

NIP REPORT
January 2006- May 2007

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January 2006 –May 2007 NIP Report. Executive Summary

This report covers the activities of the National Institute of Physics (NIP) from January 2006 to May 2007. From January 2006- May 2006 Dr. Saloma served the remaining portion of his second three year term as NIP Director. During that period he was assisted by Dr. Arnel Salvador, as Deputy Director of Research and Extension, by Dr. Ronald Banzon, as Deputy Director for Academic Affairs and by Dr. Luis Buot, as Deputy Director for Resources and Facilities. On June 2006 Dr. Arnel Salvador was appointed by the UP BOR to serve as NIP Director for the next three years covering June 2006-May 31 2009. During the period June 2006 to May 2007, Dr. Roland Sarmago was appointed as Deputy Director for Research and Extension, Dr. Wilson Garcia as Deputy Director for Resources and Facilities, and Dr. Maricor Soriano as Deputy Director for Academic Affairs.

Academic highlights:

The academic functions of NIP include the teaching of physics service courses for non physics majors (Physics 71, 72, 73 and their corresponding laboratory classes), physics subjects under the UP General Education Program (Physics 10), and the overseeing of its degree programs namely the BS Physics and BS Applied Physics, the MA in Physics Education, the MS in Physics program and the Ph.D in Physics program.

For the academic year 2006-2007 the number of students enrolled in the service courses for the 1st semester, 2nd semester and summer were 1247, 1359 and 79 respectively. The corresponding number of students enrolled in the laboratory classes for the 1st semester, 2nd semester and summer were 1096, 1253 and 178. The number of students who enrolled in Physics 10 for the 1st and 2nd semester of the AY 2006-2007 were 305 and 308 respectively. The number of students enrolled in the undergraduate program as of 2nd semester AY 2006-2007 was 243. The number of students enrolled in the MS Physics program and Ph.D Physics for the same period were 74 and 26 respectively.

In the April 2006 College of Science graduation rites a total of 25 and 14 students received their BS Physics and BS Applied Physics degrees respectively. There were 8 honor graduates from NIP with Mr. Francis Paraan (BS Applied Physics, Materials Science) graduating summa cum laude. Eleven students received their MS Physics degree while two students received their Ph.D in Physics degree.

In the April 2007 College of Science graduation rites, the total number of students who graduated in Physics were: 15 in B.S. Applied Physics, 14 in B.S. Physics, 11 in M.S. Physics and 8 in Ph.D. Physics. There were 4 students who graduated with honors. Ms Fudolig graduated Summa cum laude and was valedictorian of UP Diliman graduating class of 2007. Dr. Cemine received the Edgardo D Gomez Award while the Dr. Juanico was the College of Science Most Outstanding PhD graduate.

Research Highlights:

The NIP's research functions are carried out through the six research laboratories that it manages. Each laboratory is headed by a coordinator, has several senior level faculty as its members and is staffed by undergraduate and graduates students who are doing their thesis. The bulk of the operating cost for these laboratories are shouldered by external grants such as those provided by the agencies of the Department of Science and Technology, particularly PCASTRD, and private companies. Support is also provided by internal grants such as those coming from the UP Office of the Vice Chancellor for Research and Development (OVCRD), UP Systems Research Grants and the budget allotted by UP to NIP. In 2006 NIP faculty members were also able to secure funding from the UP Emerging Technology Grant as well as UP Diliman Open Grant. The total amount of funding for projects that were obtained by NIP faculty

for the year 2006 is over P20M. In addition the department benefited from roughly P12 M external funding for grants obtained the year before.

The NIP had 21 papers published in ISI listed journals in 2006. In the first half of 2007 we had 7 papers published. The NIP also had 78 research papers presented in the 2006 SPP Physics Congress.

Among the research highlights was the work done by Dr. Blanca, Dr. Cemine, Dr. Saloma and Engr. Buenaobra entitled, "Localizing defects on circuits using high resolution optical feedback thermography". It was featured and cited as one of the top 100 exciting developments in applied optics by Optical Society of America in its December 2006 monthly magazine Optics & Photonics News.

Last March 16 2007 a patent was granted by the Taiwan Intellectual Office for the work done by Dr. Henry Ramos entitled "Titanium Nitride Thin Film Formation on Metal Substrate by Chemical Vapor Deposition in A Magnetized Sheet Plasma Source". As of May 2007 the US patent application of Dr. Saloma, Dr. Daria and J. Miranda on "Method for generating high contrast images of semiconductor sites via one-photon optical beam induced current imaging and confocal reflectance microscopy" was still being pursued.

In October 2006 the Commission of Higher Education, based on the performance of the academic and research performance of NIP, designated NIP as a Center of Excellence in Physics for the period 2006-2009.

Faculty developments:

Crucial in the discharge of NIPs research and academic missions is a dynamic and vibrant faculty and it is vital that we are able to maintain the supporting infrastructure to keep our faculty well motivated and active in research. During this period a majority of our faculty were able to obtain support from the UP Systems Research Grant. NIP faculty cited for their work for this period include Dr. Wilson Garcia 2007 NRCP Achievement Award in Physics, Dr. Vincent Daria and Dr. Maricor N. Soriano 2006 NAST Outstanding Young Scientist Achievement Award in Physics, and Dr. Blanca 2006 NAST Du Pont Talent Search for Young Scientists. Dr. Caesar Saloma was given the title of UP University Scientist III in recognition of his research activities at UP for the past five years and the team of Dr. Blanca, Dr. Saloma, Dr. Cedmine and B. Buenaobra received the 2006 UP Diliman Advanced Technology Award.

It is also important that NIP is able to attract young Ph.D graduates to start their careers at our Institute. For this period we have two new additions in our faculty roster with Ph.D degrees, namely Dr. Somintac and Dr. Alonzo. Dr. Armando Somintac joined the faculty on June 2006 as a lateral entrant. He received his Ph.D in Physics in 2004 and did a two year postdoctoral stint at Doshisha University. Dr. Carlo Alonzo was an Instructor at the Institute and was promoted to the Assistant Professor rank after he successfully defended his Ph.D last May 2006. Dr. Percival Almoro meanwhile returned in October 2006 after a one year postdoctoral stint at Universitat Stuttgart. As part of the UP faculty development program, Dr. Buot went on leave starting June 2006 to pursue a Ph.D degree in Architecture in Taiwan. Dr. Alonzo is also currently on postdoctoral leave at Risoe National Laboratory.

On September 2006 the tenured faculty of NIP recommended Dr. Vincent Daria for tenure. Dr. Daria's area of research interests include photonics particularly wavefront engineering, optical trapping and microfabrication. Prior to his recommendation for tenure, Dr. Daria has supervised the dissertation of one (1) Ph.D graduate and several MS Physics graduates. His research projects at NIP were mainly funded by DOST. The BOR officially awarded his tenure on May 2 2007.

Dr. Zenaida Domingo opted for early retirement on May 2007. She was a faculty of the then Department of Physics and NIP for a combined total of 30 years. Dr. Domingo was instrumental in setting up what was then the Liquid Crystal Group at NIP. During her time as coordinator of the laboratory she supervised the thesis of several MS and BS students.

Our faculty members also provided their expertise to assist other academic institutions. Dr. Saloma was appointed Dean of the College of Science for the period June 1 2006 to May 31 2009. Dr. Ramos was appointed Director of Project Management and Resource Generation Office, Office of the Vice Chancellor for Research and Development, while Dr. Daria continued to serve as Coordinator of the Computational Science Research Center. Dr. Sarmago was the head of the Physics Division of NRCP, Dr. Soriano was the president of SPP in 2006 and for 2007 the 1st and 2nd vice presidents of SPP were Dr. Esguerra and Dr. Daria respectively.

As of May 2006 the faculty roster included 6 Professors, 8 Associate Professors, 11 assistant professors and approximately 28 instructors. 10 faculty members had tenure during this period. The NIP has only 36 faculty items assigned to it and rely on its department savings to supplement the salaries of its faculty.

Infrastructure and Facilities Developments:

Construction activities at the NIP Building continued during this period. Airconditioners, network for internet connections and wireless routers were installed at the Research Wing of the NIP Building. Corrections to the electrical wiring were also pursued. The construction of the shell structure of the Seminar Wing was finally bidded out last January 2007. The winning company, Lucky Star Construction and Trading Company started mobilization work last May 2007. The UP Systems has allotted P40 M to fund this work and an additional P20 M was put up, P10 M each coming from UP Systems and UP Diliman, to cover for the cost for the architectural finishing. The seminar wing is designed to have seven large lecture rooms with a combined seating capacity of nearly 1000. In the future this wing will be the venue for all the physics service courses that the Institute offers. The wing is expected to be completed by October 2008.

The NIP was fortunate to merit the generous support of Senator Miriam Defensor Santiago in the construction of the NIP Seminar Wing. In 2006 a special allotment release order from the Senator's PDAF amounting to P5M was issued to help defray the cost of construction of the NIP complex. The money was used in the construction of the walkway connecting the NIP research and seminar wing and the work was done by the DPWH. Another P5 M was released in January 2007 and will be used in setting up a small NIP Annex that will house the transformer, generator and liquid nitrogen plant of the Institute.

On December 2006, President Gloria Macapagal Arroyo issued EO 583 for the creation of the National Science Complex of which the NIP will be an integral part of. A total of P145M was allotted for the completion of the NIP Building Complex and this will include the construction of Administration and Lecture Wings. The NIP administration worked closely with Architect Nakpil to finalize the plans for these two wings. Expected start of the construction is by the end of this year.

Future plans of NIP.

Last May 2007 the NIP held a two day workshop to assess the previous activities of NIP and to plan for the future. For the past several years NIP's vision was to be one of the best Physics Departments in the ASEAN region. During the workshop the performance of the research laboratories were assessed

in terms of research outputs, students graduated and faculty development. While there has been a noted increase in the ISI publication in the area of Photonics, it is highly desirable that we will also be able to have increased research output, in terms of ISI publications and Ph.D graduates, in the other fields of Physics. At the end of the workshop the faculty affirmed that our vision for the next three years remain the same.

To achieve this end the NIP also reviewed the performance of its undergraduate and graduate programs and how it will have an impact on our goal. We have succeeded in maintaining the number of BS graduates within the 30-40/year range. This is considerably larger compared to what it was 6 years ago. It is important that the infrastructures to keep or increase this number are strengthened. These include close monitoring of the performance of the undergraduate students particularly in their 3rd year and up, and active recruitment of these students into the research laboratories.

The number of graduate students has increased considerably over the past years. This was due a) the increased graduation rates of our undergraduate program and b) the NIP MS program becoming attractive to students who got their BS Physics or related fields at other institutions. However, the number of MS graduates over the past years has been hovering only at 11 /year. The NIP will institute measures to increase the number of MS graduates since this will also mean a bigger pool of students for the Ph.D program. Among these measures are a) the institution of bridge programs for graduate students whose undergraduate preparation are not at par to NIP's BS programs and b) close coordination with funding agencies such as DOST/PCASTRD and DOST SEI to support the scholarships of students in the bridge program . Proposals are also being prepared to increase the graduation rate in our Ph.D program. This year we had a large pool of MS graduates who opted not to pursue our Ph.D program. Among the measures that will be pursued include a) finding means to reduce the teaching load of our instructors so that they are able to perform well also in their graduate studies and b) seeking for more scholarships from CHED and other government Institutions to allow the students to do their doctoral studies on a full time basis.

With the coming completion of the NIP building, issues of space for research laboratories will no longer be a limiting problem for NIP. We will now focus our attention to our faculty profile. We will try to increase the number of Ph.D faculty members working in subfields which we are weak while at the same time support and maintain the areas where we have considerable strength. As we now increase in numbers we will move towards having research profesors items and postdoctoral positions at NIP.

Arnel Salvador, Ph.D
Director
National Institute of Physics
October 2007

Report of the Deputy Director for Academic Affairs for Academic Year 2006-2007

by Dr. Maricor Soriano

Version 1, August 7, 2007

Outline:

1. Highlights
2. Enrollment and Graduation
 - a) GPC
 - b) Majors
3. Thesis
 - a) Undergraduate Thesis
 - b) Graduate Thesis and Dissertation
 - c) Summary
4. Graduate Admission – Report of the First ever placement interview for graduate applicants

1. Highlights

NIP graduated 1 Cum Laude (Michelle Francisco B.S. Applied Physics) , 3 Magna Cum Laudes (Christian Alis, George Allan Esleta and Lourdes Patricia Ramirez, all B.S. Applied Physics) and 1 Summa Cum Laude in Mikaela Irene Fudolig (B.S. Physics) who also became the University Valedictorian and at 16 was the youngest Summa Cum Laude in the University of the Philippine's history. A total of 29 students, 15 in Applied Physics and 14 in Physics, obtained their Bachelor in Science degrees.

Eight (8) were conferred with Ph.D. In Physics degrees at the April 2006 College of Science Commencement Exercises. These were Drs. Carlo Amadeo Alonzo, Vernon Julius Cemine, Nathaniel Hermosa II, Dranreb Earl Juanico, Wilma Oblefias, Darwin Palima, Florencio Recoleta Jr., and Alvarado Tarun.

There were 11 MS Physics graduates (4 as of summer 2006, 1 as of 1st sem AY 2006-2007 and 6 as of 2nd sem AY 2006-2007) in the April 2006 CS recognition program.

Seven (7) students enrolled in the M.A. Program at the start of the Academic Year. One has a full scholarship and the rest teach in tertiary and secondary schools. This led to a review of the M.A. Program and the offering of M.A. Courses.

Graduate students were given a study room at the start of the first sem AY 06-07. PH 3210 became the official “Tambayan” for NIP graduate students.

Five (5) B.S. Students who were in senior standing but had no laboratory affiliation were assigned thesis advisers. Of the 5 students assigned, 2 successfully defended their thesis, with one (Karen Patricia Ramirez) garnering the Best B.S. Physics Thesis award.

The first ever placement interview for applicants to the NIP graduate program was held in May 2007. M.S. Physics Programs of study designed for accepted non-NIP alumni applicants were for 3 years instead of 2 to allow students to take up prerequisite courses. All programs were defaulted to non-thesis option. The student may apply to shift to the thesis option if he or she is accepted to be supervised by a research adviser in his or her second year of study.

The DOST-SEI and PCASTRD have accepted the 3-year programs of study design with the proviso that the scholar must seek and be accepted by thesis adviser in the second year of scholarship.

Nine (9) new instructors and 1 full professor attended the Teaching Effectiveness Course conducted by the Office of the Director of Instructions from May 28 to June 1 2007. This is in line with the call to improve our teaching techniques at NIP.

2. Enrollment and Graduation

A. General Physics Committee

The number of enrollees in the General Physics courses for Academic Year are given below. These figures were compiled by Ms. Wilma Oblefias, GPC Chair.

Course Group	1 st Sem	2 nd Sem	Summer
Physics 71	678	649	135
Physics 72	385	561	167
Physics 73	184	180	64
Physics 71.1	513	613	69
Physics 72.1	342	389	79
Physics 73.1	241	251	30

The exam passing rates per lecture course group are shown below.

Course Group	1 st sem				2 nd sem			
	1 st Exam	2 nd Exam	3 rd Exam	Finals	1 st Exam	2 nd Exam	3 rd Exam	Finals
Phys 71	68.9	No data	No data	No data	No data	No data	No data	No data
Phys 72	87.8	No data	No data	No data	65.3	47.2	Inc data	Inc data
Phys 73	94.7	87.8	75.2	71.6	91.4	95.9	81.8	67.9

B. Majors in Undergraduate and Graduate Programs

The following are enrollment figures for 2006.

Total Enrollment, 2nd sem AY 2006-2007

	BS Applied Physics	BS Physics
1st year, Male (Female)	22(18)	14 (21)
2nd year	18 (9)	9 (9)
3rd year	6 (8)	13 (8)
4th year	9 (9)	4 (8)

5th year	8 (13)	5 (7)
6th year	6 (4)	3 (4)
7-9th	3 (0)	2 (3)
TOTAL	133	110

Total Enrollment, Summer AY 2006-2007

	BS Applied Physics	BS Physics
1st year, Male (Female)	19(16)	13 (7)
2nd year	11 (8)	7 (5)
3rd year	6 (7)	12 (4)
4th year	7 (9)	4 (6)
5th year	3 (5)	3 (2)
6th year	2 (3)	2 (0)
7-9th	0 (0)	0 (0)
TOTAL	96	75

Total Enrollment, 1st sem AY 2007-2008

	BS Applied Physics	BS Physics
1st year, Male (Female)	20(8)	21(14)
2nd year	26(20)	17 (19)
3rd year	15 (11)	9 (4)
4th year	8 (7)	11 (5)
5th year	7 (9)	5 (6)
6th year	5 (6)	3 (3)
7-9th	6 (3)	3 (1)
TOTAL	151	121

There are currently 73 students in the M.S. Physics Program and 27 in the Ph.D. Program.

In the April 2007 College of Science Commencement Exercises, the total number of students who graduated in Physics were: 15 in B.S. Applied Physics, 14 in B.S. Physics, 11 in M.S. Physics and 8 in Ph.D. Physics.

3. Thesis Defense

2nd SEM AY 2005-2006 BS THESIS DEFENSE SCHEDULE

* * * * DAY 1: Monday, 27 March 2006

09:00 AM Afalla, Jessica Pauline (BS Applied Physics)

"Discerning the intergranular and intragranular components of the harmonic susceptibilities of YBCO in the absence of vortices"

Adviser: Roland Sarmago

Panel: Ronald S. Banzon, Luis Ma. Bo-ot

10:00 AM Alarcon, Andrew S. (BS Physics)

"Accelerated power series solution of Lane-Emden-type system of equations for charged polytropic compact stars"

Adviser: Jose Perico Esguerra

Panel: Eric Galapon, Caesar Palisoc

11:00 AM Baldo, Carlos III F. (BS Physics)

"Fabrication and characterization of delta-doped InGaAs pseudomorphic high-electron mobility transistor"

Adviser: Arnel Salvador

Panel: Vincent Daria, Cristine Villagonzalo

01:00 PM Balista, Junius Andre F. (BS Applied Physics)

"Gestalt view of the human gait in a static image"

Adviser: Maricor Soriano

Co-adviser: Caesar Saloma

Panel: Luis Ma. Bo-ot, Roland Sarmago

02:00 PM Batac, Rene C. (BS Physics)

"Thermodynamic characterization of cellular automata rules using quantitative lattice properties"

Adviser: Caesar Saloma

Co-adviser: Johnrob Bantang

Panel: Jose Perico Esguerra, Marisciel Litong-Palima

03:00 PM Blanca, Glaiza Rose S. (BS Physics)

"An investigation on the effects of Yttrium in the flux motion of BSCCO high-temperature superconductor"

Adviser: Roland Sarmago

Panel: Gay Jane Perez, Roy Tumlos

04:00 PM Cammayo, Jumar C. (BS Physics)

"Characterization and fabrication of strained AlGaAs/GaAs high-electron mobility transistor"

Adviser: Arnel Salvador

Panel: Johnrob Bantang, Ma. Sheila Angeli Marcos

05:00 PM Catalan, Francesca Celine I. (BS Physics)

"Multiphoton optical beam-induced current with a nanosecond laser"

Adviser: Carlo Amadeo Alonzo

Panel: Carlo Mar Blanca, Julius Vernon Cemine

* * * *DAY 2: Tuesday, 28 March 2006

09:00 AM Dazo, Lorelie C. (BS Physics)
"Controlling the oxygen content of YBCO by varying annealing conditions"
Adviser: Roland V. Sarmago
Panel: Roy Tumlos, Julius Vernon Cemine

10:00 AM Defensor, Michael J. (BS Physics)
"Fabrication of enhancement and depletion mode HEMT and pHEMT devices on the same respective semiconductor layers"
Adviser: Arnel Salvador
Panel: Vincent Daria, Wilma Oblefias

11:00 AM Escay, Joaquin Jose (BS Applied Physics)
"The development of a wireless telemicroscope for optical beam induced current microscopy and microfabrication"
Adviser: Carlo Mar Blanca
Co-adviser: Vincent Ricardo Daria
Panel: Wilson Garcia, Maricor Soriano

01:00 PM Flores, Razel G. (BS Physics)
"Thermal properties of coupled iterated logistic map"
Adviser: Cristine Villagonzalo
Panel: Dranreb Earl Juanico, Wilma Oblefias

02:00 PM Garcia, Lenie G. (BS Applied Physics)
"Transport dynamics in a series of quantum wells"
Adviser: Cristine Villagonzalo
Panel: Marko Arciaga, Julius Vernon Cemine

03:00 PM Gatacelo, Laarnie G. (BS Physics)
"Dependence of two dimensional electron gas (2DEG) density, mobility, and scattering mechanisms on the donor concentration in AlGaAs/InGaAs/GaAs pseudomorphic modulation-doped heterostructures"
Adviser: Arnel Salvador
Panel: Jose Perico Esguerra, Cristine Villagonzalo

04:00 PM Jaramillo, Christian Oliver C. (BS Applied Physics)
"Constrained percolation in two dimensions"
Adviser: Cristine Villagonzalo, Ronald S. Banzon
Panel: Dranreb Earl Juanico, Giovanni Tapang

05:00 PM Legara, Erika Fille T. (BS Physics)
"Dynamical model and strategies for network marketing"
Adviser: Christopher Monterola
Co-adviser: Marisciel Litong-Palima, Caesar Saloma
Panel: Marko Arciaga, Dranreb Earl Juanico

* * * * DAY 3: Wednesday, 29 March 2006

09:00 AM Longjas, Anthony G. (BS Applied Physics)

"Jamming of hard spheres in a 2D hopper"
Adviser: Christopher Monterola, Marisciell Litong-Palima
Co-adviser: Caesar Saloma
Panel: Jacquelyn Gabayno, Caesar Palisoc

10:00 AM Manahan, Grace G. (BS Physics)
"A capillary waveguided-Nd: YAG pumped H₂ Raman shifter
of varying bore diameter"
Adviser: Wilson O. Garcia
Panel: Ma. Sheila Angeli Marcos, Wilma Oblefias

11:00 AM Manahan, Ruby Lyn C. (BS Physics)
"Investigation of the Critical Current Density of BSCCO films grown
by sedimentation deposition and liquid phase sintering and annealing technique"
Adviser: Roland V. Sarmago
Panel: Arnel Salvador, Henry Ramos

01:00 PM Mateo, Cherry Mae (BS Physics)
"Photoluminescence measurements for MBE grown GaAs heteroepitaxial
layer bonded to silicon via epitaxial lift-off"
Adviser: Arnel Salvador
Panel: Carlo Alonzo, Christopher Monterola

02:00 PM Oblefias, Cheena C. (BS Physics)
"Raman scattering study of InGaAs/InP structures at room temperature"
Adviser: Arnel Salvador
Panel: Johnrob Bantang, Wilson Garcia

03:00 PM Pagdanganan, Aldwin (BS Physics)
"A hydrogen Raman shifter with varying focusing geometry"
Adviser: Wilson O. Garcia
Panel: Maricor Soriano, Giovanni Tapang

04:00 PM Paraan, Francis N.C. (BS Applied Physics)
"Exact moments and cumulants of discrete and continuous time
elephant random walks"
["Analysis of a continuous-time system with complete memory of its history"]
Adviser: Jose Perico Esguerra
Panel: Luis Ma. Bo-ot, Jose Magpantay

05:00 PM Pastor, Marissa G. (BS Physics)
"Gravity-assisted mixing of granular materials of uniform mass and size"
Adviser: Caesar A. Saloma
Co-adviser: Johnrob Y. Bantang
Panel: Eric Galapon, Caesar Palisoc

* * * * DAY 4: Thursday, 30 March 2006

09:00 AM Quitchon, Aiza Marie (BS Applied Physics)
"Colored pattern recognition through digital holography"

Adviser: Percival Almoró
Co-adviser: Carlo Amadeo C. Alonzo
Panel: Gay Jane Perez, Ma. Sheila Angeli Marcos

10:00 AM San Juan, Jennifer Chrisna A. (BS Applied Physics)
"Stimulated Raman scattering in a single-mode optical fiber"
Adviser: Wilson O. Garcia
Co-adviser: Jacque Lynn F. Gabayno
Panel: Marko Arciaga, Christopher Monterola

11:00 AM Sastine, Vera Marie M. (BS Physics)
"High resolution differential thermal mapping of semiconductor devices"
Adviser: Carlo Mar Y. Blanca
Co-adviser: Caesar A. Saloma
Panel: Jacque Lynn Gabayno, Roy Tumlos

01:00 PM Uy, Mylein B. (BS Physics)
"Quantitative investigation of the field dependences of intergrain features of granular YBCO in fundamental AC magnetic susceptibility in the absence of vortices"
Adviser: Roland V. Sarmago
Panel: Ronald S. Banzon, Luis Ma. Bo-ot

02:00 PM Villegas, Erwin A. (BS Physics)
"Electron energy distribution function analysis of negative hydrogen ion enhancement in a magnetized sheet plasma source"
Adviser: Henry J. Ramos
Co-adviser: Virginia Noguera
Panel: Carlo Mar Blanca, Carlo Alonzo

2ND SEM AY 05-06 GRADUATE THESIS/DISSERTATION SCHEDULE

SCHEDULE, 24 MARCH 2006 (Friday)
PLACE: Audiovisual Room, Old NIP Building, 3rd Pavilion, Palma Hall

8-9:30am (MS Thesis)
Joselito E. Muldera
Thermoelectric transport coefficients of bulk and low dimensional structures
Examination Panel: C Villagonzalo (Adviser), R Banzon (Reader), H Ramos (Examiner), C Blanca (Examiner)

9:30-11am (MS Thesis)
Aristotle M. Calamba
Investigation of the energy levels of self-assembled InAs/GaAs dots
Examination Panel: A Salvador (Adviser), R Sarmago (Reader), W Garcia (Examiner), R Tumlos (Examiner)

11-12:30nn (MS Thesis)

Bhazel Anne H. Rara

MS Thesis: Interplay of Noise, Nonlinearity, and Fractional Dynamics

Examination Panel: JP Esguerra (Adviser), C Monterola (Reader), G Tapang (Examiner), M Litong-Palima (Examiner)

1-3 pm (PhD Dissertation)

Johnrob Y. Bantang

Dynamics of interacting complex systems

Examination Panel: C Saloma (Adviser), M Litong-Palima (Reader), R Banzon (Reader), P Esguerra (Examiner), L Bo-ot (Examiner)

3-4:30 pm (MS Thesis)

Maria Leilani Y. Torres

Image transfer from the excitation laser pulse to the Stokes line in a hydrogen Raman shifter

Examination Panel: W Garcia (Adviser), C Saloma (Reader), V Daria (Examiner), H Ramos (Examiner)

4:30 - 6 pm (MS Thesis)

Godofredo S. Bautista Jr.

Characterization of Semiconducting Devices via Two-photon Optical Beam-Induced Current and Spectral Reflectance Microscopy

Examination Panel: C Blanca (Adviser), C Saloma (Co-adviser), V Daria (Reader), W Garcia (Examiner), A Salvador (Examiner)

6 - 7:30 pm (MS Thesis)

Valerie Anne Innis

X-ray reflectivity studies of polymer thin films

Examination Panel: R Sarmago (Adviser), P Saligan (Co-adviser), M Soriano (Reader), C Villagonzalo (Examiner), R Banzon (Examiner)

SUMMER AY 2005-2006 BS THESIS DEFENSE SCHEDULE

Following is the schedule of presentations: Thursday, 25 May 2006

8:30 AM

Hismana, Jufel (BS Applied Physics)

"Mass spectrometric studies of low energy hydrogen beam from a gas discharge compact ion source"

Adviser: Henry J. Ramos

Panel: Marisci Palima, Roy Tumlos

9:30 AM

Mahinay, Christian Lorenz S. (BS Applied Physics)

"Solution of Navier-Stokes equations (NSE) for incompressible laminar flow along a cylindrical pipe using finite difference method"

Adviser: Luis Ma. Bo-ot

Panel: Jose Perico Esguerra, Bhazel Anne Rara

SUMMER AY 05-06 GRADUATE THESIS/DISSERTATION SCHEDULE

Summer 2006

Audiovisual Room

Old NIP Building, 3rd Pavilion, Palma Hall

25 May 2006 (Thursday)

10:30-12nn

Maria Teresa R. Pulido

Rumor Propagation within Static and Dynamic Networks

Examination Panel: Dr. Marisciell Litong-Palima (adviser) Dr. Christopher Monterola (co-adviser), Dr. Cristine DLR. Villagonzalo (Reader), Dr Ronald Banzon (Examiner), Dr Johnrob Bantang (Examiner)

1-2:30 pm

Melvin Ferrer Estonactoc

High Dynamic Range Optical Density Images of DSC-acquired Mammograms

Examination Panel: Dr. Maricor Soriano (adviser), Dr. Carlo Mar Blanca (Reader), Dr. Caesar Saloma (Examiner), Dr Wilson Garcia (Examiner)

2:30-4 pm

Louella Judy A. Vasquez

Modeling of Thermoelectric Transport Properties Of Single-Walled Carbon Nanotubes

Examination Panel: Dr. Cristine DLR Villagonzalo (adviser), Dr. Ronald Banzon (Reader), Dr. Roy Tumlos (Examiner), Dr Henry Ramos (Examiner)

4-5:30 pm

Rumelo C. Amor

Equilibrium and non-equilibrium behavior of two systems with hard-core interactions

Examination Panel: Dr. Jose Perico Esguerra (adviser), Dr. Luis Ma. Bo-ot (Reader), Dr Marisciell Litong-Palima (Examiner), Dr Johnrob Bantang (Examiner)

5:30-7 pm

Bess G. Singidas

A Mechanism for Loss Generation in AC Fields within the Meissner Regime of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$

Examination Panel: Dr. Roland V. Sarmago (adviser), Dr. Cristine Villagonzalo (Reader), Dr Arnel Salvador (Examiner), Dr Ronald Banzon (Examiner)

29 May 2006 (Monday)

10-12nn

Darwin Z. Palima

Dynamic beam shaping with spatial light modulators: Constraints and solutions

Examination Panel: Dr. Vincent Ricardo Daria (adviser) Dr. Caesar Saloma (Reader), Dr Maricor Soriano(Reader), Dr. Wilson Garcia (Examiner), Dr Carlo Mar Blanca (Examiner)

1-3 pm

Carlo Amadeo Alonzo

Two-color (two-photon) excitation for imaging applications

Examination Panel: Dr. Caesar Saloma (adviser) Dr. Wilson Garcia (co-adviser), Dr Vincent Ricardo Daria (Reader), Dr. Arnel Salvador (Examiner), Dr Carlo Mar Blanca (Examiner)

A. Undergraduate Thesis

Defense schedule are indicated in parentheses.

1st semester AY 06-07 (3)

B.S. Physics

1. Reynaldo Domingo
"Spectrum of Low-Lying Charmonium" (10/4/06 9-10am)
Adviser: Dr. Caesar Palisoc ;
Examiners: Dr. Eric Galapon, Dr. Perry Esguerra
2. Ma. Loresa Jarlego
"Fabrication and Electrical Characterization of Metal Semiconductor Field Effect Transistors (MESFET)" (10/4/06 10-11am)
Adviser: Dr. Arnel Salvador;
Examiners: Dr. Henry Ramos, Mr. Godofredo Bautista
3. Ralph Paolo Mandingiado
"Complexity Measure by Simplex Projection in an 8-bit Penna Model" (10/4/06 11-12pm)
Adviser: Dr. Ronald Banzon;
Examiners: Mr. Marko Arciaga, Ms. Bhazel Rara

2nd Semester AY 06-07

B.S. Applied Physics

1. Alis, Christian M.
"Mobile Distributed System for Telemicroscopy and Spatio-Temporal Tracking" (3/24/07 10-11am)
Adviser: Dr. Carlo Mar Blanca
Panel: Ms. Bhazel Anne Rara, Dr. Luis Sison
2. Arevalo, Phoebe Gracielle S.
"Time-Resolved Measurement of Electron Temperature and Density of a Laser Produced Aluminum Plasma in Nitrogen" (3/24/07 11-12pm)
Adviser Dr. Wilson O. Garcia Coadviser: Ms. Jacque Lynn Gabayno
Panel : Mr. Marko Arciaga, Ms. Bess Singidas
3. Ebreo, Frances Joy,
"Deformation Analysis Using Lensless Fourier Digital Holography" (3/24/07 2-3pm)
Adviser: Dr. Percival Almoró
Examiners: Ms. Ma. Leilani Torres, Mr. Godofredo Bautista, Jr.
4. Esleta, George Allan P.
"Dynamical Behavior of Threaded Systems" (3/24/07 3-4pm)
Adviser: Dr. Marisciel Palima, Co-adviser: Dr. Christopher Monterola
Examiners: Dr. Ronald Banzon, Dr. Johnrob Bantang
5. Francisco, Michelle C.
"Three-Dimensional Optical Shape Measurement Using Dual-Illumination Phase-Shifting Digital Holography" (3/24/07 4-5pm)
Adviser: Dr. Percival Almoró
Examiners: Dr. Maricor Soriano, Mr. Godofredo Bautista, Jr.
6. Ibo, Stephanie B.

“Characterization of the Penna Model by Simplex Projection Method” (3/27/07 8-9am)

Adviser: Dr. Ronald Banzon

Examiners: Dr. Johnrob Bantang, Ms. Bhazel Anne Rara

7. Javonitalla, Angelo

"Mix Gas Species Diagnostics of Streaming Neutral Gas Injection (SNGI) Set-Up" (3/27/07 9-10am)

Adviser: Dr. Henry Ramos

Examiner: Ms. Margie Olbinado, Ms. Jacque Lynn Gabayno

8. Jhocson, Angela Monique T.

"Synchronization and Chaos Control Via Directional Noise Injection" (3/27/07 10-11am)

Adviser: Dr. Giovanni Tapang

Examiners: Dr. Johnrob Bantang, Dr. Cristine Villagonzalo

9. Lagman, Karl Bryan,

"Tracking and Modeling Oceanographic Features" (3/27/07 11-12pm)

Adviser: Dr. Maricor Soriano

Examiner: Dr. Cesar Villanoy, Dr. Marisciel Palima

10. Ocampo, Leonard R.

"Time Reversal Symmetry Broken Confined Quantum Time of Arrival Operators" (3/27/07 1-2pm)

Adviser: Dr. Eric Galapon

Examiners: Dr. Caesar Palisoc, Dr. Jose Magpantay

11. Pabelina, Karel G.

"Sterilization of a Packaged Material Using Low Pressure Glow Discharge Plasma" (3/21/07 2-3pm)

Adviser; Dr. Henry Ramos

Examiner: Dr. Wilson Garcia , Dr. Ma. Auxilia Siringan

12. Ramirez, Lourdes Patricia,

“Pulse Shortening via Stimulated Raman Scattering in Nitrogen” (3/27/07 2-3pm)

Adviser: Dr. Wilson Garcia, Co-adviser: Ms. Ma. Leilani Torres

Examiners: Dr. Jose Magpantay, Mr. Marko Arciaga

13. Tusara, Loren M.

"Coral Shape Reconstruction Using Texture as 3D Cue" (3/27/07 3-4pm)

Adviser: Dr. Maricor Soriano

Examiners: Ms. Gay Jane Perez, Ms. Ma. Leilani Torres

14. Uy, Mayrene A.

"Investigation of the Effect of Yttrium-Doping on Calcium Site of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$ Film Deposited Onto Silver-Coated MgO Via Electro-phoretic Deposition Technique" (3/27/07 4-5pm)

Adviser: Dr. Roland Sarmago

Examiner: Dr. Henry Ramos, Dr. Caesar Palisoc

B.S. Physics

1. Alfonso, Ruby Agnes B.

- "New Applications of the Asymptotic Iteration Method to Eigenvalue Problems in Quantum Mechanics" (3/21/07 8-9am)
 Adviser: Dr. Jose Perico Esguerra
 Examiner: Dr. Ronald Banzon, Dr. Eric Galapon
2. Balois, Maria Vanessa C.
 "Wavefront Analysis Via Phase Retrieval by Volume Speckle Field" (3/24/07 1-2pm)
 Adviser: :Dr. Percival Almoró
 Examiners: Dr. Vincent Ricardo Daria Ms. Gay Jane Perez
3. Bañas, Andrew Rafael M.
 "Efficient Calculation of Computer Generated Holograms and Applications" (3/21/07 9-10am)
 Adviser: Dr. Vincent Ricardo Daria"
 Examiner : Ms. Jacque Lynn Gabayno, Dr. Ronald Banzon
4. Caidic, Niel Laurent C.
 "Dynamics of Coupled Fractional Van Der Pol Oscillator" (3/21/07 10-11am)
 Adviser: Dr. Jose Perico Esguerra
 Examiner: Dr. Caesar Palisoc, Dr. Cristine Villagonzalo
5. Fudolig, Mikaela Irene
 "Language Competition in Split Populations: Consequences on Language Maintenance and Death" (3/21/07 11-12pm)
 Adviser: Dr. Jose Perico Esguerra"
 Examiner: Dr. Johnrob Bantang, Ms. Teresa Pulido
6. Garcia, Emmanuel Soliman M.
 "Mean First-Passage Time for Random Walks on Circulant Networks" (3/21/07 1-2pm)
 Adviser: Dr. Jose Perico Esguerra
 Examiner: Dr. Giovanni Tapang, Dr. Marisciél Palima
7. Ramirez, Karen Patricia G.
 "Gegenbauer Reconstructed Split Operator Method for Spatially Confined Quantum" (3/21/07 2-3pm)
 Adviser: Dr. Eric Galapon
 Examiner: Dr. Caesar Palisoc, Dr. Jose Magpantay
8. Santos, Erika A.
 "Fabrication and Characteri-zation of Highly C-Axis Oriented Yttrium Substitute $\text{Bi}_2\text{Sr}_2\text{Ca}_{1-x}\text{Y}_x\text{Cu}_2\text{O}_8$? Thin Films Grown Via Sedimen-tation Deposition and Liquid Phase Sintering Technique" (3/21/07 4-5pm)
 Adviser; Dr. Roland Sarmago
 Examiner: Mr. Marko Arciaga, Ms. Ma. Leilani Torres

Summer AY 06-07

B.S. Applied Physics

1. Hasmin A. Almencion (BS. Applied Physics)
 Thermal Mapping of Semi-Circular Lecture Room: Room 109 of the National Institute of Physics New Building (5/24/07 9-10am)
 Adviser : Mr. Marko Arciaga Co Adviser : Dr. Maricor Soriano
 Examiners : Dr. Percival Almoró, Ms. Shiela Angeli Marcos

2. Claire Ann Nunez
 "A Variational Monte Carlo Study: A Particle in a Quantum Well System in an External Electric Field" (5/24/07 10-11am)
 Adviser : Dr. Ronald Banzon, Co-adviser: Dr. Cristine Villagonzalo
 Examiners: Dr. Carlo Mar Blanca, Dr. Armando Somintac

3. Emil A. Pares
 "Effect of Negative Biased Low Pressure DC Glow Discharge H₂O₂ Plasma on Sterilization of Bacillus Subtilis-Contaminated Stainless Steel" (5/24/07 11-12pm)
 Adviser: Dr. Henry Ramos, Co-Adviser : Dr. Ma. Auxilia Siringan
 Examiners: Dr. Maricor Soriano, Ms. Gay Jane Perez

4. Mary Jacqueline N. Sombillo
 "Revealing the Structure of Real Socio-Political Philippin System: A Complex Network Analysis Approach" (5/24/07 1-2pm)
 Adviser: Dr. Marisciel Palima
 Examiners: Dr. Christopher Monterola, Dr. Johnrob Bantang

B. Graduate Thesis/Dissertation

1st Semester AY 06-07

Ph.D.

1. Alvarado Tarun
 "Nondestructive and Subsurface Defect Detection in Integrated Circuits Using Advanced Microscopy and Spectroscopy Techniques" (10/4/07 1-3pm)
 Adviser: Dr. Caesar Saloma;
 Reader: Dr. Maricor Soriano;
 Examiners: Dr. Carlo Blanca, Dr. Vincent Daria, Dr. Wilson Garcia

M.S.

1. Valynn Katrine Mag-usara
 "Optical Spectra of InAs Quantum Dots in InGaAs/GaAs Quantum Wells" (10/4/07 1-2:30pm)
 Adviser: Dr. Arnel Salvador;
 Panel: Dr. Johnrob Bantang, Dr. Wilson Garcia (Reader), Dr. Percival Almoro

2. Gabriel Manasan
 "Biased Random Walks with Geometrically Shrinking Steps" (10/4/07 2:30-4pm)
 Adviser: Dr. Perry Esguerra;
 Panel: Dr. Giovanni Tapang (Reader), Dr. Ronald Banzon, Dr. Caesar Palisoc

3. Margie Olbinado
 "Study of the Intergrain Loss in Granular MgB₂ Superconductor via AC Magnetic Susceptibility Measurements" (10/11/07 9-10:30am)
 Adviser: Dr. Roland Sarmago;
 Panel Dr. Marisciel Palima (Reader), Dr. Cristine Villagonzalo, Dr. Armando Somintac

4. Veronica Torralba
 "Harmonic Generation in the Absence of Vortices" (10/11/07 10:30-12pm)

Adviser: Dr. Roland Sarmago;
Panel Dr. Christopher Monterola (Reader), Dr. Giovanni Tapang, Dr. Eric Galapon

Second Semester AY 06-07

Ph.D.

1. Cemine, Vernon Julius R.
Novel Techniques in Semiconductor Characterization and Failure Analysis Using Optical Feedback Laser Scanning Microscopy" (3/24/07 8-10am)
Adviser: Dr. Carlo Mar Blanca" Co-adviser: "Dr. Caesar Saloma"
Reader: Dr. Maricor Soriano,
Examiners: Dr. Arnel Salvador, Dr. Cristine Villagonzalo, Dr. Ruby De La Torre
2. Hermosa, Nathaniel II P. (3/28/07 8-10am)
"Birth, Propagation and Interaction of Optical Vortices in a Fractured Conical Wavefront"
Adviser: Dr. Wilson O. Garcia Co-adviser: Dr. Percival Almoro
Reader: Dr. Vincent Ricardo Daria
Examiners: Dr. Caesar Saloma, Dr. Arnel Salvador, Dr. Giovanni Tapang
3. Juanico, Dranreb Earl O.
"Self-Organizing Mechanisms of Complex Adaptive Systems Under Critical Conditions" (3/28/07 10-12pm)
Adviser: Dr. Caesar Saloma Co-adviser: Dr. Christopher Monterola
Reader: Dr. Percival Almoro
Examiners: Dr. Marisciel Palima, Dr. Ronald Banzon, Dr. Roland Sarmago
4. Oblefias, Wilma R.
"Spectral Microscopy of Fluorescence Spectra: Estimation, Unmixing, and Noise Effects" (3/28/07 3-5pm)
Adviser: Dr. Maricor Soriano Co-adviser: Dr. Caesar Saloma
Reader: Dr. Vincent Ricardo Daria
Examiners: Dr. Wilson Garcia, Dr. Giovanni Tapang, Dr. Jose Perico Esguerra"
5. Recoleta, Florencio Jr. D.
"Optical Time-Resolved Photoluminescence Studies of Semiconductor Heterostructure" (3/28/07 5-7pm)
Adviser: Dr. Arnel Salvador
Reader: Dr. Roland Sarmago
Examiners : Dr. Caesar Saloma, Dr. Wilson Garcia, Dr. Cristine Villagonzalo

M.S.

1. Casco, Ma. Frantessa T
"Molecular Beam Epitaxial Growth of InAs/InAlAs Quantum Wires on InP(001) Substrate
Adviser: Dr. Arnel Salvador" (3/26/07 8:30-10am)
Reader: Dr. Roland Sarmago
Examiners: .Dr. Henry Ramos, Dr. Armando Somintac
2. Dimamay, Mariel Grace S.

"Numerical Investigation of the Photoluminescence Decay Response Characteristics of Oxide-Confined Vertical Cavity Surface-Emitting Laser" (3/26/07 10-11:30pm)

Adviser: Dr. Arnel Salvador

Reader: Dr. Cristine Villagonzalo

Examiners: Dr. Eric Galapon, Dr. Henry Ramos

3. Go, Mary Ann B.

"Spectral Unmixing of Ideal Aquatic Benthos With Consideration of Water-Column Effect" (3/26/07 11:30-1pm)

Adviser: Dr. Maricor Soriano

Reader: Dr. Arnel Salvador

Examiner: Dr. Carlo Mar Blanca, Dr. Armando Somintac

4. Paz, Athena Evalour S.

"Optical Techniques for Painting Characterization" (3/26/07 1-2:30pm)

Adviser: Dr. Maricor Soriano

Reader: Dr. Vincent Ricardo Daria

Examiner: Dr. Armando Somintac, Dr. Christopher Monterola"

5. Romero, Mary Jacqueline T.

"Generation of Arbitrary and Programmable Optical Fields" (3/26/07 2:30-4pm)

Adviser : Dr. Vincent Ricardo Daria

Reader: Dr. Caesar Saloma

Examiners: Dr. Percival Almor, Dr. Carlo Mar Blanca

6. Roxas, Ranzivelle Marianne L.

"Network Analysis: Characterizing Classroom Dynamics and Syntactic Structure" (3/26/07 4-5:30pm)

Adviser: Dr. Christopher Monterolam Co-adviser: Dr. Giovanni Tapang

Reader: Dr. Maricor Soriano

Examiner: Dr. Jose Perico Esguerra, Dr. Johnrob Bantang

7. Samson, Edward Carlo C.

"Contrast Enhancement in Widefield Microscopy Using Projector-Generated Dynamic Pattern Illumination" (3/26/07 5:30-7pm)

Adviser: Dr. Carlo Mar Blanca

Reader: Dr. Vincent Ricardo Daria

Examiners: Dr. Arnel Salvador, Dr. Armando Somintac

Summer AY 06-07

M.S.

1. Karla Belisario

A Reaction Rate Model for Composite Particles (5/25/07 9-10:30am)

Adviser: Dr. Ronald Banzon

Reader: Dr. Roland Sarmago

Examiners: Dr. Giovanni Tapang, Dr. Henry Ramos

2. Francis Norman Paraan

Brownian Motion of a Charged Particle Driven Internally by Correlated Noise (5/25/07 10:30-12pm)

Adviser: Dr. Jose Perico Esguerra
 Reader: Dr. Marisciell Palima
 Examiners: Dr. Giovanni Tapang, Dr. Christopher Monterola

3. Anthony Villanueva
 New Results on the Confined Time of Arrival (5/25/07 1-2:30pm)
 Adviser : Dr. Eric Galapon
 Reader: Dr. Jose Perico Esguerra
 Examiners: Dr. Armando Somintac, Dr. Johnrob Bantang

4. Roberto S. Vitancol
 Application of the Clenshaw-Curtis Quadrature in Confined Time of Arrival Operator Eigenvalue Problem (5/25/07 2:30-4:30pm)
 Adviser : Dr. Eric Galapon
 Reader: Dr. Percival Almoro
 Examiners: Dr. Arnel Salvador, Dr. Roland Sarmago

C. Summary

Table 2 below shows a summary of the number of successful thesis/dissertation examinations in the Academic Year 2006-2007.

Course	1 st sem	2 nd sem	Summer	Total
B.S. Physics	3	8	0	11
B.S. Applied Physics	0	14	4	18
M.S.	4	7	4	15
Ph.D.	1	5	0	6

4. Graduate Admission – Notes on the first ever placement interview of Graduate applicants

Realizing that graduate applicants that come from schools other than NIP may not have the necessary and sufficient background to go into the physics graduate program, the DDAA conducted the first ever placement interview for graduate applicants to assess preparedness and design programs of study for accepted applicants.

Only non-NIP graduates were subjected to the placement interviews which were held from May 10-12 1-4pm at PH 3210. The interview panel were

1. Dr. Giovanni Tapang – taught Phys 201
2. Dr. Marisciell Palima – teaches 251 and off-season 151
3. Dr. Eric Galapon – teaches 204.1 and 241
4. Dr. Jose Perico Esguerra – teaches off-season 141
5. Dr. Maricor Soriano – Deputy Director for Academic Affairs

The questions fielded where on

1. Differential equations
2. Integration and differentiation

3. Limits
4. Gradients, vector algebra
5. General physics knowledge

In cases where the applicant cannot be physically present, the question and answer was held through Skype internet telephony. One applicant was interviewed in Bicol and another in Baguio. The reception was good and was conducted such that the panel can see the interviewee but he cannot see the panel.

Out of the 15 non-NIP applicants, 2 were accepted outright, 8 passed the placement interview, 3 had their applications deferred and 2 never showed up.

The 2 applicants who were accepted outright were

1. Varsolo Sunio – Ateneo de Manila University (summa) (M.S. Physics)
2. John Ray Martinez – De La Salle University (B.S. Physics and BS Educ (Math)) (M.S. Physics)

The 8 applicants who were accepted after interview were

1. Amante Ama – University of Nueva Caceres (M.A. Physics)
2. Jesus Anastacio – Cagayan State University (M.S. Physics)
3. Mark Earnest Dizon – ADMU (M.S. Physics)
4. Alladin Jasmin – UP Baguio (M.S. Physics)
5. Nelson Lazare – PNU (M.S. Physics)
6. Carolina Lim – UP Baguio (M.S. Physics)
7. Lyrica Lucas – PNU (M.A. Physics)
8. Pepito Nicolas – PATTS (M.A. physics)

The 4 applicants with deferred applications were

1. Melanie Bernardo – PNU – did not do well in the interview. Requested deferment.
2. Eva Obal – MSU-IIT – did not do well in the interview and did return for written exam.
3. Marco Osabel – PNU – did not do well in the interview and did not return for placement exam.

The 2 applicants who did not show up were

1. Flordecita Florendo
2. Jason Punay – Requested deferment.

After the interview, programs of study were designed for each accepted applicant. PCASTRD and DOST – SEI were given copies of the programs of study in case the students file for scholarship in these agencies. All M.S. Physics applicants were given the non-thesis option by default with the proviso that they will seek an adviser on their second year of graduate studies. Upon the acceptance of a Ph.D. Adviser, the graduate student can then transfer to the thesis option.

Observations

1. The interview allowed the probing of preparedness of the applicants. It also made the applicants aware of the minimum Math skills required to enter the program.
2. Applicants who teach in college remember their calculus but those who teach in high school forget.
3. What appears on transcripts may not reflect the actual depth of knowledge of the student especially in math and physics courses.

Recommendations:

1. Since most of the questions were repeated it was recommended that a standard placement exam be part of the requirements for graduate applicants to NIP and that the exam be conducted in one

day.

2. Several versions of the program of study can be standardized such that applicants with the same level of preparation can be given the appropriate program immediately.
3. The placement exam/interview can replace the old practice of collecting signatures from the graduate committee.
4. Faculty assigned to conduct the placement exam/interview should have taught core courses in the graduate program.

1. CM Blanca, VJ Cemine, B Buenaobra and C Saloma, "Localizing Defects on Curcuits using High-Resolution OFT," Optics and Photonics News (Optical Society of America) p 30 (December 2006)
2. VJ Cemine, C Blanca and C Saloma, "High-resolution quantum efficiency mapping of silicon photodiode via optical-feedback laser microthermography," Appl Opt 45 pp. 6947-6953 (2006).
3. W Oblefias, M Soriano, A Tarun and C Saloma, "Individual classification of buried transistors in live microprocessors by functional infrared emission spectral microscopy," App Phys Lett 89, 151113 (2006)
4. J Bantang and C Saloma, "Co-existence of Poisson and Non-Poisson Processes in Ordered Parallel Multilane Pedestrian Traffic," Complexity Vol. 11, No. 5, pp 35-42 (2006)
5. R Pobre and C Saloma, Radiation force exerted on nanometer size non-resonant Kerr particle by a tightly focused Gaussian beam, Optics Communications 67/2 pp 295-304 (2006)
6. G Bautista Jr, CM Blanca, S Delica, B Buenaobra and C Saloma, Spectral microthermography for component discrimination and hot spot identification in integrated circuits ,Opt Express 14, pp 1021-1026 (2006)
7. W Oblefias, M Soriano and C Saloma, "Accuracy of spectrum estimate in fluorecence spectral microscopy with spectral filters," Opt Commun 260, pp 755-766 (2006)
8. Saloma and GJ Perez, "Herding in real escape panic," in Pedestrian and Evacuation Dynamics 2005, N Waldau, P Gatterman, H Knoflacher, M Schrekenberg, editors (Springer-Verlag, Berlin, November 2006) pp 453-461.
- 9 D. Palima and V. Daria " Effect of Spurious Diffraction orders in arbitrary multifoci patterna produced via Phase only holograms", Applied Optics, Vol 45, September 2006.
10. Almero, G. Pedrini and W. Osten, "Complete wave front reconstruction using sequential intensity measurements of a volume speckle field," Applied Optics 41, 8596-8605, December 1, 2006.
11. G. Q. Blantocas, H. J. Ramos and M. Wada, "Surface modification of narra wood (*Pterocarpus Indicus*) by ion shower treatment", *Japanese Journal of Applied Physics* 45 (10B) (2006) 8498.
12. G. Q. Blantocas, H. J. Ramos and M. Wada, "An investigation as to the cause of beam asymmetry in a compact gas discharge ion source: a focus on beam-wall interaction", *Japanese Journal of Applied Physics* 45 (10B) (2006) 8425.

13. R. E. Flauta, M. R. Vasquez, Jr., H. J. Ramos and M. Wada, "Effect of surface and growth conditions for the formation of textured polycrystalline GaN crystals by reactive N₂ plasma", *Japanese Journal of Applied Physics* 45 (10B) (2006) 8512.
- 14 V. R. Noguera, and H. J. Ramos, "A magnetized sheet plasma source for the synthesis of TiN on stainless steel substrates", *Thin Solid Films* 506-507 (2006) 613.
15. H. J. Ramos, J. L. C. Monasterial and G. Q. Blantocas, "Effect of low energy ion beam irradiation on wettability of narra (*Pterocarpus indicus*) wood chips", *Nuclear Instrum. Methods B* 242 (2006) 41
16. FDRcoletto, J.N Mateo, MGS Dimamay, AS Somintac, ES Estacio and A. Salvador "Photoluminescence Decay Characteristics of an Oxide-Confined vertical cavity surface emitting laser", *Applied Physics Letters*, 88(12) 21122 , 2006
17. E. Estacio, A. Quema, R. Pobre, G. Diwa, C. Ponceca, S. Ono, H. Maurakami, A. Somintac, J. Sy, V. Magusara, A. Salvador and N. Saruhara, " Below bandgap excited terahertz emission of optically pumped GaAs/AlGaAs multiple quantum wells", *Journal of Photochemistry and Photobiology*, Vol 183 #3, pp 334-337 , 2006.
18. R.L.C. Manahan and R.V. Sarmago, "Growth of superconducting Bi₂Sr₂CaCu₂O_{8+x} films by sedimentation deposition and liquid phase Sintering technique", *Physics C* 445-448 P733-736 (2006)
19. B.A. Kniehl and C. P. Palisoc, "Prompt J/Psi plus proton associated electron production at DESY HERA ", *The European Physical Journal C*, DOI 10.1140/epc/S10052-006-0044-2.
20. F. N. C. Paraan and J. P Eguerra, " Exact Moments in a continuous time random walk with complete memory of its history", *Physical Review E* 74, 132101 pp1-4.
21. E A Galapon, "theory of quantum first time of arrival via spatial confinement I: Confined time of arrival operators for continuous potentials", *International Journal of Modern Physics A* 21(31) :6351-6381 (2006)

List of NIP ISI Publications (Jan-May 2007)

1. P. Almoró, G. Pedrini and W. Osten, “Aperture synthesis in phase retrieval using a volume-speckle field,” *Optics Letters* 32, 733-5, April 1, 2007.
2. N. Hermosa and C. Manóis, “Phase structure of helicon-conical optical beams” *Optics Communications*, 271 (1), 178-183, March 2007.
3. C. Alonzo, W. Garcia and C. Saloma, “Crosstalk Between Two-Photon and Two-Color (Two-Photon) Excitation in Optical Beam Induced Current Generation with Two Confocal Excitation Beams,” *Optics Communications* 270, 139 – 144, Feb. 2007.
4. C. Mateo, A. Garcia, F. Ramos, K. Manibog and A. Salvador “ Strain induced splitting of the valence band in epitaxially lifted off GaAs films”, *Journal of Applied Physics* (2007)
5. D. Jaunico, C. Monterola and C. Saloma , “Dissipative self organized branching in a dynamic population”, *Physical Review E (Rapid Communication)* , April 2007
6. D. E. Juanico, C. Monterola and C. Saloma “ self organized critical branching in systems that violate conservation laws”, *new Journal of Physics*, Vol.9 Article 92 pp1-18 , April 2007.

List of NIP Papers in International Publications 2006 (Books, Conference proceedings)

1. E.A. Galapon, "What could have we been missing while Pauli's theorem was enforced?," in Time and Matter (I. Bigi, ed.), World Scientific Singapore 2006.

List of NIP Papers in International Publications 2007 (Books, Conference proceedings)

1. G. Perez and C. Saloma, "Herding in Real Escape Panic", Pedestrian and Evacuation Dynamics 2005, edited by N. Waldau, P. Gatterman, H. Knofler, M. Scheckenberg, Springer Verlag, Berlin Heidelberg, January 2007.

2. F.D. Reoleto, J. N. Mateo, M.S. Dimamay, E. Estacio, A. Somintac and A. Salvador "Improvement of the Photoluminescence Decay Response Characteristics of an Oxide confined Vertical cavity surface emitting laser probed by Femtosecond laser pulses", Ultrafast Optics V, S. Watanabe and K. Midorikawa (editors), Springer 2007.

3. E. Estacio, A. Quema, G. Diwa, G. De los Reyes, H. Murakami, S. Ono, N. Sarukura, A. Somintac and A. Salvador "Action spectra of GaAs/AlGaAs Multiple quantum wells exhibiting terahertz emission peak at excitation energies below the bandgap", Ultrafast Optics V, S. Watanabe and K. Midorikawa (editors), Springer 2007.

List of NIP papers at the 2006 SPP Conference

MANUSCRIPTS OF NIP FACULTY MEMBERS AND STAFF (For multiple authors/faculty members/staff, a paper is attributed only to a single faculty member as presenter.)

Ph.D. Faculty (20)

Count	Faculty Name / Presenter	Manuscript No.	Title	CoAuthors
1	Almoro, Percival	SPP2006121	Phase Retrieval Using Measurements of a Volume Speckle Field with Synthetic Apertures	
2	Bantang, Johnrob	SPP2006137	Sustainable and catastrophic harvest methods	
	Bantang, Johnrob	SPP2006144	Experimental Study on the Angle of Repose of Rice in the Presence of the Interstitial Matrix	Marissa Pastor
3	Banzon, Ronald	SPP2006061	Complexity in Competitive Populations	Ralph Paolo Mandingiado
	Banzon, Ronald	SPP2006072	Particle Density Dependence of Molecular Dynamics Estimated Reaction Ra	tesKristine Eia Antonio
4	Blanca, Carlo	SPP2006118	Numerical and Experimental Simulation of an Electrocardiogram using a Michelson Interferometer	Frances Joy Ebreo
	Blanca, Carlo	SPP2006138	High resolution tracking of mobile agents by electromagnetic timereversal techniques	Christian Alis
5	Boot, Luis Ma.	SPP2006078	Solution of the NavierStokes Equation (NSE) for the Incompressible Laminar Flow along a Cylindrical Pipe using Finite Difference Method	Christian Lorenz Mahinay
6	Daria, Vincent Ricardo	SPP2006005	Parallel implementation of the GerchbergSaxton algorithm and holographic field projection using a phaseonly spatial light modulator	Andrew Rafael Bañas
	Daria, Vincent Ricardo	SPP2006035	Boosting the coupling efficiency in singlemode microstructured fibers	Andrew Rafael Bañas
7	Esguerra, Jose Perico	SPP2006065	Relating the mean first passage times for continuous and discrete time random walks on complex networks	Emmanuel Soliman Garcia
	Esguerra, Jose Perico	SPP2006108	Modeling the Survival of Minority Languages	Mikaela Irene Fudolig
	Esguerra, Jose Perico	SPP2006112	Analytical Underpinnings of a Hybrid AnalyticNumeric Scheme for the AbeThurner Generalization of the Diffusion Equation	
	Esguerra, Jose Perico	SPP2006171	On the Feasibility of Analytical Approximations for the Bound State Energy Spectra of OneDimensional Quantum Systems	M. Sereno
	Esguerra, Jose Perico	SPP2006172	Eigenenergies of the Generalized Hulthen Potential by the Asymptotic Iteration Method	Ruby Agnes Alfonso
8	Galapon, Eric	SPP2006084	Numerical Quantum Evolution of Confined Particle with nonperiodic boundary conditions through Split operator method reconstructed by Gegenbauer Series	Karen Patricia Ramirez

MANUSCRIPTS OF NIP FACULTY MEMBERS AND STAFF (For multiple authors/faculty members/staff, a paper is attributed only to a single faculty member as presenter.) MANUSCRIPTS OF NIP FACULTY MEMBERS AND STAFF (For multiple authors/faculty members/staff, a paper is attributed only to a single faculty member as presenter.)

	Galapon, Eric	SPP2006085	Symmetry Breaking Quantizations for the Confined Quantum Time of Arrival Operator	Leonard Ocampo
	Galapon, Eric	SPP2006087	Born Series Solution of the Time Kernel Equation and Quantum	Anthony Villanueva
	Galapon, Eric	SPP2006088	Superalgebraic Computation of the Quantum Confined Time of Arrival Operator Eigenvalues	Roberto Vitancol
	Galapon, Eric	SPP2006089	Modified Time Kernel Equation for Entire Analytic Potentials	Herbert Domingo
9	Garcia, Wilson	SPP2006083	Generation of Optical Lattices using Variable Amplitude Spatial Fourier Filter	ing Lourdes Patricia Ramirez
	Garcia, Wilson	SPP2006109	Temporal behavior of nitrogen Raman lines with increasing input energy	Lourdes Patricia Ramirez
	Garcia, Wilson	SPP2006123	Laser induced breakdown spectroscopy of copper in heterogeneous gas me	dia Michelle Francisco
10	Monterola, Christopher	SPP2006041	Criticality of a nonconservative selforganized branching process in a stochastically dynamic population	Dranreb Earl Juanico
	Monterola, Christopher	SPP2006055	Tear Propagation Model of Woven Fabrics	George Allan Esleta
	Monterola, Christopher	SPP2006140	Characterizing the Propagation of Information in a Classroom Using Neural Networks	
11	Palima, Marisciel	SPP2006110	Emerging Structure in the Network of Bill Coauthorships in the Philippine House of Representatives	Mary Jacqueline Sombillo, Dr. Caesar Saloma
	Palima, Marisciel	SPP2006166	Jamming of Hard Spheres in a 2D Hopper	Anthony Longjas, Dr. Caesar Saloma, Dr. Marisciel Palima
12	Palisoc, Caesar	SPP2006016	Prompt J/psi plus jet associated production in ep deepinelastic scattering	
13	Ramos, Henry	SPP2006032	Effect of Using Variable Extractor Voltage in N+ Plasma Enhanced Chemical Vapor Deposition on Substrate Land Pads	Maria Celine Alarcon
	Ramos, Henry	SPP2006040	Surface Morphology and Optical Characterization of Argon Plasma Treatment of Polyaniline Emeraldine Base at Various Powers	Earl Vincent Lagsa
	Ramos, Henry	SPP2006045	Investigation of the Gas Discharge Ion Source Three Electrode System for Optimum H+ Extraction	Jufel Hismana
	Ramos, Henry	SPP2006154	Electron Temperature Measurement of an Argon Microwave Discharge Using Spectroscopic Analysis of 4p Transition Levels	Marko Arciaga
	Ramos, Henry	SPP2006179	TiN depth calibration of simulated synthesis using Kinetic Monte Carlo meth	odM. Villamayor

14	Saloma, Caesar	SPP2006139	Holographic generation of wavelet beam shapes with dynamic scaling param	eterMary Jacqueline Romero, Dr. Vincent Ricardo Daria
15	Salvador, Arnel	SPP2006133	Straininduced Splitting of the Valence Band in Epitaxially Liftedoff GaAs Fil	msCherry May Mateo
	Salvador, Arnel	SPP2006136	Fabrication and Characterization of InAlAs/InGaAs PIN structures	John Vincent Misa
16	Sarmago, Roland	SPP2006064	Surface Morphology and Composition of YBa ₂ Cu ₃ O ₇  (Y123) Films on (001) LaAlO ₃ Grown by Liquid Phase Sintering Technique	Ayn Hazel Manuel
	Sarmago, Roland	SPP2006134	Mechanism of Hydrothermal Growth of ZnO Nanoflowers and Nanoblades	Ian Harvey Arellano
	Sarmago, Roland	SPP2006168	MgB ₂ Synthesis on Alumina/Porous Ceramic Substrates using Different Bind	ersK. So
	Sarmago, Roland	SPP2006169	Fabrication of Carbon Nanotubes by Ambient Thermal Chemical Vapor Deposition Method	Astrid Ayla Liberato
	Sarmago, Roland	SPP2006170	Effect of Sintering Temperature on the Electrical Property and Microstructure of Zn _{0.9} Bi _{0.02} Mn _{0.02} Cr _{0.02} Al _{0.04} Varistor	Astrid Ayla Liberato
	Sarmago, Roland	SPP2006178	Spincoated MgB ₂ films on alumina by postannealing techniques	Eden Marie Borgonia
17	Somintac, Armando	SPP2006156	Optical Spectra of InAs Quantum Dots in InGaAs/GaAs Quantum Wells	Valynn Katrine Magusara, Dr. Arnel Salvador
18	Soriano, Maricor	SPP2006060	Tilt angle determination in images of semiregular patterned object using local spectral distortion	Loren Tusara
	Soriano, Maricor	SPP2006073	Robust Underwater Object Tracking Using Color and Motion Cues	Karl Bryan Lagman
	Soriano, Maricor	SPP2006128	Bathymetry using an underwater color locus	Jenny Aggangan
	Soriano, Maricor	SPP2006147	Robust Smile Detection Algorithm using Curvature and Area as Cues	Karl Bryan Lagman
19	Tapang, Giovanni	SPP2006150	Robustness of Meaning and Readability in Written Syntactic Networks	Josephine Jill Cabatbat, Dr. Christopher Monterola
20	Villagonzalo, Cristine	SPP2006022	Heat Capacity of Logistic Maps with Bidirectional Coupling	R. Flores
	Villagonzalo, Cristine	SPP2006069	Thermodynamic Properties of a Two Dimensional Electron Gas in the Fractional Quantum Hall Regime	Rayda Gammag
	Villagonzalo, Cristine	SPP2006155	A Finite Temperature Magnetic Phase Transition in a One Dimensional Lattic	eG. Tongco

INSTRUCTORS (19)

Count	Instructor Name / Presentor	Manuscript No.	Title	CoAuthors
1	Agra, Elise Stacey	SPP2006068	The Molecular Dynamics of Two Particles on a Ring	Karla Belisario, Dr. Ronald Banzon
2	Arciaga, Marko	SPP2006067	Optimization studies of a 2.5 GHz microwave argon plasma with varying distances between two repelling hexapoles	
	Arciaga, Marko	SPP2006082	3D Simulation and Analysis of the Magnetic Field from a DoubleHexapole	Henry Lee
	Arciaga, Marko	SPP2006104	Automated Analysis of Langmuir Probe Traces Using Nonlinear Regression	Ivan Mark Yanson
3	Balista, Junius Andre	SPP2006007	Rotation and reptation of swirling spheres as slope relaxation and avalanche	
4	Bautista, Godofredo	SPP2006131	Tracking the onset of defect in light emitting semiconductor devices via twophoton excitation microscopy and spectral microthermography	Dr. Caesar Saloma, Dr. Carlo Mar Blanca
5	Cemine, Vernon Julius	SPP2006163	Imaging of Si photodiode under different biasing conditions via optical feedback microscopy	Dr. Carlo Blanca, Dr. Caesar Saloma
6	Delica, Serafin	SPP2006162	3Dimensional Direct Observation of Singlewalled Carbon Nanotubes Distribution in Living Cells	Serafin Delica
7	Dy, Dexter	SPP2006167	Evolution of the Reduced Probability Distribution Function of a Random Walker on a Lattice with Zigzag Boundaries	Dr. Jose Perico Esguerra
8	Go, Mary Ann	SPP2006033	Spectral unmixing of idealized aquatic benthos with consideration of water-column effect	Dr. Maricor Soriano
9	Legara, Erika	SPP2006097	Preferential Attachment Model of Multilevel Marketing	Dr. Marisciel Palima, Dr. Caesar Saloma, Dr. Christopher Monterola
	Legara, Erika	SPP2006158	Scientific collaboration in the SPP Physics Congress in 20012005	Stephen Daedalus Separa
10	Longias, Anthony	SPP2006164	Jamming of Mixed and Homogenous Hard Spheres in a Two DImesional Hopper	Dr. Christopher Monterola, Dr. Caesar Saloma, Dr. Marisciel Palima, Dr. Johnrob Bantang
11	Manahan, Grace	SPP2006109	Temporal behavior of nitrogen Raman lines with increasing input energy	
12	Marcos, Ma. Sheila Angeli	SPP2006051	Rapid Reef Assessment through Subsurface Underwater Video	Dr. Maricor Soriano
13	Oblefias, Wilma	SPP2006066	Unmixing Error of Overlapping Spectra as a Function of Concentration and Peak Separation	Dr. Caesar Saloma, Dr. Maricor Soriano

14	Paz, Athena Evalour	SPP2006132	Painting Characterization Using Photometric Stereo and Spectral Unmixing	Dr. Maricor Soriano
15	Perez, Gay Jane	SPP2006135	Numerical model for analyzing the dynamics of a dielectric particle in an optical landscape	Dr. Vincent Ricardo Daria
16	Pulido, Ma. Teresa	SPP2006120	Information Propagation within Complex Networks	Dr. Caesar Saloma, Dr. Christopher Monterola, Dr. Marisciel Palima
17	Romero, Mary Jacqueline	SPP2006048	Modified filter design to optimize the synthetic reference wave in	Dr. Vincent Ricardo Daria
18	Singidas, Bess	SPP2006113	Synthesis and Evaluation of Magnetic property of StrontiumDoped Lanthanum Cuprate (La ₂ x Sr _x CuO ₄ ;δ)	Medarjune Baliber, Dr. Roland Sarmago
19	Torres, Ma. Leilani	SPP2006026	Image transfer from the Laser Excitation Pulse to the Stokes in a Hydrogen Raman Shifter	Dr. Wilson Garcia

UNIVERSITY RESEARCH ASSOCIATE (2)

Count	Instructor Name/Presenter	Manuscript No.	Title	CoAuthors
1	Noguerra, Virginia	SPP2006074	Investigations on the Effects of Ti Target Position and Bias Potential to the Synthesis of TiN in a Magnetized Sheet Plasma Source	
	Noguerra, Virginia	SPP2006077	Electron Energy Distribution Function (EEDF) Analysis of Negative Hydrogen Ion (H ⁻) Enhancement in a Magnetized Sheet Plasma Source	Dr. Henry Ramos
2	Separa, Stephen Daedalus	SPP2006160	Modeling the effects of diversity on the spread of an infection	Dr. Johnrob Bantang
	Separa, Stephen Daedalus	SPP2006152	Mobile ECG: A Real Time Telemonitoring System via GSM and GPRS	Carlos Jr. del Rosario, Dr. Carlo Mar Blanca

List of NIP Faculty and Staff that attended the 2006 SPP Conference through the NIP Faculty Development Grant

Ph. D. Faculty

1. Almoró, Percival
2. Bantang, Johnrob
3. Banzon, Ronald
4. Blanca, Carlo Mar
5. Boot, Luis Ma.
6. Daria, Vincent Ricardo
7. Esguerra, Jose Perico
8. Galapon, Eric
9. Garcia, Wilson
10. Monterola, Christopher
11. Palima, Marisciel
12. Palisoc, Caesar
13. Ramos, Henry
14. Saloma, Caesar
15. Salvador, Arnel
16. Sarmago, Roland
17. Somintac, Armando
18. Soriano, Maricor
19. Tapang, Giovanni
20. Villagonzalo, Cristine

Instructors

1. Agra, Elise Stacey
2. Arciaga, Marko
3. Balista, Junius Andre
4. Bautista, Godofredo
5. Cemine, Vernon Julius
6. Delica, Serafin
7. Dy, Dexter
8. Go, Mary Ann
9. Legara, Erika
10. Longjas, Anthony
11. Manahan, Grace
12. Marcos, Ma. Sheila Angeli
13. Oblefias, Wilma
14. Paz, Athena Evalour
15. Perez, Gay Jane
16. Pulido, Ma. Teresa
17. Romero, Mary Jacqueline
18. Singidas, Bess
19. Torres, Ma. Leilani

University Research Associate

1. Noguerra, Virginia
2. Separa, Stephen Daedalus

List of Foreign Travel of NIP / List of International Conferences attended by NIP faculty

Name	Purpose	Place	Date
1. Caesar A. Saloma	To present a paper on 2006 SOKENDai International Symposium on Networks on Science and Cultural Exchanges among Asian Countries	Nayama, Kanagawa Prefecture, Japan	01/20/06-01/23/06
2. Caesar A. Saloma	To participate on 16 th Council Meeting of the Association of Asia Pacific Physical Societies	Osaka, Japan	4/02/06-4/05/06
3. Ma. Shiela Angeli C. Marcos	To do collaborative work with the World Bank Global Environment Facility-Remote Sensing	Koror, Palau, Micronesia	4/04/06-4/09/06
4. Arnel A. Salvador	To do research and collaborative work at Lulea University of Technology	Lulea, Sweden	05/01/06-06/10/06
5. Carlo Amadeo C. Alonzo	Post doctoral research fellowship	Risoe National Lab Roskilde, Denmark	6/01/06-5/31/07
6. May T. Lim	Post doctoral research	New England Complex Cambridge, USA	6/06/06-5/31/07
7. Edward Carlo C. Samson	To undertake a study visit at the College of Optical Sciences, University of Arizona as part of his prize for being the first recipient of the Young Scientist Competition and Exchange Program of the NAST	Tucson, Arizona, USA	06/02/06-06/22/06
8. Henry J. Ramos	To present a paper on Seminar on Plasmas Processing and Surface Coating Technologies	Bangkok, Thailand	8/22/06-8/26/06
9. Caesar A. Saloma	To speak at the 9 th International Conference on Optics within Life Sciences	Tapei, Taiwan	11/26/06-11/29/06
10. Arnel A. Salvador	To present a paper on the 3 rd International Workshop on Nanostructures and Nanotechnology	Halong Bay, Vietnam	12/05/06-12/09/06
11. Gay Jane P. Perez	To participate in Kahn-Minerva School on Design Principles of Biological Systems	Rehovot, Israel	12/28/06-01/07/07
12. Caesar P. Palisoc	To undertake research visit at II. Institute for Theoretical Physics, Hamburg University	Germany	4/15/07-6/15/07
13. Wilma R. Oblefias	To attend the Training on The Use of Synchrotron Radiation	National Synchrotron Research Center, Nakhon, Ratchasima, Thailand	4/21/07-5/06/07
14. Margie P. Olbinado	To attend the Training on The Use of Synchrotron Radiation	Nakhon, Ratchasima, Thailand	4/22/07-5/06/07

List of NIP Funded Projects in 2006

NAME	RESEARCH TITLE	PERIOD	AMOUNT
Percival F. Almoro (3 mos, Oct-Dec. 2006)	Aperture Synthesis in Phase Retrieval Based on Measurements of Volume Speckle Field	Oct . to Dec. 2006	P 9,000.00
Johnrob Y. Bantang	Sustainable and Catastrophic Harvest Methods in a Diffusion Equation-Based Growth Model of Natural Resources	June. to Dec. 2006	P 21,000.00
Ronald S. Banzon	Complexity in Competitive Population	Jan. to Dec. 2006	P 36,000.00
Carlo Mar Y. Blanca	High Resolution Indoor Tracking of Mobile Agents by Electromagnetic Time-Reversal Techniques	Jan. to Dec. 2006	P 42,000.00
Jose Perico H. Esguerra	Analytical Underpinnings of a Hybrid Analytic-Numeric Scheme for the Abe-Thurner Generalization of the Diffusion Equation	Jan. to Dec. 2006	P 36,000.00
Vincent Ricardo M. Daria	Generation of Optical Lattices Using Variable Amplitude Spatial Fourier Filtering	Jan. to Dec. 2006	P 42,000.00
Eric A.Galapon	Symmetry Broken Confined Time of Arrival Operators	Jan. to Dec. 2006	P 36,000.00
Wilson O. Garcia	Generation and Application of Multicolor Laser Light Produced Via Stimulated Raman Scattering	Jan. to Dec. 2006	P 42,000.00
Christopher P. Monterola	Dynamics of Information Propagation in A classroom: Theory and Experiments	Jan. to Dec. 2006	P 42,000.00
Marisciel L. Palima	Structure, Processes and Complexity in the Growth of Metallic Whisker	Jan. to Dec. 2006	P 36,000.00
Caesar P. Palisoc	Prompt $J/\psi+\gamma$ Associated Electro-production at Desy Hera	Jan. to Dec. 2006	P 36,000.00
Caesar A. Saloma	Poisson and Non-Poisson Processes in Multilane Pedestrian Traffic	Jan. to Dec. 2006	P 48,000.00

Arnel A. Salvador	Strain in Epitaxial Liftoff Films Bonded On Dissimilar Substrate	Jan. to Dec. 2006	P 48,000.00
Roland V. Sarmago	ZnO Nanoparticles	Jan. to Dec. 2006	P 48,000.00
Armando S. Somintac	Feasibility Study on the Possible Restoration of the Second MBE of CMPL	June. to Dec. 2006	P 21,000.00
Henry J. Ramos	Beam Asymmetry in a Compact Gas Discharge Ion Source	Jan. to Dec. 2006	P 48,000.00
Maricor N. Soriano	Development of Optical Tools for Oil On Canvas Painting Characterization	Jan. to Dec. 2006	P 42,000.00
Giovanni A. Tapang	Prose and Poetry Disambiguation Using Syntactic Networks	Jan. to Dec. 2006	P 36,000.00
Cristine DLR. Villagonzalo	Modeling of Two-Dimensional Electron Gases' Thermodynamic Properties in the Fractional Quantum Hall Regime	Jan. to Dec. 2006	P 36,000.00
Program Coordinators:			
Johnrob Y. Bantang	Teaching Laboratories Coordinator	June to Dec. 2006	P 7,000.00
Carlo Mar Y. Blanca	Program Coordinator, Instrumentation Physics Lab, National Institute of Physics, UP Diliman	Jan. to Dec. 2006	P 12,000.00
Jose Perico H. Esguerra	Coordination of Theoretical Physics Group	Jan. to Dec. 2006	P 12,000.00
Wilson O. Garcia	Coordination of Research Activities of the Photonics Research Group of the National Institute of Physics	Jan. to Dec. 2006	P 12,000.00
Henry J. Ramos	Supervision of R&D of the Plasma Physics Laboratory	Jan. to Dec. 2006	P 12,000.00
Roland V. Sarmago	Coordination of Research at the Condensed Matter Physics Lab	Jan to July 2006	P 7,000.00
Armando S. Somintac	Coordination of the Condensed Matter Physics Laboratory	Aug. to Dec. 2006	P 5,000.00
Cristine DLR. Villagonzalo	Program Coordinator of the Structure and Dynamics Research Program	Jan. to Dec. 2006	P 12,000.00

List of OVCRD Research Projects in 2006-2007

Proponent	Title	Amount of funding and Duration
Arciaga, Marko E.	Studies of a Newly-Developed Microwave Plasma	P300,000 Sept 2006-August 2007
Bantang, Johnrob Y.	Dynamics of interacting complex systems	P 203,250 Sept 2006-August 2007
Monterola, Christopher P.	Dynamics of Information Propagation in a Classroom: Theory and Experiments	P300,000 Sept 2006-Aug 2007
Palima, Marisciel L.	Complex Network Analysis of the Structure and Key Functions of the Legislative and Corporate Institutions of the Philippines	P300,000 Sept 2006-Aug 2007
Palisoc, Caesar P.	W Boson Pair Production in ep Scattering	P197,410.00 Sept 2006-Aug 2007
Blanca, Carlo Mar Y.	Development of Semiconductor Nanostructures as Optical Sensors to Quantify Anti-tumor Efficacy in Animal Models - Project 2: NIP Component	P1,729,576.00 Dec 2006-Feb 2008 (UP Open Grant)
Soriano, Maricor	Art Beyond Appearances – Physics Looks into Paintings: Preventive Conservation, Digital Archiving and Analysis	P1,905,356.00 Dec. 2006 - Nov. 2007 (UP Open Grant)
Almoro, Percival F.	Wavefront Sensing with Random Amplitude Mask and Phase Retrieval	P300,000 May 2007-May 2008
Galapon, Eric A.	Theory of Quantum Arrival for Arbitrary Arrival Point and Arbitrary Interaction Potential via Spatial Confinement	P300,000 May 2007-May 2008
Somintac, Armando S.	Growth of Nanorods via Molecular Beam Epitaxy	P300,000 May 2007-May 2008
Sarmago, Roland V.	Crystal Habit Specific Synthesis and Characterization of Zinc Oxide Nanostructure	P299,110 May 2007-May 2008
Tapang, Giovanni A.	Microwriting on Fluids Real-time Manipulation and Control via Ferrofluids	P271,000 May 2007-May 2008

List of OVCRD Thesis Writing Grants

Proponent	Title	Amount of Funding
Cemine, Vernon Julius R.	Novel Techniques in Semi-Conductor Characterization and Failure Analysis Using Optical Feedback Laser Scanning Microscopy	P60,000
Marcos, Ma. Sheila Angeli C.	Automated Coral Reef Classifier and Extraction of Spatial Mapping of Benthic Components from Underwater Video	P60,000
Oblefias, Wilma R.	Spectral Microscopy of Fluorescence Spectra Unmixing Noise Effects and Spatial Resolution	P60,000
Romero, Mary Jacquiline T.	Arbitrary Three Dimensional Optical Field Pattern Generation	P30,000
Samson, Edward Carlo C.	Arbitrary Three Dimensional Optical Field Pattern Generation	P30,000

List of Grants under the UP Emerging Technology Grant

Proponent	Title	Amount of Funding
Blanca, Carlo Mar Daria, Vincent Ricardo Garcia, Wilson Saloma, Caesar Salvador, Arnel, Sarmago, Roland Soriano, Maricor	Enhancement of Technical Capability in Nanoscience and Nanotechnology at the College of Science	Equipment \$ 65,000
Sarmago, Roland	Manipulation, Mounting and Characterization of Nano Structured Zinc Oxide Particles	P7,710,000

List of UP Systems Research Grant 2007

Proponent	Title	Amount of Funding
Almoro, Percival F.	Increase Resolution by Aperture Synthesis In Phase Retrieval Based on a Volume Speckle Field	P 136,000
Blanca, Carlo Mar Y.	Probing the Onset of Semiconductor Failure Using Thermal Microspectroscopy And Laser Feedback Interferometry	P 154,000
Daria, Vincent Ricardo M.	Programmable Optical Fields and Applications	P 186,000

Galapon, Eric A.	Zeroth-order Theory of Quantum First Time Of Arrival via Spatial Confinement for Arbitrary Arrival Point and Arbitrary Interaction Potential	P 135,000
Garcia, Wilson O.	Generation and Application of Multicolor Laser Light Produced by Simulated Raman Scattering in Gases	P 144,000
Monterola, Christopher P.	Dynamical Model of Landslides, Slope Failures and Debris Flow	P 144,000
Palima, Marisciel L.	Finding the Epicenter of Failure in a Branching Network with Crossovers by Entropy-Based Measures	P 135,000
Palisoc, Caesar P.	Charmonium and Jet Associated in e^+e^- Collision	P 135,000
Ramos, Henry J.	Synthesis of Hydrogenerated Amorphous Silicon via Ion-Surface Interaction in a Magnetized Sheet Plasma Negative Ion Source (SPNIS)	P 209,000
Saloma, Caesar A.	Preparedness and Learning During Escape Panic	P 209,000
Salvador, Arnel A.	Epitaxial Lift Off Techniques as a Means of Mapping the Effect of Variable Strain in the Band Structure of GaAs Based Films	P 191,000
Sarmago, Roland V.	Spectroscopic Characterization of ZnO Nano Particles	P 191,000

List of Externally Funded Projects Initiated in 2006

Proponent	Title	Amount of Funding, Funding Source and period of Grant
Blanca, Carlo Mar Y.	Imaging of Quantum-Dot Labeled Mouse Embryos Using Multi-Dimensional Spectral Microscopy	P3,546,177 PCASTRD/DOST Sept 2006-Oct 2008
Ramos, Henry J.	TiN/TiCN/TixCuyNz Coating Technology with the SPNIS and PSTNIS	3,769,435.75 DOST Dec 2006-Dec 2007
Ramos, Henry J.	Polymer Treatment of Low Energy Ions from a Gas Discharge Ion Source (GDIS)	4,061,711.43 DOST Dec 2006-Dec 2007
Ramos, Henry J.	Beam Focus, Enhancement and Transport in the PSTNIS	686,321.92 DOST Dec2006-Dec 2007

List of Externally Funded Grants Initiated before 2006 but covered 2006

Proponent	Title	Amount of Funding, Funding Source and Period of Grant
	Development of 635nm Single Mode Laser Diode by Optical Feedback	P500,000 PCASTRD November 2003-March 2006
Daria, Vincent Ricardo M.	Facility for programmable and spatially addressable optical phase	2,300,000.00 PCASTRD IDP Jan 2005-Dec 2006
Daria, Vincent Ricardo M.	Development of a hub for High Performance Computing at the Computational Science Research Center (CSRC-HPC)	4,835,000.00 PCASTRD IDP Jan 2005-Dec 2006
Salvador, Arnel A.	Program for the Development of Optoelectronic Devices and Integrated Circuits Suitable for RF Applications	P8,020,373.80 PCASTRD/DOST Oct, 2005-Dec 2006

List of Faculty Roster as of May 2007

Professors

- Jose A. Magpantay, PhD
- Henry J. Ramos, PhD
- Caesar A. Saloma, PhD
- Arnel A. Salvador, PhD
- Roland V. Sarmago, PhD
- Danilo V. Yanga (on Leave)

Associate Professors

- Jun Abastillas, PhD
- Carlo Mar Y. Blanca, PhD
- Luis Maria T. Boot, PhD (*On Study Leave*)
- Vincent Ricardo Daria, DEng
- Wilson O. Garcia, PhD
- May T. Lim, PhD (on Post doctoral Leave)
- Christopher P. Monterola, Ph.D
- Maricor N. Soriano, Ph.D

Assistant Professors

- Percival F. Almoró, PhD
- Carlo Amadeo C. Alonzo, PhD (*On Post-Doc*)
- Johnrob Y Bantang, PhD
- Ronald S. Banzon, PhD
- Jose Perico H. Esguerra, PhD
- Eric A. Galapon, PhD
- Caesar A. Palisoc, PhD
- Marisciel T. Litong-Palima, PhD
- Armando S. Somintac, PhD
- Giovanni A. Tapang, PhD
- Cristine D. Villagonzalo, D.Sc

Instructors

- Marko E. Arciaga, M.S.
- [Godofredo S. Bautista Jr, M.S.](#)
- Vernon Julius R. Cemine, M.S
- Serafin F. Delica, M.S
- Jacque Lynn F. Gabayno, M.S.
- Ma. Shiela Angeli C. Marcos, M.S.
- Wilma R. Oblefias. M.S
- Gay Jane P. Perez, M.S.

- Maria Teresa R. Pulido. M.S
- Margie P Olbinado, M.S
- Bhazel Anne H. Rara, M.S.
- Bess G. Singidas, M.S.
- Maria Leilani Y. Torres, M.S
- Mary Ann B. Go
- Francis Norman C. Paraan
- Mary Jacqueline T. Romero
- Edward Carlo C. Samson
- Gendith M. Sardane
- Elise Stacey G. Agra

- [Junius Andre F. Balista](#)
- Carlos F Baldo III
- [Erika Fille T. Legara](#)
- Anthony G. Longhas
- Grace G. Manahan
- Kristine I. Manibog
- Athena Evaflour Paz
- Imee Rose M. Tagaca
- Rene Cabahug Batac
- Diandrew Lexter L. Dy

List of Non Academic Personnel as of May 2007

Administrative Staff

1. Flora P. Luis Administrative Officer III
2. Angelina H. Palo-Galapon Data Entry Mach. Optr. III
3. Christopher L. Moralejo Reprod. Eqpt. Mach. Optr. III
4. Patricinio M. Enriquez, Jr. Supply and Property Officer II

NIP Carpentry and Machine Shop

5. Danilo F. Gayagoy Mach. Shop Foreman
6. Rodolfo P. Gaca Machinist

Electrical and Electronics

7. Joel A. Arellano Laboratory Aide II
8. Arturo D. Del Rosario Electrician II
9. Felix V. Maulion Electronics Comm. Eqpt. Tech.
10. Romeo B. Albaniel Precision Instrument Technician
11. Daniel S. De los Reyes Laboratory Aide II
12. Macario C. Roque Carpenter

List of Honors and Awards Received by NIP faculty and Students 2006

1. Francis Norman G. Paraan Joker P. Arroyo Award for Outstanding B.S. Applied Physics
2. Andrew S. Alarcon Joker P. Arroyo Award for Outstanding B.S. Physics
3. Jessica Pauline C. Afalia Leticia Shahani Award for Best Undergraduate Thesis in B.S. Applied Physics
4. Ruby Lyn C. Manahan Leticia Shahani Award for Best Undergraduate Thesis in B.S. Physics
5. Godofredo S. Bautista, Jr. Dr. Edgardo Gomez Award for Excellence in M.S. Physics
6. Junuis Andre F. Balista Cum Laude (B.S. Applied Physics)
7. Rumar Christopher A. Lledo Cum Laude (B.S. Applied Physics)
8. Francis Norman C. Paraan Summa Cum Laude (B.S. Applied Physics)
9. Andrew S. Alarcon Cum Laude (B.S. Physics)
10. Carlos F. Baldo, III Cum Laude (B.S. Physics)
11. Erika Fille T. Legara Cum Laude (B.S. Physics)
12. Grace G. Manahan Cum Laude (B.S. Physics)
13. Vincent Ricardo M. Daria NRCP Achievement Award 2006.
14. Vincent Ricardo M. Daria NAST Outstanding Young Scientist Award 2006.
15. Maricor N. Soriano NAST Outstanding Young Scientist Award 2006.
16. Carlo Mar Y. Blanca NAST-DU Pont Talent Search for Young Scientists 2006
17. Roland V. Sarmago NAST Best Scientific Posters Award

List of Honors and Awards Received by NIP faculty and Students 2007

- | | |
|---------------------------------|---|
| 1. Mikaela Irene D. Fudolig | Joker P. Arroyo Award for Outstanding
B.S. Physics |
| 2. George Allan P. Esleta | Joker P. Arroyo Award for Outstanding
B.S. Applied Physics |
| 3. Christian M. Alis | Leticia Shahani Award for Best Undergraduate Thesis
in B.S. Applied Physics |
| 4. Karen Patricia G. Ramirez | Leticia Shahani Award for Best Undergraduate Thesis
in B.S. Physics |
| 5. Vernon Julius R. Cemine | Dr. Edgardo Gomez Award for Outstanding Ph.D Graduate |
| 6. Dranreb Earl O. Juanico | Most Outstanding College of Science Ph.D Graduate |
| 7. Mikaela Irene D. Fudolig | Summa Cum Laude (B.S. Physics) |
| 8. Christian M. Alis | Magna Cum Laude (B.S. Applied Physics) |
| 9. George Allan P. Esleta | Magna Cum Laude (B.S. Applied Physics) |
| 10. Lourdes Patricia R. Ramirez | Magna Cum Laude (B.S. Applied Physics) |
| 11. Michelle C. Francisco | Cum Laude (B.S. Applied Physics) |
| 12. George Allan P. Esleta | Oblation Scholar |
| 13. Chistian M. Alis | NAST First Prize Awardee, Magsaysay Young
Engineers/Technologists Competition |
| 14. Wilson O. Garcia | NRCP Achievement Award 2007 |
| 15. Dranreb Earl O Juanico | NRCP 1st Prize in the Scientific Poster Exhibition of the
74th Annual Scientific Meeting |
| 16. Christopher P. Monterola | NRCP 1st Prize in the Scientific Poster Exhibition of the
74th Annual Scientific Meeting |
| 17. Caesar A. Saloma | Metrobank's 2007 Search for Outstanding Teachers
(Higher Education Category) |

Report of the Research Laboratories

Instrumentation Physics

List of Students graduated in 2006, 2007 and their corresponding thesis titles

THESIS LIST

Name	Year	Course	Thesis title	Adviser
<i>Mar-06</i>				
Johnrob Y. Bantang	2006	PhD	Dynamics of interacting complex systems	Dr. Caesar A. Saloma
Godofredo S. Bautista Jr.	2006	MS	Characterization of Semiconducting Devices via Two-photon Optical Beam-Induced Current and Spectral Reflectance Microscopy	Dr. Carlo Mar Y. Blanca
Balista, Junius Andre F.	2006	BS	Gestalt view of the human gait in a static image	Dr. Maricor Soriano
Batac, Rene C.	2006	BS	Thermodynamic characterization of cellular automata rules using quantitative lattice properties	Dr. Johnrob Bantang
Escay, Joaquin Jose	2006	BS	The development of a wireless telemicroscope for optical beam induced current microscopy and microfabrication	Dr. Carlo Mar Y. Blanca
Legara, Erika Fille T.	2006	BS	Dynamical model and strategies for network marketing	Dr. Marisciel Palima-Dr. Christopher Monterola
Longjas, Anthony G.	2006	BS	Jamming of hard spheres in a 2D hopper	Dr. Marisciel Palima-Dr. Christopher Monterola

Pastor, Marissa G.	2006	BS	Gravity-assisted mixing of granular materials of uniform mass and size	Dr. Johnrob Bantang
Sastine, Vera Marie M.	2006	BS	High resolution differential thermal mapping of semiconductor devices	Dr. Carlo Mar Y. Blanca
<i>Mar-07</i>				
Cemine, Vernon Julius R.	2007	PhD	Novel Techniques in Semiconductor Characterization and Failure Analysis Using Optical Feedback Laser Scanning Microscopy	Dr. Carlo Mar Y. Blanca and Dr. Caesar A. Saloma
Juanico, Dranreb Earl O.	2007	PhD	Self-Organizing Mechanisms of Complex Adaptive Systems Under Critical Conditions	Dr. Caesar A. Saloma
Oblefias, Wilma R.	2007	PhD	Spectral Microscopy of Fluorescence Spectra: Estimation, Unmixing, and Noise Effects	Dr. Maricor Soriano
Go, Mary Ann B.	2007	MS	Spectral Unmixing of Ideal Aquatic Benthos With Consideration of Water-Column Effect	Dr. Maricor Soriano
Paz, Athena Evalour S.	2007	MS	Optical Techniques for Painting Characterization	Dr. Maricor Soriano
Romero, Mary Jacqueline T.	2007	MS	Generation of Arbitrary and Programmable Optical Fields	Dr. Vincent Ricardo Daria

Roxas, Ranzivelle Marianne L.	2007	MS	Network Analysis: Characterizing Classroom Dynamics and Syntactic Structure	Dr. Christopher Monterola
Samson, Edward Carlo C.	2007	MS	Contrast Enhancement in Widefield Microscopy Using Projector-Generated Dynamic Pattern Illumination	Dr. Carlo Mar Y. Blanca
Alis, Christian M.	2007	BS (Applied)	Mobile Distributed System for Telemicroscopy and Spatio-Temporal Tracking	Dr. Carlo Mar Y. Blanca
Esleta, George Allan P.	2007	BS (Applied)	Dynamical Behavior of Threaded Systems	Dr. Marisciel Palima-Dr. Christopher Monterola
Jhocson, Angela Monique T.	2007	BS (Applied)	Synchronization and Chaos Control Via Directional Noise Injection	Dr. Giovanni Tapang
Lagman, Karl Bryan	2007	BS (Applied)	Tracking and Modeling Oceanographic Features	Dr. Maricor Soriano
Tusara, Loren M.	2007	BS (Applied)	Coral Shape Reconstruction Using Texture as 3D Cue	Dr. Maricor Soriano
Banas, Andrew Rafael M.	2007	BS	Efficient Calculation of Computer Generated Holograms and Applications	Dr. Vincent Ricardo Daria
<i>May-07</i>				

Mary Jacqueline N. Sombillo	2007	BS (Applied)	Revealing the Structure of Real Socio-Political Philippine System: A Complex Network Analysis Approach	Dr. Marisciel Palima
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2. List of Publications ISI, SPP, Sci. Diliman etc, grouped accordingly.

2006 Publications

CM Blanca, VJ Cemine, B Buenaobra and C Saloma, "Localizing Defects on Curcuits using High-Resolution OFT," Optics and Photonics News (Optical Society of America) p 30 (December 2006)

VJ Cemine, C Blanca and C Saloma, "High-resolution quantum efficiency mapping of silicon photodiode via optical-feedback laser microthermography," Appl Opt 45 pp. 6947-6953 (2006).

W Oblefias, M Soriano, A Tarun and C Saloma, "Individual classification of buried transistors in live microprocessors by functional infrared emission spectral microscopy," App Phys Lett 89, 151113 (2006)

J Bantang and C Saloma, "Co-existence of Poisson and Non-Poisson Processes in Ordered Parallel Multilane Pedestrian Traffic," Complexity Vol. 11, No. 5, pp 35-42 (2006)

R Pobre and C Saloma, Radiation force exerted on nanometer size non-resonant Kerr particle by a tightly focused Gaussian beam, Optics Communications 67/2 pp 295-304 (2006)

G Bautista Jr, CM Blanca, S Delica, B Buenaobra and C Saloma, Spectral microthermography for component discrimination and hot spot identification in integrated circuits, Opt Express 14, pp 1021-1026 (2006)

W Oblefias, M Soriano and C Saloma, "Accuracy of spectrum estimate in fluorescence spectral microscopy with spectral filters," Opt Commun 260, pp 755-766 (2006)

C Saloma and GJ Perez, "Herding in real escape panic," in Pedestrian and Evacuation Dynamics 2005, N Waldau, P Gatterman, H Knoflacher, M Schreckenberg, editors (Springer-Verlag, Berlin, November 2006) pp 453-461.

2007 Publications

M Lim, Y Bar-Yam and R Meitzler, "Global Pattern Formation and Ethnic/Cultural Violence.", 317, pp. 1540-1544 (14 September 2007).

Edward Carlo Samson and Carlo Mar Blanca, "Dynamic contrast enhancement in widefield microscopy using projector-generated illumination patterns" , New Journal of Physics (To be published)

R Sarmiento, VJ Cemine, IR Tagaca, A Salvador, CM Blanca and C Saloma, "Fault localization and analysis in semiconductor devices with optical feedback infrared confocal microscopy and optical beam induced resistance change imaging," Applied Optics (To be published)

MJ Romero and VR Daria, "Modified filter design to optimize the synthetic reference wave in the generalized phase contrast method," Optics Communications (To be published)

S Delica and CM Blanca, "Widefield depth-sectioning fluorescence microscopy using projector-generated patterned illumination," Applied Optics(To be published)

P Almoró, W Garcia and C Saloma, "Colored object recognition by digital holography and a hydrogen Raman shifter," Optics Express 15, pp 7176-7181 (2007).

DE Juanico, C Monterola, and C Saloma, "Dissipative self-organized branching in a dynamic population," Physical Review E, Rapid Communications 75, 045105(R) (2007)

D Palima and VR Daria, "Holographic projection of arbitrary light patterns with suppressed zero-order beam ," Applied Optics (To be published)

DE Juanico, C Monterola and C Saloma, "Self-organized critical branching in systems that violate conservation laws," New Journal of Physics 9, 92 (2007).

G Bautista, C Blanca and C Saloma, "Tracking the emergence of defect in light emitting semiconductor devices with two-photon excitation microscopy and spectral microthermography," Appl Opt 46, pp 855-860 (2007)

J Bantang and C Saloma, "Suppression of chaos in coupled chaotic logistic models," in New Research in Nonlinear Phenomena, F Columbus, editor (Nova Science Publishers, New York)

C Alonzo, W Garcia, and C Saloma, "Crosstalk between two-photon and two-color" (two-photon) excitation in optical beam induced current generation with two confocal excitation beams," Opt Commun 270/2 pp 139-144 (2007).

Photonics Laboratory

ISI Publications

1. P. Almoró, G. Pedrini and W. Osten, "Aperture synthesis in phase retrieval using a volume-speckle field," *Optics Letters* 32, 733-5, April 1, 2007.
2. N. Hermosa and C. Manaois, "Phase structure of helicon-conical optical beams" *Optics Communications*, 271 (1), 178-183, March 2007.
3. C. Alonzo, W. Garcia and C. Saloma, "Crosstalk Between Two-Photon and Two-Color (Two-Photon) Excitation in Optical Beam Induced Current Generation with Two Confocal Excitation Beams," *Optics Communications* 270, 139 – 144, Feb. 2007.
4. P. Almoró, G. Pedrini and W. Osten, "Complete wave front reconstruction using sequential intensity measurements of a volume speckle field," *Applied Optics* 41, 8596-8605, December 1, 2006.

SPP

1. M.L.Torres, G.G. Manahan, L.P.Ramirez, and W.O. Garcia, "Image Transfer from the Laser Excitation Pulse to the Stokes in a Hydrogen Raman Shifter," *Proceedings of the 24th Samahang Pisika ng Pilipinas Physics Congress, Ateneo de Davao University, Davao City, 25 to 27 October 2006.*
2. L.P. Ramirez, G. Manahan, E. Reyes, M.L. Torres and W. Garcia, "Temporal Behavior of Nitrogen Raman Lines with Increasing Input Energy," *Proceedings of the 24th Samahang Pisika ng Pilipinas Physics Congress, Ateneo de Davao University, Davao City, 25 to 27 October 2006.*
3. M.C. Francisco, P.S. Arevalo, L.P. Ramirez, F.M. Ebreo, M.C.Paguio and W.O.Garcia, "Laser Induced Breakdown Spectroscopy of Copper in Air," *Proceedings of the 24th Samahang Pisika ng Pilipinas Physics Congress, Ateneo de Davao University, Davao City, 25 to 27 October 2006.*
4. P. Almoró, G. Pedrini and W. Osten, "Phase retrieval using a volume speckle field and synthetic apertures," *Proceedings of the 24th Samahang Pisika ng Pilipinas Physics Congress, Ateneo de Davao University, Davao City, 25 to 27 October 2006.*

International conference

1. "Frequency Image Conversion from the Laser Excitation to the Stokes Using a Hydrogen Raman Shifter," M. Torres, G. Manahan, L. Ramirez and W. Garcia. 27th APAMS : 2007 International S & T Conference, Annual Philippine-American Academy of Science and Engineering Meeting & Symposium, De La Salle University – Manila and Century Park Hotel – Manila, Philippines, 15 to 17 Feb. 2007 (ISSN : 1908 – 5907)

2. "The Nitrogen Raman Shifter – a Multicolor and Picosecond Light Source," L. Ramirez, G. Manahan, E. Reyes, M. Torres and W. Garcia. 27th APAMS : 2007 International S & T Conference, Annual Philippine – American Academy of Science and Engineering Meeting & Symposium, De La Salle University – Manila and Century Park Hotel – Manila, Philippines, 15 to 17 Feb. 2007 (ISSN : 1908 – 5907)
3. "A Broadband Light Source from a Femtosecond Laser-Pumped Nonlinear Photonic Crystal Fiber," J. Gabayno, F. Catalan, C. Alonzo and W. Garcia. 27th APAMS : 2007 International S & T Conference, Annual Philippine – American Academy of Science and Engineering Meeting & Symposium, De La Salle University – Manila and Century Park Hotel – Manila, Philippines, 15 to 17 Feb. 2007 (ISSN : 1908 – 5907)
4. "Laser – Induced Breakdown Spectroscopy in Air and in Water for Trace Element," Detection," M. Francisco, P. Arevalo, F. Ebreo, M. Paguio and W. Garcia, 27th APAMS : 2007 International S & T Conference, Annual Philippine – American Academy of Science and Engineering Meeting & Symposium, De La Salle University – Manila and Century Park Hotel – Manila, Philippines, 15 to 17 Feb. 2007 (ISSN : 1908 – 5907)
5. "Wavefront phase and amplitude reconstruction techniques using multiple intensities," P. Almoró, G. Pedrini, and W. Osten, SPECKLES 2006 (plenary presentation), Nimes, France, September 13-15, 2006. (Partially funded using postdoctoral grant, U.P. Faculty Development Program)

Grants

OVCRD Outright Research grant (March 2007)

Wavefront sensing with random amplitude mask and phase retrieval

Abstract: A new practical method for wavefront sensing using a random amplitude mask and a phase retrieval method based on the wave propagation equation is described. The proposed inexpensive wavefront sensor has a resolution of half the laser wavelength (0.315 μm). The proposed sensor has many potential applications such as measurement and correction of lens aberration for astronomy and ophthalmology. The proposed sensor can also applied for phase contrast imaging of microscopic specimens, 3D shape and photo-elastic measurements for industrial non-destructive testing.

Personnel: Percival Almoró (Proponent)

Margarette Maallo, BS student (Research Assistant)

Research projects

"Generation, characterization and applications of laser produced plasma"

W. Garcia

The interaction of a high energy laser pulse with matter results in the generation of a plasma. This project will investigate the characteristics of the plasma and its possible applications.

"Wavefront sensing with random amplitude mask and phase retrieval,"

P. Almoró

Develop a practical method for wavefront sensing using a random amplitude mask and a phase retrieval method based on the Rayleigh-Sommerfeld propagation equation.

Stimulated Raman scattering in different gases

W. Garcia

M.S.: G. Manahan

B.S.: L. Ramirez

Frequency conversion is a technique for shifting the monochromatic output of a laser into a different spectral region. Raman shifting operates on the nonlinear process known as stimulated Raman scattering (SRS) which is capable of simultaneously producing several laser lines called Raman lines, ranging from the ultraviolet to the near infrared spectral region. Although hydrogen has proven to be an effective Raman shifting medium, a laser's versatility can be enhanced by having the capability of generating a wide variety of wavelengths. By investigating SRS in other gases, one may exploit the differences in Raman shifts of the media to produce numerous wavelengths. Accordingly, the Raman lines of each gas may serve as a light source for other applications.

Wavefront analysis of stimulated Raman scattering pulses

W. Garcia

PhD.: M.L. Torres

M.S.: G. Manahan

A nonlinear interaction happens when the polarization of the optical medium interacts nonlinearly with the electric field of the pump beam. This process occurs using a very intense pulsed laser. Some nonlinear behaviors that can be observed are the violation of principle of superposition, the beam can alter its frequency as it propagates and interacts through the optical medium and the beams do interact with each other. The propagation of laser beam in a Raman-active medium is an interesting study. For one, due to the Gaussian profile of the input beam, the conversion of the pump to the Raman components varies along the axial and transverse direction. With SRS capability to transfer an image from the pump to the SRS output, the conversion of the pump to the Stokes is non-uniform in terms of intensity profile.

Image transfer from the laser excitation pulse to the Stokes in a Hydrogen Raman shifter

W. Garcia

Ph.D.: L. Torres

M.S.: G. Manahan

Frequency conversion of image bearing beams has been an active research area for many years due to its significant application in industrial and biomedical fields. We can classify image frequency conversion into two types: upconversion and downconversion with respect to the image carrier frequency. An attractive technique in image frequency conversion is the use of Raman shifters. Raman shifters are devices that use a Raman active media to shift the frequency of a laser into another spectral region. It is based on the phenomenon known as the stimulated Raman scattering. This study aims to explore the possibility of using a hydrogen Raman shifter for image transfer from the excitation laser to the Raman scattered beam. The hydrogen Raman

shifter has been a workhorse in frequency conversion due to its high conversion of the pump beam to the Raman components. We present, for the first time to the best of our knowledge, evaluation of the images obtained under several parameters such as laser excitation energy, hydrogen gas pressure and focusing geometry.

Analysis of Laser produced plasma

W. Garcia

Ph.D.: J. Gabayno

B.S: M. Paguio, P. Arevalo

The integration of lasers into research laboratories has led to the investigation of pulsed laser interaction with matter at laser intensities sufficient to transform matter into plasma. The stream of electrons, ions, excited and neutral atoms as well as other ejected materials produced via such laser-matter interaction is referred to as Laser Produced Plasma (LPP). In our group, we specialize on the characterization of LPP particularly by obtaining the relevant plasma parameters like the electron temperature and electron density via optical diagnostic methods particularly time resolved optical emission spectroscopy. To date, the study of LPP has attracted a lot of attention. The continuing interest in this field is driven by its scientific and technological applications which includes pulsed laser deposition, spectrochemical or mass analysis of samples. This study aims to investigate the temperature and electron density of a laser produced hydrogen, titanium and aluminum plasma.

Phase retrieval using a volume speckle field

P. Almoró

B.S.: V. Balois, M. Maallo, Edelyn Reyes

The technique allows measurements of the phase and amplitude of wave fields from rough objects. Applications include wavefront sensing and coherent metrology. The main advantage of this new phase retrieval method is the simple setup because it does not require a separate reference beam (as in holography). Thus the setup is inexpensive to build and is not tedious to implement. The essential difference compared to conventional phase retrieval methods is that the source of information in this technique is the whole volume of the sampled field and not just the usual two measurement planes. The accuracy of the calculated phase using SBMIR technique, therefore, is more reliable and converges faster.

Applications of a portable shearography system

P. Almoró

M.S.: F. Catalan

Conventional speckle interferometry is sensitive to displacement of a point on the object's surface. Shearography, on the other hand, is sensitive to strain and surface slope measurements. Due to its sensitivity to the *derivative* of the displacement, it is unaffected by rigid body motion, which makes it more appealing for vibrational and structural analysis. Recent studies on shearography have geared towards its use in other applications such as art conservation and high temperature measurements. A portable shearography set-up for industrial on-site inspection is yet to be achieved.

Applications of digital holography

P. Almero

M.S.: M. Francisco

B.S.: F. Ebreo

Holography is study of transformation of waves by interference structures (hologram) formed when coherent beams interact with matter. In digital holography, recording is done using CCD camera and reconstruction of wave field is done in the computer. Applications include deformation analysis using Fourier holography and shape measurement using dual-illuminations or two-wavelengths.

Plasma Physics Laboratory

ISI Publications

1. G. Q. Blantocas, H. J. Ramos and M. Wada, "Surface modification of narra wood (*Pterocarpus Indicus*) by ion shower treatment", *Japanese Journal of Applied Physics* 45 (10B) (2006) 8498.
2. G. Q. Blantocas, H. J. Ramos and M. Wada, "An investigation as to the cause of beam asymmetry in a compact gas discharge ion source: a focus on beam-wall interaction", *Japanese Journal of Applied Physics* 45 (10B) (2006) 8425.
3. R. E. Flauta, M. R. Vasquez, Jr., H. J. Ramos and M. Wada, "Effect of surface and growth conditions for the formation of textured polycrystalline GaN crystals by reactive N₂ plasma", *Japanese Journal of Applied Physics* 45 (10B) (2006) 8512.
4. V. R. Noguera, and H. J. Ramos, "A magnetized sheet plasma source for the synthesis of TiN on stainless steel substrates", *Thin Solid Films* 506-507 (2006) 613.
5. H. J. Ramos, J. L. C. Monasterial and G. Q. Blantocas, "Effect of low energy ion beam irradiation on wettability of narra (*Pterocarpus indicus*) wood chips", *Nuclear Instrum. Methods B* 242 (2006) 41

Research papers presented at the 24th SPP Congress

1. J. S. Hismaña, G. Q. Blantocas and H. J. Ramos, "Investigation of the gas discharge ion source three-electrode system for optimum H⁺ extraction".
2. V. R. Noguera, M. Camacho, E. Lagsa and H. J. Ramos, "Investigations on the effects of Ti target position and bias potential to the synthesis of TiN in a magnetized sheet plasma source".
3. M. E. Arciaga, A. M. Ulano, H. J. Ramos and R. B. Tumlos, "Electron temperature measurement of an argon microwave discharge using spectroscopic analysis of 4p transition levels".
4. R. B. Tumlos, I. T. Yanson and M. E. Arciaga, "Automated analysis of Langmuir probe traces using nonlinear regression".
5. M. Villamayor, V. Noguera and H. J. Ramos, "TiN depth calibration of simulated synthesis using kinetic Monte Carlo method".
6. R. V. R. Virtudazo, M. L. Baligod, R. B. Battung, A. P. Formento, V. R. Noguera and H. J. Ramos, "Synthesis of MgO on stainless steel substrates in a magnetized sheet plasma source".

7. M. P. Alarcon, D. E. Balacano, A. A. Liberato, D. D. Navaja and H. J. Ramos, "Effect of using variable extractor voltage in N^+ plasma-enhanced chemical vapor deposition on substrate land pads".
8. P. C. Concepcion, E. P. Casulla, R. E. Flauta, H. J. Ramos and M. Wada, "Conductive atomic force microscopy of plasma sputter-type ion source deposited gallium nitride thin films".
9. H. Lee, R. tumlos and M. Arciaga, "3D simulation and analysis of the magnetic field from a double-hexapole".
10. E. V. B. Lagsa, A. K. G. Tapia. R. Tabajonda, K. Olova, V. Noguera and H. J. Ramos, "Surface morphology and optical characterization of argon plasma treatment of polyaniline emeraldine base at various powers".
11. E. A. Villegas, V. R. Noguera and H. J. Ramos, "Electron energy distribution function (EEDF) analysis of negative hydrogen ion (H^-) enhancement in a magnetized sheet plasma source".
12. M. E. Arciaga, A. M. Ulano, H. V. Lee Jr., I. T. Yanson and R. B. Tumlos, "Optimization studies of a 2.45 GHz microwave argon plasma with varying distances between two repelling hexapoles".
13. C. L. S. Mahinay and L.M.T. Bo-ot, "Solution of the Navier-Stokes equation (NSE) for the incompressible laminar flow along a cylindrical pipe using finite difference method".

Attendance to International conferences.

1. C. P. Patacsil, G. M. Malapit and H. J. Ramos, "Optical emission spectroscopy of low temperature CVD diamond", *J. Plasma Fusion Res. SERIES*, Vol. 7 (2006) 145-149.
Sponsor: UP Baguio and National Institute for Fusion Science, Toki, Japan
2. B. N. Laniog, H. J. Ramos, M. Wada, M. G. Mena and R. E. Flauta, "Surface modification of epoxy resin-based PCB substrates using argon and oxygen plasmas", Proc. International Conference on electronic Materials and Packaging, Hongkong University of Science and Technology, December 11-14, 2006.

Sponsor: UP Diliman

Research Projects:

DOST-PCASTRD

Program Title: Transport of Low Energy Plasmas for the Synthesis of TiCN/TiCuN Films and Ion Treatment of Polymers

Duration: Three years
Year I (April 15, 2007 to April 15, 2008)

Amount/Fund: PhP 8,517,469.10

Projects under the program

- B. TiN/TiCN/TiCuN coating technology with the SPNIS and PSTNIS
Amount: 3,769,435.75
- C. Polymer treatment of low energy ions from gas discharge ion source (GDIS)
Amount: 4,061,711.43
- D. Beam focus, enhancement and transport in the PSTNIS
Amount: 636,321.92

Project Leaders: Dr. Henry J. Ramos and Dr. Gene Q. Blantocas

Students involved:

PhD Virginia R. Noguera
MS Melissa Camacho
Angelo Javonitalla
Emil Pares
Adonis Flores
Hamdi Muhyuddin Barra

Published Papers:

1. G. Q. Blantocas, H. J. Ramos and M. Wada, "Surface modification of narra wood (*Pterocarpus Indicus*) by ion shower treatment", *Japanese Journal of Applied Physics* 45 (10B) (2006) 8498.
2. V. R. Noguera, and H. J. Ramos, "A magnetized sheet plasma source for the synthesis of TiN on stainless steel substrates", *Thin Solid Films* 506-507 (2006) 613.
3. H. J. Ramos, J. L. C. Monasterial and G. Q. Blantocas, "Effect of low energy ion beam irradiation on wettability of narra (*Pterocarpus indicus*) wood chips", *Nuclear Instrum. Methods B* 242 (2006) 41.

The program aims to continue the development of innovative plasma process technologies using the three upgraded facilities which are 1) Plasma Sputter-type Negative Ion Source, 2) Sheet Plasma Negative Ion Source, c) Plasma Enhanced Chemical Vapour Deposition. New process technologies will also be developed by modifying/upgrading the existing facilities. In addition, a new facility, the Gas Discharge Ion Source (GDIS), intended for ion irradiation of polymers will be constructed.

Specifically, its three projects has the following objectives:

- Project A:
- a. modify the SPNIS for the synthesis of TiCN on sample substrates
 - b. Utilize the SPNIS in TiCN coating of sample cutting, engraving, milling and punching tools used by industries in the Philippines

- c. establish data on throughput of the device, ion source lifetime, tune time, meantime before failure, and the total availability of the machine for optimization and standardization of prototype device
 - d. make a comparative studies of metal-doped C on TiN and diamond/diamond like carbon film exposed to titanium/nitrogen plasma to synthesize TiCN
 - e. synthesize TiCuN thin films
- Project B:
- a. develop emittance and brightness techniques to characterize beam
 - b. study beam focusing and acceleration methods
 - c. study applications of ion treatment on biological, semiconductor and polymer samples
- Project C:
- a. utilize einzel lens for beam focusing techniques of metal and gas ions
 - b. construct electrostatic energy analyzer to determine ion energy downstream from ion source
 - c. develop time-of-flight mass spectroscopy (TOFMS)

OVCRD, UP Diliman

Project Title: Studies of a Newly-Developed Microwave Plasma Device for Plasma Applications

Duration: September 1, 2006 to August 31, 2008 (requested to be extended until December 31, 2008)

Amount/Fund: PhP 300,000

Grantee: Marko Arciaga

Research Goals

- Further develop the design and operation of the microwave plasma device
- Evaluate the discharge characteristics of the microwave plasma device
- Optimize the plasma parameters of the microwave plasma device for several discharge conditions and gases
- Use the microwave plasma device for plasma processing, such as abatement of PFCs

Students involved

BS: April Ulano
Henry Lee

This study will help in further understanding the characteristics of a newly-developed microwave plasma device, which is actually the first non-DC plasma device in the Plasma Physics Laboratory (PPL) of the National Institute of Physics. Further characterization of this device is needed for its eventual usefulness in various applications in the future such as plasma wood processing, elimination of soot from diesel engines, abatement of perfluorinated

compounds (PFCs) emitted from the semiconductor industry, and decomposition of toxic gases like CF₄.

This proposed study will be a continuation of the research project entitled “Development of a Compact Multi-Cusp ECR Ion Source for Plasma Applications” supported by OVCRD in the year 2001. The newly-developed microwave plasma device was constructed because it does not require a filament or cathode for plasma generation, unlike the other existing DC plasma devices in the PPL. The disadvantages of using a filament or cathode are: sputtering or evaporation of the filament or cathode produces contaminants in the plasma; and the replacement of broken filament or cathode is laborious and requires breaking the vacuum of the chamber. The microwave plasma device avoids these complications. Furthermore, the microwave plasma device is already proven internationally to have a wide-variety of applications as a source of highly-charged ions or as a device for plasma processing.

Intel Research Grant

Project Title: Gas Discharge Ion Source Applications in IC Packaging

Duration: One Year (April 16, 2007 to April 16, 2008)

Amount/Fund: 8,000 USD (P396,000.00 @49.5:1USD)

Goal

- For enhanced imaging and microanalysis using standard devices, the specimen has to be ultra-clean. The GDIS is compact, low energy and can be retrofitted to a characterization machine as part and parcel of it.
- The ion beam can be focused and energized to desired values for precise removal of specific materials from sample surfaces.

Project Leader: Dr. Henry J. Ramos

Lab Members and Students involved:

PhD holder: Dr. Gene Q. Blantocas
PhD: Virginia R. Noguera
MS: Adonis Flores
Melissa Camacho

In this project, we wish to demonstrate the capability of the Gas Discharge Ion Source as a plasma cleaning device and determine the balance between the physical and chemical processes in the cleaning or etching of samples. Gas chemistry in the plasma process will be tailored for proper selectivity and anisotropy for specific applications. The operating conditions (such as plasma discharge current, volume ratio of gas mixtures, input power, ion fluxes, process pressure and treatment time) for optimum cleaning of various specimens will be established. The first phase of the project covers the putting up of the facility, its characterization and assessment of polyimide removal on silicon using plasma cleaning process. The second phase is on the

quantitative measurement of plasma cleaning efficacy. The cleaning process will also be assessed if it is applicable to epoxy materials on top of polyimide layer.

a. CHED Visiting Professor Grant

Project Title: Development of gas discharge ion source for polymer treatment

Duration: August 2006 to July 2007

Amount/Fund: PhP 100,000.00

Goals

- Produce high-grade wood with high water repellency, anti-termite and flame-retardant characteristics. The technique is an alternative method of wood preservation offering a sterile procedural environment which renders the use of chemicals totally irrelevant,
- Surface modify other organic/inorganic polymers such as textile, abaca and polytetrafluoroethylene materials to produce advanced materials with high hydrophobic or hydrophilic properties depending on intended use,
- Develop instrumentations to quantify the changes in surface characteristics brought about by the irradiation process.

The GDIS was used as test facility to produce and study the characteristics of diffused, low-energy hydrogen beams. Calculations using the optical relations of the device's electric pole pieces show that the GDIS has a negative focal strength. That is, the beams generated by the device have shower-like configurations hence the acronym LEHIS for Low Energy Hydrogen Ion Showers. This particular beam shape is most suitable for surface processing of polymers as it modifies polymeric surfaces without destroying their bulk properties.

Wood was used as the initial target material for this research. The study, using experimental and statistical techniques have shown that LEHIS treatment of wood enhanced its anti-moisture and anti-fire attributes. LEHIS was found to be equally as effective as Permethrin (a strong pyrethroid toxin) in minimizing attacks from subterranean termites. Spectroscopy using a cast steel mass analyzer indicated a predominance of H^+ with faint signals of H_2^+ in the ion showers. The monatomic ion plays an essential participatory role in the attribute enhancement process. It is shown that wood affinity to water decreased as the proportion of H^+ increased, i.e. higher flux density ratios favored surface inactivation. It is further demonstrated using hardwood samples that a dominance of H^+ also improved fire resistance. H^+ ions seemed to be the initiator in the formation of hydrophobic and flame resistant wood surfaces at the same time rendering wood unpalatable to certain termite species (in particular, subterranean termites). Scanning electron micrographs showed subsequent smoothening of topographic features for the irradiated substrates. The images of treated samples showed diminished voids and partial closures of surface micro-pores. The method proved benign showing no unfavorable effects on paint

adherence and original texture and color. This plasma-based procedure could probably be developed as an alternative, non-chemical mode of wood preservation.

Grantee: Dr. Gene Q. Blantocas

Students involved:

BS: Jethro Salapare III

NIP funded grant

Project Title: Nanostructure research using the Streaming Neutral Gas Injection Facility

Amount/Fund: P100,000.00

Project Leader: Dr. Henry J. Ramos

Students involved:

PhD: Giovanni Malapit

MS: Paolo Aleo Pacho
Angelo Javonitalla

BS: Marianne Therese Agcaoili

The aim of this project is to grow carbon nanostructures on silicon and metal-catalyzed (Ni and Au) silicon substrates using the SNGI facility. The gas precursors include acetylene, hydrogen and argon. The effect of growth times and substrate heating will be investigated together with the effect of different C₂H₂ concentrations in the gas mix. Optical emission spectroscopy will be employed to identify the species in the plasma and will be compared with data reported by credible authors working on CNTs and CNWs. The role of Ar and H₂ in the plasma chemistry will be investigated. The samples will be characterized using SEM, TEM, Raman spectroscopy and XRD.

Objectives:

- Growth of CNTs and CNWs using the SNGI facility
- Comparison of samples produced at different parameters using different characterization techniques
- Analysis of growth mechanism for CNT and CNW during deposition and examine the dominant species/precursor in the growth process

Expected Output/Results:

- carbon nanostructure samples
- morphologies of the different samples using SEM and TEM
- characterization of CNS samples using Raman Spectroscopy and XRD
- plasma diagnostics using Optical Emission Spectroscopy and Langmuir probe
- analysis of the relationships between the parameters used in the experimental operations

- optimum parameters for the growth of quality nanostructures
- dominant species in the growth process

UP Research Grant: Creative and Research Scholarship Fund

Title: Low energy ion beam irradiation on organic polymers

Amount/Fund: PhP 201,000.00

Duration: One Year (October 1, 2005 to September 30, 2006)

Grantee: Dr. Henry J. Ramos

Positive hydrogen ions of H^+ and H_2^+ produced from a gas discharge ion source (GDIS) were used to irradiate organic polymers like wood to either make them hydrophobic or hydrophylic.. The extracted beam current is varied depending on the discharge currents and discharge potentials between electrodes. The samples are positioned downstream from the ion source, and are processed for different time periods and discharge currents. The wettability is characterized by the contact angle of the liquid droplet with respect to the sample surface. Surface modifications are assessed with by measurements of the water contact angle. Scanning electron micrograph spectrometry was performed to reveal the difference in morphologies of treated and untreated samples. Other attributes of wood samples like resistances to termite and fire, stain and decay were also investigated. Other Projects

Collaboration projects with the Department of Mining, Metallurgical and Materials Engineering, College of Engineering, UP Diliman resulted in the publication of papers 2.a.3 and 2.c.8.

STRUCTURE AND DYNAMICS GROUP 2007 REPORT WITH PROJECTION
National Institute of Physics, University of the Philippines, Diliman, Quezon City
(date submitted: September 5, 2007)

Prepared by: Dr. Cristine Villagonzalo, SanD Program Coordinator, and Dr. Ronald Banzon

Contents: Part I. SanD Developments Part II. Summary of Past and Ongoing Research Projects
Part III. Projection for the next three years

Part I. SanD Developments

Period covered: January 2006 – May 2007

I. List of students who defended their thesis

For the period covered, there were three MS students and 6 undergraduate students who finished their theses in SanD.

A. Master of Science in Physics

- i. Joselito E. Muldera (PCASTRD scholar), March 2006 Thesis:
Thermoelectric Transport Coefficients Of Bulk and Low Dimensional Structures
Adviser: Dr. C. Villagonzalo
- ii. Louella Judy A. Vasquez (PCASTRD scholar), May 2006 Thesis:
Modeling of the Thermoelectric Transport Properties Of Metallic Single-Walled Carbon Nanotubes
Adviser: Dr. C. Villagonzalo
- iii. Karla Belisario (PCASTRD scholar), May 2007
Thesis: *Reaction Rate Model for Composite Particles*
Adviser: Dr. R. Banzon

B. BS Physics

- i. Stephanie Ibo, March 2007
Thesis: Characterization of the Penna Model by the Simplex Projection Method
Adviser: Dr. R. Banzon

C. BS Applied Physics

- i. Razel G. Flores, March 2006
Thesis: *Thermal Properties Of Coupled Iterated Logistic Maps*
Adviser: Dr. C. Villagonzalo
- ii. Lenie Garcia, March 2006
Thesis: *Transport Dynamics in a Series of Quantumwells*
Adviser: Dr. C. Villagonzalo
- iii. Christian Oliver Jaramillo, March 2006
Thesis: *Constrained Percolation in Two Dimensions*
Adviser: Dr. R. Banzon and Dr. C. Villagonzalo
- iv. Ralph Paolo Mandingiado, October 2006
Thesis: *Complexity in Competitive Populations*

Adviser: Dr. R. Banzon

v. Claire Nunez, May 2007

Thesis: *Variational Monte Carlo Study: A Particle in a Quantum Well System in an External Electric Field*

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

II. List of Publications

A. SPP Conference The following articles were published in the

Proceedings of the Samahang Pisika ng Pilipinas , Vol. 3, (ISSN 16562666), October 2006:

i.E.S. Agra, K.E. Antonio, K. Belisario and R. Banzon, *The Molecular Dynamics of Two Particles on a Ring*

ii.K.E. Antonio and R. Banzon, *Particle Density Dependence of Molecular Dynamics Estimated*

iii. R. Gammag and C. Villagonzalo, *Thermodynamics Properties of a Two Dimensional Electron Gas in the Fractional Quantum Hall Regime*

iv. R.P. Mandingiado, S. Ibo and R. Banzon, *Complexity in Competitive Populations*

v.C. Villagonzalo and R. Flores, *Heat Capacity of Logistic Maps with Bidirectional Coupling*

vi. Villagonzalo and G.R. Tongco, *A Finite Temperature Magnetic Phase Transition in One dimensional Lattice*

III. Attendance to conferences

A. 24th SPP Physics Congress, Ateneo de Davao University, Davao City, 2527 October 2006

- i. The following SanD members attended: a) Dr. Ronald Banzon, travel fund from NIP b) Dr. Cristine Villagonzalo, travel fund from NIP and SPP c) Ms. Karla Belisario, travel fund from PCASTRD d) Ms. Rayda Gammag, travel fund from PCASTRD e) Ms. Kristine Eia Antonio f) Mr. Ralpha Mandingiado g) Ms. Stephanie Ibo

IV. Grants

A. UP System Faculty Grant

i. Dr. Ronald Banzon

Title: *Molecular Dynamics of Two Particles in a Ring*

Duration: July 2006 to January 2007

Amount: PhP 15,000.00

ii. Dr. Cristine Villagonzalo

Title: *Bidirectional coupling of logistic maps*

Duration: July 2006 to June 2007

Amount: PhP 15,000.00

B. NIP Funded Research

i. Dr. Ronald Banzon

Title: *Complexity in Competitive Populations*
Duration: January to December 2006
Amount: PhP 36,000.00

i. Dr. Cristine Villagonzalo

Title: *Modeling of TwoDimensional Electron Gases' Thermodynamics Properties in the Fractional Quantum Hall Regime*
Duration: January to December 2006
Amount: PhP 36,000.00

Part II. Summary of Past and Ongoing Research Projects

The physics of macroscopic and microscopic systems from bulk solids and living organisms to atoms and molecules are dictated by their structure and the dynamics of their constituent parts. Understanding these underlying principles through theoretical and computational methods is the research thrust of the Structure and Dynamics Group.

I. Theoretical and Computational Physics

A. Penna Model [Dr. Banzon]

We started investigations on a population dynamics model that yields a Gompertzian age structure distribution - the Penna Model. It is a model that conforms to the mutation accumulation theory of aging. We showed that a Penna bitstring model with only 8bits exhibits the same chaotic properties as that of the original 32bit model.[Nombres]

A variant implementation of the model was also investigated that which applied the so called Verhulst factor (to account for the influence of the environmental carrying capacity) only to newborns (VB), as opposed to all ages in the original model. This implementation takes into account the idea that older individuals are able to adapt to the environment. It was found that it displays a greater degree of chaos compared to the original (VA) implementation. Also, the effective carrying capacity is explicitly defined only for the age at which the Verhulst factor is applied.[Nombres, Beech]

It was noted that the newer, biologically more acceptable implementation (VB) does not yield a Gompertzian age structure. The nonGompertzian distribution was accounted for by an observed time dependence of the distribution with a shortterm periodicity. [Beech]

Intraspecific competition was simulated for different Penna parameters. It was found that in general, the preferred population exhibits less fluctuation in its timeseries. [Beech]

The degree of complexity associated with the resulting timeseries for a population was estimated using the embedding dimension. [Mandingiado, Ibo]

A study was made to find a correlation between the embedding dimension and the competitiveness of a population. [Mandingiado]

An investigation to find a correlation between the estimated regions of chaotic and non chaotic regimes and the associated embedding dimension and lagtime parameters of the simplex projection method was also conducted. [Ibo]

A current study focuses on the carrying capacity a concept thought to be necessary in models to keep the population finite. So far we find that in the framework of the Penna bit string model, a bitstring length of two does not require the concept of a carrying capacity.[Pinol]

B. Molecular Dynamics [Dr. Banzon]

We presented a model for molecular formation and outlined an approach that enables the determination of the rate of reaction. Molecular formation was made possible by successive inelastic collisions, where each collision results in a fixed fraction of the kinetic energy being lost. [Antonio,Belisario, Nicolas]

Implementation details such as the introduction of a cutoff range for the particle interaction was investigated in one dimension. [Agra, Belisario]

The particle density dependence of the reaction rate was estimated using the model.[Antonio] An approach that utilizes the model was introduced to estimate the rate of reaction for composite molecules from their constituent parts. [Belisario]

An ongoing study is the determination of the acceptable range of values for the model parameters fractional kinetic energy loss per collision, and fraction of maximum depth of interaction potential. [Antonio]

Simultaneously, a different procedure for the simulation of molecular formation is being devised. It will take into account the composite nature of the atom having a central nucleus and an electron cloud. [Uy]

In preparation for the incorporation of particle interactions and diffusion in molecular dynamics, we are currently devising a numerical integration procedure that may be preferable to the standard RungeKutta order 4 method (RK4). A predictor-corrector method is being devised that is more efficient and more accurate than RK4. [Rodriguez]

C. Polymer Physics [Dr. Banzon]

A study was made using a Monte Carlo parallel tempering (as opposed to a pure simulated annealing) procedure of mapping out the energy surface of a Verdier-Stockmayer Polymer. The number of degenerate states were estimated as a function of temperature and polymer length, in addition to the determination of the ground state configuration. Uniqueness of the polymer configurations were checked with respect to translational and mirror invariance. [Obias]

D. Variational Monte Carlo studies of Quantum Systems [Dr. Banzon, Dr. Villagonzalo]

The approach was utilized to investigate a number of configurations of two dimensional quantum well systems. A determination of its efficiency in terms of the number of accepted trials against the total was made. [Sandagon]

A possible transition investigation with an applied external electric field and increasing number of wells was studied utilizing the approach. [Nunez]

Ongoing is the determination of minimum depth with a bound state for a given well width for the system with an applied electric field. The dimensions are to be comparable to available quantum well systems. With the anticipated increase in the required accuracy, importance sampling or some other procedure to accelerate convergence will be added to the existing procedure. [Alinea]

E. Percolation [Dr. Banzon, Dr. Villagonzalo] The percolation threshold was estimated for a two-dimensional lattice with regions of disallowed occupancy. The initial focus was the suggestion of an appropriate definition for the percolation threshold in this case where constraints were imposed on the available sites. The suggested definitions were calculated for various lattice sizes. [Jaramillo]

Further investigations are ongoing regarding the idea of what constitutes a spanning cluster for a given topology. [Capili, Hernal]

F. Molecular Electronics [Dr. Banzon, Dr. Villagonzalo] Devised a self consistent root-finding procedure to determine the appropriate values for two implicitly defined functions $n_1 = f(n_1, n_2)$ and $n_2 = g(n_1, n_2)$. The goal here is to model electron hopping in a two identical atom molecular wire and to consider the effects of hopping on the wire's current. [Marco]

It is our hope to derive an analytic single and multi channel theory of conductance in molecular wires. The work in this topic is not finished. It has been shelved due to the departure of the student. [Sardane]

G. Multifractal Dissipative Systems [Dr. Villagonzalo]

Thermal properties and the density of states are studied for logistic maps with dissipative coupling. The coupled maps models systems with multifractal energy spectra such as in quasicrystals. Synchronization in the heat capacity oscillations of two bidirectionally coupled logistic maps is observed. For some coupling parameters, logarithmic oscillations in the heat capacity vanishes. An ongoing project is to work out the case of unidirectional coupling of logistic maps for synchronized periodic and chaotic regions. [Flores, Crisostomo]

II. Solid State Physics

Spin Dynamics [Dr. C. Villagonzalo]

The one dimensional Ising model is used to simulate a magnetic system with the addition of dipolar i

interactions between spins. With the addition of a long range interaction, it is established that a one dimensional Ising short chain will have a unexpected finite temperature phase transition. [Tongco]

B. Multilayers Structure [Dr. C. Villagonzalo]

Giant magnetoresistance in a multilayer is due to the growth of alternately layered ferromagnetic and nonmagnetic materials. Different multilayer structures are numerically tested through ab-initio methods. The most relaxed layer combination is obtained. The structural relaxation is observed in the lowering of the total ground state energy and in obtaining equilibrium forces on each lattice site. [Morales, Labora]

Transport of phonons through superlattices are modeled considering harmonic and anharmonic approximations. Established in these works are different layer parameters that will yield a reduced thermal conductivity. [Dizon, Parinas]

C. Transport in Low Dimensional Systems [Dr. C. Villagonzalo]

Transport in low dimensional systems in the presence of a temperature gradient or a magnetic field is investigated. A quasioptimal conductor model of free electrons in the direction of propagation and confined in other directions using the relaxation time approximation yields a high thermal efficiency. [Muldera] Effects of Landau level broadening usually attributed to impurities, interactions and disorder are investigated in two dimensional electron systems under strong magnetic fields and low temperatures. Variations in the Landau level broadening yield oscillations in the chemical potential and the heat capacity when the electron concentration is kept constant. [Gammag]

D. Modeling of Carbon Nanotubes [Dr. Villagonzalo]

A tight binding calculation of the bandstructure of single walled carbon nanotubes is utilized to determine enhancement of the thermoelectric power in these systems. [Vasquez]

E. Heat Transport [Dr. Villagonzalo]

Heat analysis in devices plays an important role in the industry of electronics, information storage, structural applications and refrigeration. Standard Fourier law of heat transport assumes infinite propagation speed. Taking into account a finite thermal speed, the transient conduction of heat across a slab for varying heat sources is simulated. The focus is now on the effect of different layer interfaces on the thermal transport properties. [De La Torre, Cortez]

F. Superconductivity [Dr. Villagonzalo]

The Ginzburg-Landau theory is a macroscopic model of superconductivity. A central difference scheme for the Ginzburg-Landau equations is implemented to find the probability of finding the superconducting electrons in a film. [Castro]

Part III. Projection for the next three years

I. Future Projects

A. Penna Model

Within the next two years, we hope to be able to address additional issues raised by our investigations so far: account for the observed shortterm periodicity of the nonGompertzian age-structure, a more detailed account of the complexity characteristics of the (VB) implementation - the closedcurve first return map may be the result of the shortterm periodicity of the agestructure.

The application of the Penna model to a variety of systems that exhibit aging or those with memory may be investigated. In addition to physical (wear and tear, complexity and related fields) and biological (aging, memory, competitiveness, and derivatives) issues, social and psychological issues may also be addressed. The concept of "happiness" may correlated with an accumulation and thus serves as an entry point for a Pennatype model for "happiness".

B. Molecular Dynamics

It is our hope to increase the dimension of the investigations (current studies are in one dimension) to address topological and confinement issues within the next two years.

The introduction of a background structure within the molecular dynamics simulation as with the interaction of different particles within a fluid or solid, and/or the propagation of physical entities within them is envisioned.

C. Polymer Physics

A good addition for the determination of a unique configuration is the check for rotational transformations.

A model that predicts the equal energetic preference for plectonomic and toroidal conformations of closedcircular DNA may introduce insights that may lead to an explanation for this unsolved problem.

D. Heat Transport

The goal is to extend the model to finite systems and to address realistic boundary conditions in the simulation for pulsed and continuous heat sources.

E. Spin Dynamics

To model actual magnetic systems, longer spin chains need to be simulated. Another goal is to build an efficient and fast algorithm such as to simultaneously calculate the state of the spin systems at different temperatures.

G. Future Projects

1. Projects in the pipeline

a. Quantum Computing –

The objective in this work is to create an efficient program that discriminates pair unknown quantum states. [Amarra]

b. DNA Dynamics –

The aim here is to have a numerical model of DNA electrophoresis-a standard operating procedure in DNA analysis [Johnson]

2. Introduction of new topics

- a. Modeling Electromagnetic systems
- b. Social Systems (modelling Hobbes' Leviathan)

3. Revival of shelved topics

- a. Modeling of heat transport properties in carbon nanotubes
- b. Molecular electronics

II. Future plans on resources for the next three years

A. Laboratory needs

A computational group needs a reliable computing facility. Updating of computers is a priority for the next 3 years. The group will seek grants and external funds to update its existing computers.

B. Human resources: Student recruitment

The PhD faculty in SanD have helped seven undergraduate students with work on liquid crystals to finish their undergraduate theses in 2003. Beginning 2004 until May 2007, excluding students working on liquid crystals, five MS students and 16 undergraduate students have successfully completed their theses in SanD. In a span of 4 years, SanD manages to graduate annually at least one MS student and 4 undergraduate students on average. The average number of student members in SanD per semester is 18. These students have varying academic status.

In the next three years, SanD intends to streamline the research topics to be more effective. SanD's ideal maximum number of students is 10 for two PhD faculty members. With at most, 2 graduate and 3 undergraduate students per PhD faculty.

Theoretical Physics Group

1) Students who Defended Their Thesis

BS

March 2006

Francis Norman Paraan, BS (Applied Physics)

Summa cum laude

Recipient of Deans Medallion for Outstanding BS Graduates – BS Applied Physics

Thesis: “Exact Moments and Cumulants of Discrete and Continuous Time Elephant Random Walks”

Thesis Adviser: J.P. Esguerra

Manuel Soriano, BS (Applied Physics)

Thesis: “Nonlinear Dynamics of a Quasi-periodically Driven Oscillator”

Thesis Adviser: J.P. Esguerra

Andrew Alarcon, BS (Physics)

Cum laude

Recipient of Deans Medallion for Outstanding BS Graduates – BS Physics

Thesis: “Accelerated power series solution of Lane-Emden type systems of equations for charged polytropic stars”

Thesis Adviser: J.P. Esguerra

October 2006

Reynaldo Domingo (BS Physics)

Thesis: Mass spectrum of low lying charmonia

Thesis Adviser: C. Palisoc

March 2007

Leonard R. Ocampo (BS Applied Physics)

Thesis: Time Reversal Symmetry Broken Confined Quantum Time of Arrival Operators

Thesis Adviser: E. Galapon

Karen Patricia G. Ramirez (BS Physics)

Best BS Physics Thesis

Thesis: “Gegenbauer Reconstructed Split Operator Method for Spatially Confined Quantum Systems”

Thesis Adviser: E. Galapon

Mikaela Irene Fudolig, BS(Physics)

University Valedictorian

Gawad Chanselor Para sa Natatanging Mag-aaral

Summa Cum Laude

Dean’s Award for Excellence in Undergraduate Studies

Dean’s Medallion for Most Outstanding BS Graduates – BS Physics

Thesis: "Language Competition in Split Populations with Limited Interaction: Consequences on Language Maintenance and Death"

Thesis Adviser: J.P. Esguerra

Ruby Agnes Alfonso, BS(Physics)

Thesis: "Eigenenergies of the Pseudoharmonic and the Manning-Rosen Potentials via the Asymptotic Iteration Method"

Thesis Adviser: J.P. Esguerra

Emmanuel Soliman M. Garcia, BS(Physics)

Thesis: "Mean First Passage Time for Random Walks on Circulant Networks"

Thesis Adviser: J.P. Esguerra

Niel Caidic, BS (Physics)

Thesis: "Dynamics of Coupled Fractional Van der Pol Oscillators"

Thesis Adviser: J. P. Esguerra

MS

March 2006

Bhazel Anne Rara, MS (Physics)

Thesis: "Interplay of Noise, Nonlinearity, and Fractional Dynamics"

Thesis Adviser: J.P. Esguerra

May 2006

Rumelo Amor, MS (Physics)

Thesis: "Equilibrium and Non-equilibrium Behavior of Two Systems with Hard Core Interactions"

Thesis Adviser: J.P. Esguerra

October 2006

Gabriel Manasan Jr, MS(Physics)

Thesis: "Biased Random Walks with Geometrically Shrinking Steps"

Thesis Adviser: J.P. Esguerra

May 2007

Roberto Vitancol Jr

Thesis: Application of the Clenshaw-Curtis Quadrature in Confined Time of Arrival Operator Eigenvalue

Problem

Adviser: E. A. Galapon

Anthony D. Villanueva

Thesis: New Results on the Confined Time of Arrival

Adviser: E.A. Galapon

Francis Norman C. Paraan

Thesis: Brownian Motion of a Charged Particle Driven Internally by Correlated Noise

Adviser: J.P. Esguerra

2) Publications

ISI

1. F.N.C. Paraan and J.P. Esguerra, 'Exact moments in a continuous time random walk with complete memory of its history,' *Phy. Rev.E* 74, 032101 (2006).
2. B.A. Kniel and C.P. Palisoc, 'Prompt J/ψ plus photon associated electroproduction at DESY HERA,' *Eur. Phys. J. C* 48 (2006), 451.
3. E.A. Galapon, 'Theory of confined quantum time of arrival via spatial confinement I: Confined time of arrival operators for continuous potentials', *Intl J Modern Physics A* (2006) 6351-6381.

Non ISI International (Book Chapter)

1. E.A. Galapon, "What could have we been missing while Pauli's theorem was enforced?," in *Time and Matter* (I. Bigi, ed.), World Scientific Singapore 2006.

SPP

1. R. Amor and J.P. Esguerra, 'Relaxation and steady state behavior of an analytically tractable one-dimensional model', *Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006)* p.7
2. M.R.C. Solis, 'Thermal interaction of a black hole with a finite temperature environment', *Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006)* p.29
3. E.S.M. Garcia and J.P. Esguerra, 'Relating the mean first passage times for continuous and discrete time random walks on complex networks', *Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006)* p.30.
4. H.B. Domingo, A.Villanueva, and E.A. Galapon, 'Born series solution of the time-kernel equation and quantum mechanical derivation of the anharmonic oscillator classical time of arrival', *Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006)* p.32
5. R.S. Vitancol and E.A. Galapon, 'Superalgebraic computation of the quantum time of arrival operator eigenvalues', *Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006)* p.32

6. H.B. Domingo and E.A. Galapon, 'Modified time kernel equation for entire analytic potentials', Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006) p.33
7. K.G. Ramirez and E.A. Galapon, 'Numerical quantum evolution of confined particle with non-periodic boundary conditions through split operator method reconstructed by Gegenbauer series', Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006) p.38
8. M.I. Fudolig and J.P. Esguerra, 'Modeling the survival of minority languages', Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006) p.43
9. L.R.Ocampo and E.A. Galapon, 'Symmetry breaking quantizations for confined quantum time of arrival operator', Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006) p.38
10. D.L. Dy and J.P. Esguerra, 'Evolution of the reduced probability distribution function of a random walker on a lattice with zigzag boundaries', Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006) p.69
11. M.S. Sereno and J.P. Esguerra, 'On the feasibility of analytical approximations for the bound state energy spectra of one-dimensional quantum systems', Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006) p.69
12. R.A. Alfonso and J.P. Esguerra, 'Eigenenergies of the generalized Hulthen potential by the asymptotic iteration method', Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006) p.70
13. J.P.H. Esguerra, 'Analytical underpinnings of a hybrid analytic-numeric scheme for the Abe-Thurner generalization of the diffusion equation', Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006) p.79
14. R.C.F. Caballar and E.A. Galapon, 'Long time dynamical behavior of the confined quantum time of arrival eigenfunctions', Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006) p.85
15. C. Palisoc, 'Prompt J/psi plus jet associated production in ep deep inelastic scattering', Proceeding of the Samahang Pisika ng Pilipinas v.3 (24th SPP Physics Congress, Ateneo de Davao University, Davao City, 25-27 October 2006) p.86

3) Attendance to Conference

The following members of the group attended the 24th Physics Congress of the Samahang Pisikang Pilipinas in Davao City from October 25 to 27, 2006: R. Amor, J.P. Esguerra, H.B. Domingo, E.A. Galapon, K.G. Ramirez, M.I. Fudolig, L.R. Ocampo, R.A. Alfonso, C. Palisoc. The participation of E. Galapon, C. Palisoc, and J.P. Esguerra was supported through the NIP Faculty Development Grant.

4) Research grants awarded in January 2006 – May 2007

1. Title of Project: W boson pair production in ep scattering

Project Leader: Caesar Palisoc

Source of Funding: OVCRD

Grant Amount: PhP 197,410.00

Duration: 1 September 2006 to 31 August 2007

The production of W Boson pair in electron-proton scattering is to be investigated. Like the familiar electron and proton, the W boson is a realizable and detectable particle, but unstable with a short lifetime. A few of the W boson's physical properties, like its mass and lifetime for instance, are the subject of intense research since its discovery in 1986, with their values experimentally determined with impressive precision. However, a few more of its physical properties, like how strong or feeble it couples with other realizable particles, are not as constrained and are awaiting further precision test: an activity the proposed study will contribute on. The study is timely and has not been dealt with yet in the literature. Measurement of the cross section of the process in this study is underway in one laboratory and it would be interesting to see how results from this measurement compares with the theoretical predictions the study here aims to obtain.

Individuals involved: C. Palisoc Asst. Prof.

2. Title of Project: Charmonium and Jet Associated Production in positron-electron Collision

Project Leader: Caesar Palisoc

Source of Funding: OVPAA

Grant Amount: PhP 15,000.00

Duration: 1 July 2006 to 30 June 2007

The associated production of charmonium and a hadron jet in positron-electron collision is to be studied to leading order within the factorization formalism of nonrelativistic quantum chromodynamics. The charmonium plus hadron jet associated production in positron-electron collision involves subprocesses where one (both) of the initial state photons is (are) highly virtual. To the best of my knowledge, this process has not been dealt with yet in the literature and since this process proceed via color-octet (CO) subprocesses, conclusions therefrom will help

determine if CO processes are realities of nature or not.

Individuals involved: C. Palisoc Asst. Prof.

3. Title of Project: Stochastic Resonance in Linear Fractional Dynamical Systems

Project Leader: Jose Perico Esguerra

Source of Funding: OVPAA

Grant Amount: PhP 15,000.00

Duration: 1 July 2006 to 30 June 2007

The problem to be solved is a stochastic fractional differential equation with multiplicative colored noise terms and sinusoidal driving. The solution to the above problem is potentially significant because of the following: Stochastic resonance is usually observed in nonlinear systems simultaneously driven by noise and a periodic signal.

It has been invoked to explain the periodic recurrence of ice ages and observed in systems such as electronic Schmitt triggers, bidirectional ring lasers, driven magnetoelastic ribbons, ion channels, and mechanoreceptor cells of a crayfish. Recently it was discovered that stochastic resonance can also happen in linear systems provided the noise is multiplicative rather than additive and colored rather than white.

At the same time, systems have been discovered whose dynamics is better described by equations involving fractional derivatives rather than integer order derivatives.

Individuals involved: J.P. Esguerra Asst. Prof.

5) NIP Funded Researches

1. Title of Project: :Solution of the Generalized Langevin Equation for a Charged Particle Under the Influence of External Electric and Magnetic Fields Stochastic Resonance in Linear Fractional Dynamical Systems

Project Leader: Jose Perico Esguerra

Duration: 1 January 2007 to 31 December 2007

The problem involves the solution of a Generalized Langevin equation for a charged particle under the influence of electric fields, magnetic fields, and internally generated noise. The internally generated noise ensures that the charged particle and its surrounding medium attain the same temperature in the long run. The solution to the Generalized Langevin eq.(2) equation is significant because of the following reasons: In the literature, the analytical solution for the generalized Langevin equation has only been obtained for arbitrary forms of the noise correlation only for the case where there is no external field. The solution of the generalized Langevin equation for a charged particle in external electric and magnetic fields has applications in charged particle diffusion in colloids and plasmas. While Langevin equations for charged particles in external electric and magnetic fields have been studied in the past, these studies have been limited to either delta-correlated noise or to colored noise but using an inappropriate expression for the drag force .

Individuals involved: J.P. Esguerra Asst. Prof, Bhazel Rara (PhD student), Francis Norman Paraan (MS student), Mikhail Solon (BS student)

Status of Project: 1 paper has been submitted for possible publication in Phys.Rev.E. Two papers have been submitted for presentation to the 25th SPP Physics Congress to be held in UPLB this coming October 2007 – these two papers will be further developed and possibly merged for a future submission to Physica A.

2. Title of Project: Analytical Underpinnings of a Hybrid Analytic-Numeric Scheme for the Abe-Thurner Generalization of the Diffusion Equation Solution of the Generalized Langevin Equation for a Charged Particle Under the Influence of External Electric and Magnetic Fields Stochastic Resonance in Linear Fractional Dynamical Systems

Project Leader: Jose Perico Esguerra

Duration: 1 January 2006 to 31 December 2006

A hybrid analytic-numeric scheme for obtaining approximate solutions to a generalization of the diffusion equation for non-homogeneous media recently introduced by Abe and Thurner [Physica A 356 (2005) 403-407] will be proposed. A variational-perturbation approach will be used. The scheme will be applied to the evolution of a Dirac-delta initial distribution. The final result should be an expression for the evolution of the distribution function of a system governed by Abe-Thurner generalized diffusion that is amenable to numerical integration.

Individuals involved: J.P. Esguerra Asst. Prof

Status of Project: The work was accepted as an oral presentation in the 24th SPP Physics Congress held in Davao City from October 24 to 26, 2006.

6) Thesis Grants

None

7) Research Summary by Subgroups

The Theoretical Physics Group has three subgroups. Subgroup 1, currently headed by J.P. Esguerra focuses on mathematical physics fractional dynamics, statistical mechanics, Subgroup 2, currently headed by E.Galapon, focuses on the foundations and computational methods of quantum mechanics. Subgroup 3, currently headed by C.Palisoc, focuses on high-energy phenomenology.

Subgroup 1 (Mathematical physics, statistical mechanics, fractional dynamics)

Subgroup 1's fields of interest include: the applications of fractional calculus in physics, the development of approximate analytical solutions schemes for quantum mechanics and nonlinear problems, non-extensive statistical mechanics, random walks and diffusions, transport phenomena in classical fluids, random walks and diffusion in lattices and networks. A representative listing of the current research interests of the group follows:

1. Time Evolution of a Simplified Kinetic Equation, (P. Esguerra)
2. Pulse Propagation in Cross-Linked Oscillator Networks Obeying Fractional Dynamics, P.Esguerra, B. Rara (PhD student)
3. Approach to Steady State of Conservative and Dissipative Two Piston Systems, R. Amor, PhD student
4. Path integral Analysis of Quantum Systems with moving Boundaries, P.Esguerra, G. Aguarte (MS student)
5. Development of Analytical Schemes for Surface Wave Propagation, P.Esguerra and R. Coronel (MS student)
6. Diffusion on Wedges, P.Esguerra and Mr. Diandrew Lexter Dy (MS student)
7. Persistent Random Walks with Geometrically Shrinking Steps, P.Esguerra and M. Alcanzare (BS student)
8. Evolution of Self-Gravitating Systems Using Variational Iteration and Homotopy Perturbation Methods, P. Esguerra and J. Imperio (BS student)

9. Evolution of the Momentum Distribution Function of Kicked Systems with Non-Poissonian Waiting Times, P. Esguerra and A. Laganapan (BS student)
10. Development of Accurate Solutions for Relativistic Oscillators, P. Esguerra and M.Solon (BS student)
11. Solutions of the Generalized Langevin equation for charged particles influenced by electric and magnetic fields, P. Esguerra, B.Rara (PhD student), F. Paraan (MS student), M.Solon (BS student)
12. Issues on the thermodynamics of blackholes, P.Esguerra and M.Solis (MS student)
13. Vlasov-Poisson perturbation schemes for colliding galaxies, P.Esguerra and R.Sol (BS student)
14. Dynamics of graded non-linear systems, P. Esguerra and R. Perez

The members of the subgroup as of April 15,2007 are:

Assistant Professor: Jose Perico Esguerra

PhD Students: Rumelo Amor, Bhazel Anne Rara

MS Students: Glenn Aguarte, Rochelle Coronel, Diandrew Lexter Dy, Francis Norman Paraan, Ruel Perez,
Michael Reuben Solis

BS Students: Michiko Alcanzare , Ruby Agnes Alfonso, Niel Laurent Caidic, Mikaela Irene Fudolig,

Emmanuel Soliman Garcia, Jomel Imperio,Aleena K. Laganapan, Ramses Russel Sol, Mikhail Solon,
Kristian Hauser Villegas

Subgroup 2 (Foundations and computational methods of quantum mechanics)

Project title: Theory of quantum arrival for arbitrary arrival point and arbitrary interaction potential via spatial confinement and applications
(Long term project of the subgroup)

Summary

The project seeks to address the quantum time of arrival problem in one dimension for arbitrary arrival point and for arbitrary interaction potential using the researcher's theory of quantum arrival via spatial confinement. In particular, the project seeks to investigate the theoretical and practical ramifications of the theory. On the theoretical side, we explore the implications of the theory to the foundations of quantum mechanics, primarily in the areas of quantum measurement and interpretations of quantum mechanics, and from that draw specific experimentally verifiable or falsifiable predictions of the theory that can distinguish standard quantum mechanics from its alternative formulations. On the practical side, we seek to apply the theory to the temporal aspects of quantum tunneling and to the translational motion of ultracold atoms. For the former, we seek to extend the theory to potentials with compact supports such as piecewise potential barriers; then apply the extended theory to quantum tunneling such as the dynamics of particle transport across barriers, the Hartman effect, and the presence or absence of superluminal barrier tunneling. For the later, we extend the theory to finite temperatures and to mixed initial states; then apply the extended theory to the interpretation of time-of-flight measurements involving ultracold atoms and Bose-Einstein condensates.

Importance of the project

The project is timely because it addresses a wide ranging topic that needs resolution, and whose resolutions have immediate theoretical and practical consequences. Moreover, the availability of technology needed in confirming our theory makes it even more timely. Its relevance ranges from foundational issues like quantum measurement theory and interpretations of quantum mechanics to technologically material issues like data analysis for ultracold atom time of flight experiments and temporal aspects of quantum tunneling.

Relevance in quantum measurement theory: The eigenfunctions of the confined time of arrival operators evolve such that the probability of finding the quantum particle at the arrival point is maximum at their corresponding eigenvalues. In the limit of infinite confining length, the eigenfunctions evolve to a Dirac delta at the arrival point at their eigenvalues. This dynamical behavior offers a quantum mechanical picture of the arrival of a quantum particle. And this has a direct bearing in the long standing quantum measurement problem. In standard quantum mechanics, there are two known dynamics of a quantum system: The continuous unitary evolution of the system under Schroedinger's equation, and the discontinuous non-unitary evolution during quantum measurements. The discontinuity during quantum measurements is known as wavefunction collapse and it has two distinct aspects: discontinuity in time or quantum jump, and discontinuity in space or the appearance of particle. The quantum jump occurs when measurement at some instant of time projects the initial state to another state. The particle appears when the initial state spontaneously collapses to a state of point support during position measurement, such as the scintillation on a screen. However, standard quantum mechanics has so far failed to provide a consistent mechanism on the emergence of these discontinuities from its own premises, leaving wavefunction collapse an ad hoc hypothesis. This is the well-known quantum measurement problem (QMP). The QMP has been the source of endless debate on the proper accounting of quantum mechanics. Existing different approaches to and interpretation of quantum mechanics have been developed to address these discontinuities. Our quantum theory of spacetime arrival, however, provides a framework in which the appearance of particles is not a distinct discontinuity but in fact a consequence of the combined effect of quantum jump and unitary Schroedinger evolution, reducing the QMP to half.

Relevance in interpretation of quantum mechanics: Because of our theory's implications on the appearance of particles, it has heavy impact on the interpretation of quantum mechanics. The majority of the proposed alternative interpretations and formulations of quantum mechanics have been conjured to address, in particular, the appearance of the particle, for example, Bohmian mechanics, non-linear quantum mechanics and spontaneous localization theory. In these alternative formulations, the basic Schroedinger equation is supplemented with additional features outside standard quantum mechanics to allow for the emergence of particles. The advent of our theory raises issues against these formulations. Of importance is our theory giving predictions that is distinct from the predictions of these alternative formulations of quantum mechanics. Our theory then can play a decisive role in discriminating alternative formulations of quantum mechanics from the standard formulation. However, our theory may potentially disagree with the theory of decoherence in the description of particles. Decoherence theory

describes the appearance of particle as the destruction of quantum coherence that eliminates quantum correlations between spatially separated pieces of the wavepacket. While decoherence theory is yet to address the quantum arrival problem, it can already be read off from its foregoing description that the collapse of the wavefunction occurs at the appearance of particle, in contrast to our description that the collapse occurs right after the preparation of the initial state. However, any disagreement between decoherence's description and our description needs resolution because both are within standard quantum mechanics.

Relevance in interpretation of low temperature time of flight measurements: Much of the recent advances in our understanding of low temperature physics, e.g. Bose-Einstein condensates and ultracold atoms, has been made possible through time-of-flight measurements [Mo]. In experiments involving trapped clouds of atoms or condensates, the measurement of the temperature of the cloud is crucial for characterizing the properties of the traps. The temperature can be inferred from the velocity distribution of the atoms, which in turn can be measured using time-of-flight techniques. However, the interpretation of the results of the various time-of-flight experiments have depended on the calculation of times based on classical trajectories. This makes the interpretations of the results disputable in the domain of small atomic masses and low temperatures (or low energy) where quantum mechanical effects are expected to have non-negligible aftereffects on the translational motions of the atoms involved. It is known that existing theory of quantum time of arrival differ with the classical treatment in those regions. It is this scenario that a full-fledge theory of quantum spacetime arrival is needed in the proper interpretation of time-of-flights measurements. A correct theory of quantum arrival is then necessary in the advancement of our knowledge in the low temperature domain.

Relevance in temporal aspects of quantum tunneling: Recently the orthodox interpretation of quantum tunneling experiments has been critically evaluated and more controversy on the already controversial quantum time tunneling problem is on the offing. At the heart of the latest quantum tunneling conundrum is the proper interpretation of the Hartman effect, which, according to current consensus, implies superluminal or greater-than-the-speed-of-light group velocities. But it is now claimed that no one has in fact measured superluminal group velocities in barrier tunneling, and that the purported experimental verifications of superluminal velocities are misinterpretations of the data. The contention is on the exact physical nature of the group delay or phase time. The majority opinion is that the phase time is a transit time, so that superluminal tunneling follows naturally from Hartman effect. But recent thorough analyses have put this interpretation into question. This then calls for a different theoretical approach to quantum tunneling, an approach excluding explicit use of the phase time, to independently confirm the existence or non-existence of superluminal tunneling. This is where quantum arrival theories can come into play by considering quantum arrival in the transmitted channel. Since our theory holds for arbitrary interaction potential and arbitrary arrival point, and relevant quantities are computed via the spectral resolution of the time operator and the initial state alone, our theory allows us to investigate the existence or non-existence of superluminal barrier tunneling without the use of phase times.

Feasibility of an experiment: Trapping of ultracold atoms in lattice potentials (potentials produced by counter propagating lasers) is already common. This makes it possible to design a time of arrival experiments involving ultracold atoms under lattice potentials. Lattice potentials

are appropriate because they can be modeled by an analytic sinusoidal functions, which our theory can accommodate. It is conceivable that instead of trapping the atoms they can be prepared as projectiles under the influence of the lattice and time of arrival distribution measured at some predetermined arrival point. Preliminary investigation on the theoretical time of arrival distribution predicted by our theory for low energy Gaussian projectiles under analytic potentials gives a range of verifiable predictions such as lower than classical mean arrival times and discernible multiple distinct arrival times that maybe verified experimentally.

Assistant Professor: Eric Galapon

Students involved: Roland Caballar (PhD), Anthony Villanueva(PhD), Karen Ramirez(MS), Roberto Vitacol (PhD)

Subgroup 3 (High Energy Phenomenology)

Assistant Professor: Caesar Palisoc

Ongoing projects: 1. W boson pair production in ep scattering, 2. Charmonium and Jet Associated Production in positron-electron Collision

8) Three-Year Projection

In the next three years, the major tasks will be the completion of the transfer of the group to the New NIP Building, research supervision of 5 PhD students (2 from Subgroup 1 and 3 from Subgroup 2), and the development of the High Energy Phenomenology Group through student recruitment and skills development beginning in 2009, development of linkages with collaboration with local groups such as the Manila Observatory and Philippine astronomy Research Network (Subgroup 1) and with research groups in Spain and Germany (Subgroup 2). There will be a need to acquire more computers as the computing needs of the group are growing. Space will not be a problem for the next three years. It will be nice to recruit new PhD's during the three year period in areas where there are either no existing specialists or the specialist are about to retire (Condensed matter theory, Gravitation and astrophysics, field theory, strings), and in areas where additional supervisors are needed - one member of the group will be President of the Samahang Pisika ng Pilipinas in 2009-2010.. The expected intake of BS advisees from 2007 to 2010 will be 4 to 6 new BS students per year. Graduate students will be recruited mainly to compensate for BS graduates who do not go to graduate school. Research proposals will be written to address the anticipated funding needs.

Condensed Matter Physics Laboratory

CONDENSED MATTER PHYSICS LABORATORY SEMICONDUCTOR RESEARCH
GROUP
LABORATORY ANNUAL REPORT
January 2006 - May 2007

LISTS OF MEMBERS

Laboratory Advisers

Dr. Arnel Salvador
Dr. Armando Somintac

Students

Doctor of Philosophy in Physics
Alipio Garcia

Master of Science in Physics

Imee Rose Tagaca	<i>PCASTRD Scholar, UP Instructor 3</i>
Kristine Manibog	<i>PCASTRD Scholar, UP Instructor 3</i>
Cyril Sadia	
Josephine Garcia	
Karim Omambac	<i>PCASTRD Scholar</i>
Dyna Immaculate Garcia	<i>PCASTRD Scholar, ADMU Instructor</i>
Jennifer Anne Constantino	<i>PCASTRD Scholar</i>
Carlos Baldo III	<i>PCASTRD Scholar, UP Instructor 3</i>
Cherry May Mateo	<i>PCASTRD Scholar</i>
Michael Defensor	<i>Research Assistant (RA)</i>
Jasher Ibanez	
Joel Fernando	
Ramon delos Santos	<i>DOST-SEI Scholar</i>
Rengie Mark Mailig	<i>PCASTRD Scholar</i>

Bachelor of Science in Physics

Rafael Jaculbia
Jonathan Azares
Jorge Michael Presto
Fritz Christian Awitan
Maria Emma Villamin

Bachelor of Science in Applied Physics

Elizabeth Ann Prieto	
Ronel Roca	
Jamaica Palay	
Mae Agatha Tumanguil	
Jeremy Porquez	
Ryan Alentajan	<i>DOST-SEI Scholar</i>

Vernon Ali Dayawan

Thesis of students

Second Semester, AY 05-06

BS

Carlos F. Baldo III

cum laude, DOST-SEI Undergrad Scholar

“Fabrication and Characterization of Delta-doped InGaAs Pseudomorphic High Electron Mobility Transistor”

Jumar C. Cammayo

DOST-SEI Undergrad Scholar

“Fabrication and Characterization of Strained AlGaAs/GaAs High Electron Mobility Transistor (HEMT)”

Michael J. Defensor

“Fabrication of Enhancement and Depletion mode HEMT and pHEMT devices on the Same Respective Semiconductor Layers”

Laarnie G. Gatacelo

“Dependence of Two-Dimensional Electron Gas (2DEG) Density, Mobility and Scattering Mechanisms on the Donor Concentration in AlGaAs/InGaAs/GaAs Pseudomorphic Modulation-doped Heterostructures”

Cherry May N. Mateo

“Photoluminescence Measurements of MBE-grown GaAs hetero-epitaxial layer bonded to Si via Epitaxial Lift-off”

Cheena C. Oblepias

“Raman Scattering Study of $\text{In}_x\text{Ga}_{1-x}\text{As}$ Structures at Room Temperature”

MS

Aristotle M. Calamba

“Investigation of the energy levels of self-assembled InAs/GaAs dots”

First Semester, AY 06-07

BS

Ma. Loresa Y. Jarlego

“Fabrication and Characterization of Metal Semiconductor Field Effect Transistors (MESFET)”

MSE

John Vincent A. Misa

“Fabrication and Characterization of InGaAs/InAlAs Semiconductor structures Lattice Matched on (100) InP Grown via Molecular Beam Epitaxy”

MS

Valynn Katrine P. Mag-Usara

“Optical Spectra of InAs Quantum Dots in InGaAs/GaAs Quantum wells”

Second Semester, AY 06-07

Ph.D

Florencio D. Recoleta

PCASTRD Scholar

“Optical Time Resolved Photoluminescence Studies of Semiconductor Heterostuctures”

MS

Mariel Grace Dimamay

“Modeling the Photoluminescence Decay Response Characteristics of Oxide-Confined Vertical Surface-Emitting Lasers”

Casco, Ma. Frantessa T

"Molecular Beam Epitaxial Growth of InAs/InAlAs Quantum Wires on InP(001) Substrate

LISTS OF PUBLICATIONS

1. F.D. Recoleta Jr., J.N. Mateo, M.G.S. Dimamay, A.S. Somintac, E.S. Estacio and A.A. Salvador, “Photoluminescence decay characteristics of an oxide-confined vertical cavity surface emitting laser”, *Applied Physics Letters* (February 2006)
2. E. Estacio, A. Quema, R. Pobre, G. Diwa, C. Ponseca, S. Ono, H. Maurakami, A. Somintac, J. Sy, V. Magusara, A. Salvador and N. Saruhara, “ Below bandgap excited terahertz emission of optically pumped GaAs/AlGaAs multiple quantum wells”, *Journal of Photochemistry and Photobiology*, Vol 183 #3, pp 334-337 , 2006.
3. A.T. Garcia, F.R. Ramos, A.A. Salvador, C. Boothroyd, H.H. Kim, and E. Philpott, Tailoring the Emission Characteristics of Indium Arsenide Quantum Dots by Varying the Arsenic Pressure, *Proceedings of the 1st International Workshop on Functional Materials and 3rd International Workshop on Nanophysics and Nanotechnology* (Halong, Vietnam December 2006)
4. C.M.N. Mateo, A.T. Garcia, F.R.M. Ramos, K.I. Manibog and A.A. Salvador, “Strain-induced Splitting of the Valence-band in the Epitaxially lifted off GaAs on Silicon” *Journal of Applied Physics* 101, 073519 (April 2007)

2006 SPP Proceedings

1. V.K. Mag-usara, A.S. Somintac and A.A. Salvador, “Optical Spectra of InAs Quantum Dots in InGaAs/GaAs Quantum Wells”, *24th SPP Proceedings, oral presentation* (Davao City, Philippines, October 2006).
2. J.V. Misa, M.F. Casco, V. K. Mag-usara and A. A. Salvador, “Fabrication and Characterization of InAlAs/InGaAs PIN structures Lattice-matched to (100) InP grown via Molecular Beam Epitaxy”, *24th SPP Proceedings, poster presentation* (Davao City, Philippines, October 2006).

- 3 C.M.N. Mateo, A.T. Garcia, F.R.M. Ramos and A.A. Salvador, "Strain-induced valence-band splitting in the Epitaxially lifted off GaAs on Silicon", *24th SPP Proceedings, poster presentation* (Davao City, Philippines, October 2006)

LISTS OF CONFERENCES

1. M. F. Casco, J. V. Misa, M. Defensor, A. Garcia and A. Salvador, "Surface Structure Dependent Growth of InAs/InAlAs Quantum Wires on InP(100) Substrate" *Intl. Conf. on Materials for Advanced Technologies* (July 2007)
persons attended: Ma. Frantessa Casco and Alipio Garcia
date: July 1-6, 2007
venue: Suntec Singapore International Convention & Exhibition Center, Singapore
2. J. V. Misa, M. F. Casco, A. Garcia and A. Salvador, "Control of the Surface Morphology of MBE-Grown $\text{In}_x\text{Al}_{1-x}\text{As}$ and $\text{In}_x\text{Ga}_{1-x}\text{As}$ Layers on InP Via Manipulation of In Content" *Intl. Conf. on Materials for Advanced Technologies* (July 2007)
person attended: Ma. Frantessa Casco and Alipio Garcia
date: July 1-6, 2007
venue: Suntec Singapore International Convention & Exhibition Center, Singapore

PROJECTS

Program for the Development of Devices and Integrated Circuits Suitable for RF Applications: Period: October 2005 – December 2006 (DOST/PCASTRD)
Amount/Fund: PhP 8,020,372.80

This program aimed to produce GaAs-based field effect devices and millimeter wave integrated circuits (MMICs) suitable for RF applications. For the first phase of the project, the goal was to establish the protocols for the growth, fabrication and characterization of transistors and passive components. The wafers were grown by molecular beam epitaxy (MBE) and fabricated into High Electron Mobility Transistors (HEMTs) using the facility set up by the group. The new photolithographic masks used for the devices were specifically designed for RF-testing. The wafer and device optical and electrical characteristics were measured in-house, while their RF characteristics were extracted using the Network Analyzer facility (MicroLab Group, UP EEE Department) as potential calibration data for future devices. The Reactive Ion Etcher setup (Shono Laboratory, NEC) was also repaired for future use in high yield 1- μm gate FET device and airbridge fabrication.

In addition to testing and calibration of the transistor devices, the group also explored other properties of GaAs-based layers. Induced strain in GaAs was observed using the Epitaxial Lift-Off (ELO), with changes in the heavy-hole and light-hole splitting observed through low temperature PL experiments. Variation in the growth parameters for quantum dots (QDs) was done to tailor their emission wavelengths. QDs were also incorporated into quantum wells (QWs) and phonon assisted optical transitions were observed in the electroluminescence spectra of these structures. Lattice-matched growth of InP-based devices was also optimized for future

optoelectronic applications. It was found that the formation of InAs quantum wires or quantum dots on InP can be controlled in situ by changing the surface morphology of the InAlAs layer where the quantum wires or dots are grown.

