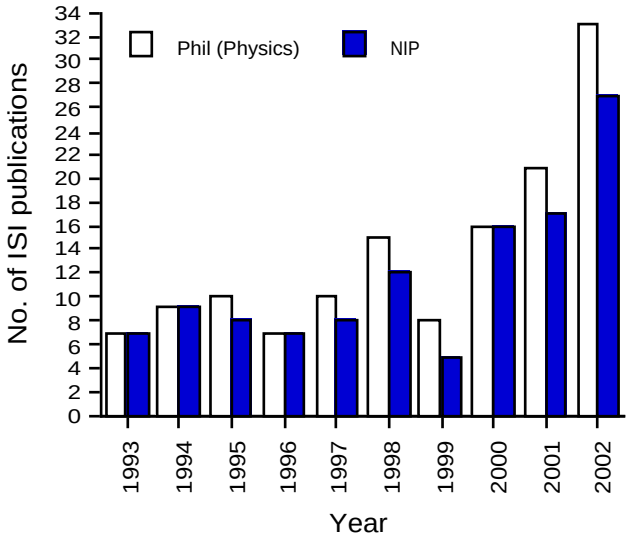


Figure 1. Number of ISI publications in physics (1993-2002).

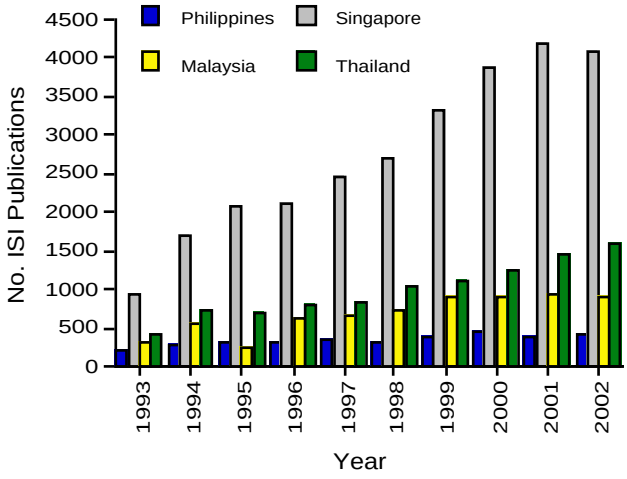


Figure 2. Number of ISI publications in science and engineering (1993-2002).

It is noteworthy to point out that progress was made without significant infusion of faculty members from abroad. Sixty-eight percent of the PhD's who are currently affiliated with NIP, obtained their degrees from the Institute. Their graduate training powered the research infrastructure development of NIP in the 1990's. The technical skills that they have acquired were also adapted to prevailing local conditions.

To be considered as one of the finest in the region, NIP scientists must be among the top experts in their respective fields of interest. The generally accepted

measures of research excellence include number of publications produced, reputation of ISI journals where they appeared, and number of citations that these publications have generated. Appointment to journal editorial boards and international awards for NIP researchers, also count. Performance of NIP researchers will be evaluated using these measures as part of a comprehensive review of NIP that will be carried out in the first half of 2006.

Core values. The uncompromising practice of *honesty*, *openness*, *fairness*, and *collegiality*, is necessary if NIP is to overcome the dire conditions of doing scientific research in the Philippines. Unlike those in US physics departments, faculty researchers in NIP are mostly alumni who have known each other since their freshman days in UP. In such a situation, decisions regarding key facets of academic life (e.g. faculty tenureship and appointment) could be easily and painfully slowed by mistrust and personal considerations when adherence to the core values is weak within the NIP community. Hence, the understanding, acceptance, and practice of these values are vital and shall be promoted more vigorously.

Epilogue. Over the years, many men and women have worked hard to make NIP a true national center of excellence. I have been a proud witness of their extraordinary commitment, dedication, and technical competence. Because of them NIP is now poised to become one of the finest in the ASEAN.

For our dream to become a reality (and not just wishful thinking), NIP must be able to provide a dynamic environment that nurtures talented researchers and encourage the rise of new ones. Such an environment will not emerge spontaneously – its emergence requires leadership by example, foresight, and careful planning. I will continue to exert my best efforts to develop NIP into a place that we can all be proud of.

Thank you.

References:

1. Proceedings of the 2002 NIP Planning & Development Workshop (www.nip.upd.edu.ph/history.html)
2. The NIP Annual Report for 2000 (www.nip.upd.edu.ph/history.html)
3. The NIP Annual Report for 2001 (www.nip.upd.edu.ph/history.html)
4. The NIP Annual Report for 2002 (www.nip.upd.edu.ph/history.html)
5. R. Azanza, Memorandum RVA 2003-15 (Office of the Dean, College of Science, 17 February 2003)

APPENDIX B. PUBLICATIONS

A1. PAPERS IN ISI-ABSTRACTED JOURNALS (10)

1. Miranda JJ, Saloma C
Four-dimensional microscopy of defects in integrated circuits
APPL OPTICS 42 (32): 6520-6524 NOV 10 2003
2. Saloma C, Perez GJ, Tapang G, et al.
Self-organized queuing and scale-free behavior in real escape panic
P NATL ACAD SCI USA 100 (21): 11947-11952 OCT 14 2003
3. Romallosa KM, Bantang J, Saloma C
Three-dimensional light distribution near the focus of a tightly focused beam of few-cycle optical pulses
PHYS REV A 68 (3): Art. No. 033812 SEP 2003
4. Monterola C, Saloma C
Solving the nonlinear Schrodinger equation with an unsupervised neural network: estimation of error in solution
OPT COMMUN 222 (1-6): 331-339 JUL 1 2003
5. Lim M, Saloma C
Primary spherical aberration in two-color (two-photon) excitation fluorescence microscopy with two confocal excitation beams
APPL OPTICS 42 (17): 3398-3406 JUN 10 2003
6. Somintac A, Estacio E, Salvador A
Observation of blue-shifted photoluminescence in stacked InAs/GaAs quantum dots
J CRYST GROWTH 251 (1-4): 196-200 APR 2003
7. Juanico DE, Monterola C, Saloma C
Allelomimesis as a generic clustering mechanism for interacting agents
PHYSICA A 320: 590-600 MAR 15 2003
8. Arciaga ME, Mendenilla AG, Ramos HJ
Characteristics of an ExB probe for extraction of H- ions from a magnetized sheet plasma source
REV SCI INSTRUM 74 (2): 951-955 FEB 2003
9. Soriano M, Martinkauppi B, Huovinen S, et al.
Adaptive skin color modeling using the skin locus for selecting training pixels
PATTERN RECOGN 36 (3): 681-690 MAR 2003
10. Kniehl BA, Kramer G, Palisoc CP
chi(c1) and chi(c2) decay angular distributions at the Fermilab Tevatron
PHYS REV D 68 (11): Art. No. 114002 DEC 2003

B2. DOMESTIC JOURNALS

B3. PROCEEDINGS OF INTERNATIONAL CONFERENCES

Oral presentations

1. C. Saloma, W. Oblefias and M Soriano, *"Spectral microscopy of live luminescent samples,"* Proceedings of the International Nanophotonics Syposium Handai (July 24-26, 2003 in Osaka, Japan.)

B4. CONFERENCE PROCEEDINGS
(21st Physics Congress of the Samahang Pisika ng Pilipinas Held in the University of San Carlos in Talamban, Cebu City on 22-25 October 2004) 86 out of 148 papers

ORAL PRESENTATIONS

Ab-initio Structural Investigations of Fe/V (001) Multilayers	*M.Labora, C.Villagonzalo*
Numerical Model of Stimulated Raman Scattering in an Optical Waveguide	*J.C.D.L.David, C.A.Saloma*
Deriving Difference Equation Describing Agent-based Models	*J.Y.Bantang, C.A.Saloma*
Hysteretic Behavior in a Defective Lattice Network of Non-Hysteretic Agents with Continuous Responses	*M.Lim, C.A.Saloma*
Deposition of TiN on Drill Bits Using a Sheet Plasma Negative Ion Source	*V. Noguera, M. Arciaga, R. Awayan, G. Blantocas, L. Villorente, J. Monasterial, J. Lazarte, J. Hismana, P. Pineda, E. Fabonan and H. Ramos*
Surface Alignment Effects on the Reflectance and Contrast Ratio of Bistable Cholesteric Liquid Crystal	*L. J. Vasquez, J. Muldera and M. Estonactoc*
Optical Beam-induced Current Microscopy with a Laser Diode	*Vernon Julius Cemine*, Bernardino Buenaobra, Carlo Mar Blanca and Caesar Saloma*
Thermally Activated Vortex Motion in YBa2Cu3Od Thin Film	*G.A. Dumlao, A.P. dela Cruz, E.J. Hinojales, C.R. De la Cruz, A.H. Manuel, and R.V. Sarmago*
Higher-Order Corrections in the Hole Spectral Function Using the Finite Temperature Green's Function Method	*A.Z. Francia Jr., D.M. Yanga, A.A. Morales Jr.*
Strong-Coupling Superconductivity Theory in the Finite Temperature Green's Function Scheme	*E.G. Navarro, A.A. Morales, Jr., D.M. Yanga*
A Simplified Approach to the Temperature, Frequency, and Applied Field Variation in AC Susceptibility Measurements of Bulk Superconductors	*B. G. Singidas, R. V. Sarmago*
Applied Magnetic Field and Temperature Dependence of the Potential Barrier in the Flux Creep Process in Bi2Sr2CaCu2O High Temperature Superconductor	*C.R. de la Cruz, R.V. Sarmago*
Power Law in Raindrop Size Distribution	*M.J. Romero, E.C. Samson, M. Lim, J. Bantang, and C. Saloma*
Stimulated Raman Scattering of 532-nm Pulsed Nd:YAG Laser in Multimode Optical Fiber	*J.F. Gabayno, B. Marana, C.A Alonzo, and W.O. Garcia*
Time Evolution of the Fourth-wave in Degenerate Four-wave Mixing (DFWM) in Methyl Red doped Nematic Liquid Crystals (MRNLC)	*Kristel D. Guto and Nathaniel P. Hermosa II*
Bandstructure Characterization of GaAs/AlGaAs MQW of Varying Well Widths and Temperature Using Reflectance Spectroscopy	*C. Ison, E. Estacio, A. Somintac and A. Salvador*
Simulating Color Appearance Change due to Interreflections in a Spherical Concavity under Two Illuminants	*A. K. B. Mallari, M. N. Soriano, and C. A. Saloma*
Angular Scatter Microscopy	*S. Delica€ and C.M. Blanca*
Transition of Low Temperature DLC Thin Films to Diamond via DC Discharge CVD	*G.M. Malapit, A.F.G. Montecillo and H.J. Ramos, Ph.D*
Characteristics of a Linearly Magnetized Plasma Equipped with a Hollow Cathode	*Alexander Mendenilla, Marko Arciaga, Shota Irie, Toshiro Kasuya, Henry J. Ramos, and Motoi Wada*
Measurement of Negative Ion Density in a Magnetized Sheet Plasma by DC Laser Photodetachment Method	*H. Takahashi, M. E. Arciaga, A. G. Mendenilla, T. Kasuya, H. J. Ramos and M. Wada*

Inline Interferometer in an Optical-Feedback Semiconductor Laser	*J. F. M. Jecong, P. F. Almoro, A. A. Tarun, C. A. Saloma*
Optical Properties of in situ Annealed InAs/GaAs Quantum Dots	*J. Mateo, E. Estacio, A. Somintac, A. Podpod, M. J. de Luna and A. Salvador*
Current Confinement in an Optical Device Using AlAs Oxide	*A. Samson, F. Agra, G. Manasan, E. Estacio, A. Podpod, A. Somintac, and A. Salvador*
Probing the Attoliter Focal Volume of a High Numerical Aperture Objective Lens	*C.M. Blanca, E.C. Samson, B. Buenaobra and C. Saloma*
Characteristics of an Oxide-Confined GaAs/AlGaAs Vertical Cavity Surface Emitting Laser (VCSEL) emitting at 842nm	*E.Estacio, G. Manasan, A. Somintac, A. Podpod, A. Samson, F. Agra, and A. Salvador*
A Closer Inspection of the Meissner Transition of Bulk Bi2212 by AC Susceptibility Measurements	*F.L. Bernaldez and R.V.Sarmago*
Intra-granular Loss Peak in the AC Magnetic Susceptibility of Magnesium Diboride in the Meissner State at Various Applied Fields and Frequency	*M.P.Olbinado and R.V.Sarmago*
Frequency and Applied Magnetic Field Dependence of the Hysteresis Loss Peak of YBCO in Purely AC Magnetic Fields	*B. G. Singidas, M. B. Uy, R.V. Sarmago*
Magnetic Field and Temperature Dependence of Above-TC Superconducting Fluctuations in a Bi2Sr2CaCu2O8+_ Thin Film	*E. J. Hinojales, C. Dela Cruz, R.V. Sarmago*
Fabrication of Yba2Cu3O7-x Thin Films In SrTiO3 Substrate Via a Liquid-Assisted Deposition Technique and Growth by Partial Melting	*G.B.Pascua, A.V.Cueto, R.V.Sarmago*
Population Dynamics in a Scaled-Down Penna Model of Biological Aging	*C.C. Nombres, R.S. Banzon*
Spectral Microscopy of Bioluminescent and Fluorescent Samples Using Colored Image	*Wilma Oblefias, Maricor Soriano, Caesar Saloma*
3D Biological Imaging using Laser-scanning Confocal Fluorescence Microscopy	*Godofredo S.Bautista Jr., Carlo Mar Y. Blanca, Caesar A. Saloma*
A Perturbation Inspired Variational Technique	*L.C. Chan and M.G. Manding*
Perturbative Solution of Coupled Transport Equations for a Fluid of Two-level Atoms	*M. S. A. Sereno, M. R. C. Solis*
On the Eigenvalue Problem for Periodic Confined Time of Arrival Operators	*R.C.F. Caballar and E.A. Galapon*
Vlasov-Poisson Perturbation Approach to Tidal Interactions of Stellar Systems	*R. R. D. J. Sol and J. P. H. Esguerra*
Fractional Dynamics of One-Dimensional Linear Chain	*B.H.Rara, J.P.H.Esguerra*
Periodically Driven Intermediate Fractional Relaxor-Oscillator with Piecewise Linear Restoring Force	*R. Coronel, and J. P. Esguerra*
Pulsed Multicolor Digital Holography using Hydrogen Raman Shifter	*Percival F. Almoro, Marilou M. Cadatal, Fema A. Daquiado, Wilson O. Garcia and Caesar A. Saloma*
Investigation of the Quantum Efficiency of an Edge Emitting InGaAs Laser	*G. Manasan, E. Estacio, A. Salvador*
Infrared Emission Spectroscopy: How it can be used in Failure Analysis	*M.F. Bailon, A. Tarun, W. Oblefias, E. Estacio, M. Soriano, and C. Saloma*
Numerical Investigations on the Growth Textures of Co/Cu Multilayers	*C. Villagonzalo, A.K. Setty, B.R. Cooper*
Dynamics of Strategy-based Competition	*M.E.A. Marfil, J. Bantang, and C. Saloma*
Allelomimesis: "Three is a crowd"	*Dranreb Earl Juanico and Caesar Saloma*
Investigation of Fundamental Cycles of Economic Activity and Rebate Time in a Closed Winner-Take-All System	*M.T.R. Pulido, C.P. Monterola, C.A. Saloma*

Design and Performance of a Cast Steel Deflection Type Mass Spectrometer	*Gene Q. Blantocas, Rainier L. Awayan, Virginia R. Noguera, Jufel S. Hismaña, Jonathan Lee C. Monasterial, Liza Marie M Villorente, Jeni Rose S. Lazarte, Henry J. Ramos*
Recovery of Underwater Object Reflectance	*M. Go, M. Soriano, C. Saloma, K. Silvano, O. Cabrera, B. Canto, L. David*
Raman Shifting of a 532-nm Nd:YAG Laser in Methane Gas	*F. P. Pataleta, Jr., R. S. Ibarreta, M. M. Cadatal, W. O. Garcia*
Multiphoton Optical Beam-Induced Current in Blue Light-Emitting Diodes	*C.A.C. Alonzo*, W.O. Garcia and C.A. Saloma*
Raman Spectroscopy of a Single Layer and Three Coupled Layers of InAs/GaAs Quantum Dots	*M. J. M. De Luna, A. Somintac, E. Estacio, and A. Salvador*

POSTER PRESENTATIONS

Stimulated Raman Scattering in a 532-nm Nd:YAG Laser Pump Hydrogen Raman Shifter with a Capillary Waveguide	*M.L. Torres, M.M. Cadatal, W.O. Garcia*
Linewidth Measurements of a Diode Laser by Optical Heterodyne Detection	*R. Sarmiento*
Anomalous Intensity Degradation in the Temperature-Dependent Photoluminescence of 50Å GaAs/AlGaAs Multiple Quantum Wells Grown on On-axis and Off-axis Substrates	*E.Estacio, J. Mateo, J.P. Sy, K. Bautista, L. Guiao, A. Somintac, and A. Salvador*
Benign and Malignant Prostate Tumor Membranes: Spectrofluorophotometric Study	*G.R.A. Cureg, J.A. Roman, C.C. Deocaris, Z.B. Domingo*
Chromosome Pair Finding Using Intensity Profiles of M-FISH Images	*R. M. L. Roxas, M. N. Soriano and C. A. Saloma*
Noise in Human Hearing	*R.R. Violanda, M. L. Palima, and C. A. Saloma*
Comparative Analysis of AC Harmonic Susceptibility Measurements on Polycrystalline YBCO Samples with and without Intergranular Coupling	*M.V.S. Torralba and R.V. Sarmago*
Textured Bi-Sr-Ca-Cu-O/Ag Film Synthesis by Electrophoretic Deposition	*R. Sarmiento A. H. Manuel R. Sarmago*
Crystal Growth Habit of Bi2Sr2CaCu2O8 (2212) Superconductor	*E.R. Magdaluyo Jr., J.J.Monserate and R.V.Sarmago*
Microstructural Analysis Superconducting MgB2 Prepared at Different Sintering Temperature	*W.F. Bisquera, B.N. Laniog, R.V.Sarmago, M.P Olbinado*
Approximate Analytic Solutions of the Lane-Emden Equation for Positive Integer Values of Polytropic Index	*R.M. Sese and J.P. Esguerra*
Density Profiles for a Simple Model of Spherical Galaxies and Clusters of Galaxies	*G.M. Sardane, A. Pelicano and J.P. Esguerra*
Modified Time Kernel Equation	*Herbert B. Domingo and Eric A. Galapon*
Generalized Laplace Method	*H.B. Pilapil, R.C.F. Caballar, R.E. Perez, E.A. Galapon*
Investigation on the Lifetime and Temperature Distribution of Tungsten Filament Cathodes in a Magnetized Plasma	*M. E. Arciaga, T. Kasuya, A. G. Mendenilla, M. Wada, and H. J. Ramos*
Characteristics and Quality of Unfocussed Beams in a Compact Gas Discharge Ion Beam Source	*Gene Q. Blantocas1,2, Rainier L. Awayan 1 Virginia R. Noguera 1, Jufel S. Hismaña1, Jonathan Lee C. Monasterial1 Liza Marie M Villorente1, Jeni Rose S. Lazarte1,*

	Henry J. Ramos 1, Motoi Wada3
Effects of Express Lanes in the Dynamics of Supermarket Teller Service	*J. Soriano, J. Bantang, M. Lim, C. Monterola, M. Palima, and C. Saloma*
Traffic Slowdown due to Single Tricycle Intrusion	*C. R.. Ferrer, M.L. Palima, C.A. Saloma*
Magnetization and Magnetic Anisotropy of Fe/Co Multilayers: A First-Principles Calculations	*Marienette B. Morales and Cristine DLR. Villagonzalo*
C-axis Oriented 2212 Superconducting Thin Film by Powder Deposition from a Suspension in Acetone and Growth by Partial Melting	*I.R.O. Ambanta, A.V. Cueto, A. G. Manuel and R.V. Sarmago*
Liquid Phase Epitaxial Growth of InxGa1-xAs on GaAs Substrate	*M.F.T. Casco*, C.T. Hintay and A.A. Salvador*
Simplified Color Camera Spectral Sensitivity Measurement	*A. E. Paz, W. Oblefias, M. Soriano, C. Saloma*
Relaxation Times of Bistable Cholesteric Liquid Crystal (BCLC) On Different Surface Alignments	*L. J. Vasquez, M. Estonactoc and J. Muldera*
Holographic Implementation of a Two-level Authorization Protocol Using Hidden Images in a Photorefractive Crystal	*R.A. Guerrero, L. Senatin*
Generation of Higher Radial Mode Index Laguerre-Gaussian (HRLG) Beams using Computer Generated Holograms(CGH)	*C.O. Manaois and N.H.Hermosa*
Digital Holographic Microscopy	*S.C. Ledesma, M.M. Cadatal, and P.F. Almoro*
Digital Holograms for Beginners	*Percival F. Almoro*
Teaching Special and General Relativity to Undergraduate Physics Majors	*M. R. C. Solis*
Study on the formation of Pb-free Bi-2223 from Bi-2212	*M.U. Herrera, R.V. Sarmago*
Morphological Characterization of a Film Prepared from the Bulk MgB2 Powder	*MSB Asoy, D.Ramos, RV Sarmago*
Discerning the Two-phase Transition of Pb-free Bi2 Sr2Ca(n-1)CunO(2n+4)+d(n=2; n=3) via the Intergranular-losses of the Out-of-phase AC Magnetic Susceptibility	*J. I. L. Bugante, M. U. Herrera and R. V. Sarmago*
Harmonic susceptibilities of bulk MgB2 at various AC magnetic fields	*M.V.S. Torralba, J.P.C. Afalla, and R.V. Sarmago*
Investigation of the Morphology of YBCO Deposited and Grown on SrTiO3	*Vitancol NS and Amada MR, Pascua GB, Cueto AVA, Sarmago RV*
SEM Study of Nanosize Defects in Powder-formed YBCO	*P. L. Rodgers, H.R. A. Navaja* and R.V. Sarmago*

APPENDIX C. OFFICIAL TRAVELS & FOREIGN POSTINGS

C1. International conferences

Henry J. Ramos	2003 International Con-ference on Plasma Science	1-5 June 2003	Jeju, South Korea	P39,644.00 RDG CS Faculty Dev. Fund
	First Planning Meeting for The Regional Workshop on Low Energy Accelerators for Materials Modification and Analysis	22-25 July 2003	Chiang Mai, Thailand	
	14th International Sym-posium on Applied Plasma Sciences	1-5 September 2003	Doshisha University Kyoto, Japan	
Caesar A. Saloma	InternationalNanophotonics Symposium Handai	23-27 July 2003	Suita Campus Osaka University Osaka, Japan	P1,500 pre-travel CS Faculty Dev. Fund
	First Asia Pacific Academic Forum	27 October to 2 November 2003	Shenzhen, China	

C2. Other foreign postings

Carlo Amadeo C. Alonzo	Winter College on Bio-photonics: Optical Imaging and Manipulation of Molecules and Cells"	10-21 February 2003	Abdus Salam Inter-national Center for Theoretical Physics, Trieste, Italy	P1,500 pre-travel $200 Clothing Faculty Dev. Fund
	5th Pacific Rim Conference on Lasers and Electro-Optics	15-19 December 2003	Taipei, Taiwan	
Wilson O. Garcia	To attend the Workshop on Plasma Physics	10-14 November 2003	Abdus Salam Inter-national Centre for Theoretical Physics Trieste, Italy	
Vincent Ricardo Daria	Postdoctoral Research	November 2002-October 2003; November 2003-October 2004	Risoe, Denmark	Official Leave without Pay
Giovanni Tapang	Postdoctoral Reseasrch	July 2003-June 2004	University of Strathclyde, Glasgow, Scotland	Official Leave with Pay
Christopher Monterola	Postdoctoral Research	July 2003-June 2004	Max Planck Institute for Complex Systems in Dresden, Germany	Official Leave with Pay

C3. Domestic conference

Percival F. Almoro	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Carlo Amadeo C. Alonzo	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Marko E. Arciaga	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Johnrob Y. Bantang	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Kristine Ma. Angelus Bautista	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Carlo Mar Y. Blanca	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Roland Cristopher F. Caballar	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Marilou M. Cadatal	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Vernon Julius R. Cemine	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Serafin F. Delica	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Herbert B. Domingo	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Jose Perico H. Esguerra	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Alberto Z. Francia, Jr.	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Alberto Francia, Jr.	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Jacque Lynn F. Gabayno	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Eric A. Galapon	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Wilson O. Garcia	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Nathaniel P. Hermosa, II	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Dranreb Earl O. Juanico	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Marites J. Labora	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
May T. Lim	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Jennette N. Mateo	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban	CS-FDF

			Cebu City	
Erwin G. Navarro	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Wilma R. Oblefias	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF
Marisciel L. Palima	21th Congress of the Samahang Pisika ng Pilipinas	October 22-25, 2003	University of San Carlos, Talamban Cebu City	CS-FDF

APPENDIX D. RESEARCH PROJECTS IN 2003

D1. Funded by NIP Research Funds (1 January 2003 - 31 December 2003)

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

	NAME	TITLE
1.	Dr. Lorenzo C. Chan	*Perturbation-Inspired Variational Calculation*
2.	Dr. Jose A. Magpantay	*From Microscopic Reversibility to Macroscopic Irreversibility: Breakdown of Time-Reversal Symmetry in Coarse-Grained Dynamics*
3.	Dr. Henry J. Ramos	*Ion Enhancement Studies in a Plasma Sputter-Type Negative Ion Source*
4.	Dr. Caesar A. Saloma	*Four-Dimensional Microscopy of Defects in Integrated Circuits*
5.	Dr. Danilo M. Yanga	*Magnetic Properties of Weakly-Doped Antiferro-magnets in the Spin Polaron Formulation*
6.	Dr. Arnel A. Salvador	*Oxide-Confined Resonant Cavity LED & Vertical Cavity Surface Emitting Lasers (VCSEL)*
7.	Dr. Roland V. Sarmago	*Hysteresis in YBCO Crystals*
8.	Dr. Ronald S. Banzon	*The Penna Model with Short Bitstrings*
9.	Dr. Carlo Mar Y. Blanca	*Monte Carlo Parameterization of Polymer Dispersed Liquid Crystal*
10.	Dr. Luis Ma. T. Bo-ot	*On the Formation of Dusty Components on a Plasma System*
11.	Dr. Jose Perico H. Esguerra	*Fractional Dynamics in Non-Linear Systems*
12.	Dr. Eric A. Galapon	*Confined Quantum Time of Arrivals*
13.	Dr. Wilson O. Garcia	*Generation and Applications of Laser Light Generated by Stimulated Raman Scattering in Hydrogen*
14.	Dr. May T. Lim	*Primary Spherical Aberration in 2-Color (2-Photon) Excitation Fluorescence Microscopy with Two Confocal Excitation Beams*
15.	Dr. Marisciel L. Palima	*Language-Based Information Transfer and Loss in a System of Error-Prone Agents*
16.	Dr. Caesar P. Palisoc	*Hadroproduction of Polarized Charmonia*
17.	Dr. Maricor N. Soriano	*A Novel Method for Determining the Spectral Sensitivities of Color Cameras*
18.	Dr. Cristine DLR. Villagonzalo	*Microscopic Calculation of the DC-Conductivity and Thermoelectric Power of One-Dimensional Systems.*

D2. Research Grants from External Funding Agencies

C. Saloma
PCASTRD/DOST "Development of a beam-scanning two-photon excitation microscope for biomedical researchers and materials scientists"
PhP 3,251,600.00

A. Salvador
PCASTRD/DOST "Project 1: Program for the development of III-V optoelectronic devices".

A . Salvador
PCASTRD/DOST "Project 2: Program for the development of III-V optoelectronic devices".

APPENDIX E: PhD and MS GRADUATES IN 2003

E1. PhD (1)

2nd Semester, SY 2002-2003
May T. Lim
Dissertation Title: *Emergence and detection of nonlinear behavior in complex systems*
Research Supervisor: Dr. C Saloma
Readers: Dr. M Soriano, Dr. C Monterola
Examiners: Dr. R Banzon, Dr. JP Esguerra

E2. MS (7)

2nd Semester, SY 2002-2003
1. Clarina R. dela Cruz
Title of MS Thesis: *The Magnetoresistance Profile of Bi-based High Temperature Superconductors: On the dependence of the Potential Barrier in the Flux creep process on the applied magnetic field, temperature and current*
Research Supervisor: Dr. R. Sarmago
Reader: Dr. C Villagonzalo
Examiners: Dr. LM Bo-ot, Dr. CM Blanca

2. Erwin G. Navarro
Title of MS Thesis: *Collision dynamics of multiparticle systems on a rotating surface*
Research Supervisor: Dr JP Esguerra
Reader: Dr. L Boot
Examiners: Dr. M Litong, Dr. G Tapang

Summer, SY 2002-2003
3. Ma. Sheila Angeli C. Marcos
Title: *Feature Extraction of Coral Reef Images*
Supervisors: Dr. Maricor Soriano, Dr. Caesar Saloma (Co-adviser)
Reader: Dr. Christopher Monterola
Examiners: Dr. Porfirio Aliño (Marine Science Institute), Dr. Ronald Banzon (NIP, UP Diliman)

4. Renante R. Violanda
Title: *The Role of Background Noise in Human Hearing*
Supervisors: Dr. Marisciel L. Palima, Dr. Caesar A. Saloma (Co-adviser)
Reader: Dr. May Lim,
Examiners:Dr. Carlo Mar Y. Blanca, Dr Wilson Garcia

5. Miguel L. Yambot
Title: *Effect of Cesium Seeding on H- Ion Production in a Plasma Sputter-type Ion Source*
Supervisor: Dr. Henry Ramos
Reader: Dr. R. Tumlos
Examiners: Dr. L. Bo-ot, Dr. A. Salvador

1st Semester, SY 2003-2004

6. Marienette B. Morales
Title: *Magnetisation and Anisotropy of Fe/Co Multilayers Using First-Principles Calculations*
Supervisor: Dr. Cristine Villagonzalo
Reader: Dr. Jose Perico Esguerra
Examiners: Dr. Marisciel Palima, Dr. Ronald Banzon

7. Marites J. Labora
Title: *Ab-Initio Structural Investigations of Fe-based Multilayers*
Supervisors: Dr. Cristine Villagonzalo
Reader: Dr. Arnel Salvador
Examiners: Dr. Roland Sarmago, Dr. Luis Ma. Bo-ot

8. Serafin Delica
Title: *Angular Scatter Microscopy*
Supervisor: Dr. Carlo Mar Blanca
Reader: Dr Caesar Saloma
Examiners: Dr Ronald Banzon, Dr Maricor Soriano

APPENDIX E: GUIDELINES ON THE USE OF NIP AS OFFICIAL AFFILIATION

9 July 2003

To: Members of the NIP Executive Council
From: Caesar Saloma

Below are the guidelines and policies that govern the use of NIP as official affiliation. This matter was discussed and approved in an NIP Executive Council meeting on 2 July 2003.

Its initial draft was formulated during a miniworkshop that was held on 29 May 2003. The workshop was participated BY the NIP Director, Deputy Directors and Program Coordinators.

Thank you.

END.

POLICY ON USE OF NIP AS OFFICIAL AFFILIATION

Issue. This pertains to the use of "National Institute of Physics, University of the Philippines," by an individual or group of individuals, as official address in a scientific publication, multimedia presentation, research grant application and other similar documents where the reputation and interest of the National Institute of Physics are at stake.

Below the word "NIP" and "University" refer to the National Institute of Physics and the University of the Philippines, respectively.

Policy and Guidelines. The following individuals are considered officially-affiliated with NIP and may therefore use its name as their official address in the documents referred to above:

1) Tenured NIP faculty members.
2) Non-tenured NIP faculty members with valid appointments.
3) Permanent administrative and technical-support employees of NIP.
4) Contractual researchers with valid appointments which are issued by the University on the basis of a recommendation from the Office of the NIP Director. It is understood that the recommendation of the NIP Director is consistent with the hiring procedure enforced by NIP.
5) Contractual researchers with valid appointments, who are supported by external research grants which are sanctioned by NIP and the University. The hiring of these researchers is consistent with the hiring procedure enforced by NIP. While these researchers have no employee-employer relation with the University, they are still required to abide by the same rules and regulations that govern the conduct and management of regular University employees in NIP.
6) Bonafide students in the BS Physics or BS Applied Physics programs of NIP.
7) Bonafide students in the MA Physics, MS Physics or PhD (Physics) programs of NIP.
8) Exception to guidelines 1 to 7, is made in a formal letter that is addressed to the NIP Director who will then discuss the request in a meeting of the NIP Executive Council. Only the NIP Executive Council has the power and authority to issue an exemption.

END.

End of Report
27 July 2004