2022 Annual Report
Instrumentation Physics Laboratory
National Institute of Physics
www.nip.upd.edu.ph/ipl
01 January - 31 December 2022

Submitted by:

Caesar Saloma, PhD
Program Coordinator, Instrumentation Physics Program (IPL)
Date: 11 April 2023

I. Executive Summary

A. IPL Faculty and Research Teams (5)

IPL Team One	(Leader: Professor Caesar Saloma)
Video and Image Processing Group	(Professor Maricor Soriano)
Sync-Bio-Optics Group	(Professor Giovanni Tapang)
CX Team	(Professor May Lim)
Complexity Group	(Dr Johnrob Bantang)

B. Members as of 13 February 2023

PhD Faculty: 5
Student Members: 57
- PhD Physics (8)
- MS Physics (8)
- BS Applied Physics and BS Physics (BS4: 29, BS3: 12)

C. Graduates in 2022

- PhD Physics: 0
- MS Physics: 6
- BS Applied Physics: 7
- BS Physics: 5

D. Research Highlights: Peer-Reviewed Technical Publications

1. SCI and SCOPUS Indexed Journals: 5
2. Philippine-based Journals (Indexed in SCI and/or SCOPUS): 2
3. International conference presentations (with full paper in conference proceedings): 1
4. International conference presentations (without full paper): 0
5. Local conference presentations: with full paper): 15
6. Chapters in books: 0
7. Patents: 0

8. NIP funded projects: 4
9. Non-NIP funded projects: 4
10. Major equipment acquired/upgraded: 0
11. Research travels abroad (Outbound): 0
12. Visiting researchers: 0
13. MoAs entered with local or foreign institutions and other external collaborators: 0

E. Extension Work Highlights

1. Extension Work Activities: 5
2. Research Interns/OJT's (Non-NIP), for trainings held at NIP: 0

F. Development of PhD Applied Physics (Instrumentation Physics Concentration)

G. Main Challenge and its Proposed Solution

H. Awards or Accreditations Received/Positions of Responsibility Held and Other Accomplishments

1. National awards or accreditations received, positions of responsibility held: 0
2. International awards or accreditations received, positions of responsibility held: 0
3. Other accomplishments: 0

II. Technical Report

A. Research Group Activities

The Instrumentation Physics Laboratory (IPL) aims to provide all qualified PhD, MS and BS students of the National Institute of Physics (NIP) with an enabling and nurturing environment that allows them to pursue their research projects successfully in fulfillment of their PhD dissertation, MS or BS thesis degree requirement.

Each IPL student-member is assigned an IPL PhD thesis supervisor who will direct his or her thesis research and guide his/her steady development as a young scientist. To become a student-member of IPL an applicant must be a *bonafide* NIP student during the time of application and he or she must successfully complete an in-house application process.

The IPL application period usually starts in March and culminates in June of each fiscal year. Successful applicants are admitted in the immediate first semester of the incoming academic year. They are expected to do their research work for a minimum of two years.

The IPL has consistently presented and published the research results of its faculty and students in technical conferences and peer-reviewed scientific journals over the years since the late 1980's. Its student-alumni are now occupying critical research and managerial positions in the academic and research institutions in the public and private sector all over the world.

B. IPL Organization as of 13 February 2023

Table 1. IPL Membership

IPL Research Team	PhD Faculty (5)	Students (57)			
		PhD	MS	BS4	BS3
IPL Team One	C. Saloma	2	1	4	2
Video and Image Processing	M. Soriano	1	1	10	3
Sync.Bio.Optics Group	G.Tapang	3	0	4	2
CX Team	M .Lim	2	1	4	3
Complexity Science Group	J. Bantang	0	2	7	3
TOTAL	**5**	**8**	**10**	**29**	**13**

B.1. PhD Faculty (5)

Professors:

Caesar Saloma PhD
Maricor Soriano PhD
Giovanni Tapang PhD
May Lim PhD

Associate Professor

Johnrob Bantang PhD

IPL Faculty	Administrative Position held in 2022
Dr Tapang	Dean, College of Science, UP Diliman
Dr Lim	Deputy Director for Research and Extensions, NIP
Dr Bantang	Director, Computational Science Research Center, College of Science
Dr Saloma	Program Coordinator, Instrumentaton Physics, NIP

B.2. Student Members

- **Graduate Students (16)**

Research Team	Research Supervisors (5)	Students (16)	
		PhD (8)	MS (8)
IPL Team One	C. Saloma	Roland Albert Romero Anthony Fox	Hannah Christina Arjonillo
Video and Image Processing	M. Soriano	Mark Jeremy Narag	Rene Principe
Sync.Bio.Optics Group	G.Tapang	Gabriel Sison Wynn Dunn Improso Jamika Roque	
CX Team	M. Lim	Chester Balingit Louie Rubio	Kelvin Bartilad Kenneth Leo Olyn Desabelle
Complexity Science Group	J. Bantang		Reinier Xander Ramos Matthew Banaag Carlouis Astudillo

- **Undergraduate Students (41)**

Research Team	Research Supervisors (6)	BS Applied Physics/ BS Physics (41)
IPL Team One (6)	C. Saloma	BS4 (4): Jocam Joshua Camara, Nathan Linus Sison, Francis Jether Siao, Mikkel Dorado BS3 (2): Elijah Joves, Justin Ember Mutia
Video and Image Processing (13)	M. Soriano	BS4 (10): Abdel Sinapilo, Julia Esteibar, Marion Fiorenzo Miranda, Bret Jarod Ordono, Aldrin Urbi, Janne Noelle Gamale, Ivan Richmond Jumawan, Christene Necesario, Geuel Treasure Quizon, Nicholas William Chai BS3 (3): Julian Christopher Maypa, Johnenn Manalang, Jonabel Eleanor Baldres
Sync.Bio.Optics Group (6)	G.Tapang	BS4 (4): Mariau Beltran, Arabelle Ocampo, Carl Justin Miranda, Giles Geonzon BS3 (2): Robert Roland Matthew Bagnes, Gremyco Estoista
CX Team (7)	M .Lim	BS4 (4): Mark Badua, Daniel Daiz, Lorenzo Joquiño, Josoel Sabile BS3 (3): Edneil Soriano Jr., Dana Sam Apigo, Mark Joseph William Ducusin
Complexity Science Group (9)	J. Bantang	BS5 (1): Charles Fernan BS4 (6): Sarakiel Rayco, Karl Lorenzo Aleta, Jano Peria, Glydel Fornan, Isabelle Jomuela Pelo, Jaslyn Marie Teope BS3 (2): Clarence Ioakim Sy, Arlson Steven Ibias

- **Research Collaborators (3)**

Dr. Atchong Hilario (DOST Project Researcher with Dr Soriano)
Dr Andrew Bañas (DOST Project Researcher with Dr Soriano)
Dr Cynthia Palmes-Saloma (PGC and NIMBB)

C. Successful Mentoring

List of Graduates in 2022
Period: 2nd semester AY 2021-2022, Midyear 2022, 1st semester AY 2022-2023
PhD Physics (0), MS Physics (6), BS Applied Physics (7) and BS Physics

Program	Name	Thesis Title	Adviser(s)
MS Physics	Cusi, Adrielle Theresa	Emergence of Scaled Brownian Motion Due to Elastic Probe-to-Probe Collisions	Caesar Saloma (CS)
MS Physics	Cervantes, Kristen Joyce	Information flow in wireless sensor networks	Giovanni Tapang (GT)
MS Physics	Pangilinan, Patricia	aHOTs: Augmented Holographic Optical Tweezers with Deep Learning for Rapid 3D Autofocusing	GT
MS Physics	Medrana, Micholo Lanz	Entropy and Sentiment-Based Methods for Survey Analysis	May Lim (ML)
MS Physics	Jalandoni, Rian Fritz	Numerical Analysis of Cancer Growth on a Spherical Surface and 3D Continuous Space	Johnrob Bantang (JB)
MS Physics	Lagman, Lanz Anthonee	Spatial Network Methods for the Characterization of Open Clusters	JB
BS Applied Physics	Magsigay, Christian Jay	Modified Inelastic Bouncing Ball Model for Vertically Vibrated Monodisperse Grains: Transmissibility and Its Dependence on Grain Properties	CS
BS Applied Physics	Movido, Beatriz	Using Network Analysis to Assess and Plan for the Robustness of the MERALCO Power Grid	CS
BS Physics	Recentes, Martin John V.	Network Approach for Determining the Impact of COVID-19 on Healthcare System Dynamics of Tagaytay City	CS
BS Applied Physics	Malipol, Chae Ann	Smartphone-Based Macro Photography for Measuring the Size Distribution of Sand Grains	Maricor Soriano (MS)
BS Physics	Valdellon, Carl Terence	Nature-Inspired Optimization of Power Allocation Among Light-Emitting Diodes for Uniform Illumination	GT
BS Applied Physics	Vergara, Stephanie Anne	Investigating the Effects on the Intensity of Varying Distances of a Two-Mirror Segmented System	GT
BS Physics	Desabelle, Olyn	Ride-Hailing Driver Behavior in Single-Lane and Multi-Lane Traffic	ML
BS Applied Physics	Jose, Elmo Domino	Evaluating Geospatial Efficiency of Facilities Through Direchlet Tessellation Areas and Centroid Proximity Analysis	ML
BS Applied Physics	Bagasala, Maria Tisha	Dynamics of Brain Neurons Using a One-Dimensional Probabilistic Cellular Automata Model	JB
BS Physics	Crusina, Earl John	Scale-Free Network in 2D Polar Coordinate System Generated via Random Geometric Network Algorithm Modified by Task Fragmentation Model	JB
BS Physics	Roxas, Sean Iven	Configurational States of a Quasi-2D Heap of Conducting Disks Using Low-Cost Experimental Setup and Image Processing	JB
BS Physics	Ching, Juliana Maxine	Multi-frequency fringe projection profilometry: Virtual and physical three-dimensional imaging	Ritz Aguilar

Table 3. Summary of Graduates in 2020

Degree Program	1st Semester AY 2021-2021	2nd Semester AY 2021-2022	Total
PhD Physics	0	0	0
MS Physics	1	3 + 2 (Midyear 2022)	6
BS Applied Physics	2	9	11
Total	**3**	**14**	**17**

D. Research Highlights (publications/patents/research travels)

D.1. Publications in SCI-Indexed Journals (5)

1. RA Aguilar, N Hermosa and M Soriano, "3D Fourier ghost imaging via semi-calibrated photometric stereo," Appl Opt 61(1), pp. 253-261 (2022), https://doi.org/10.1364/AO.447910
2. DA Bruzon, AP De Jesus, CD Bautista, IS Martinez IS, MC Paderes and GA Tapang, "Enhanced photo-reactivity of polyanthracene in the VIS region", PLoS ONE 17(7 July 2022),e0271280https://doi.org/10.1371/journal.pone.0271280
3. MC Paderes, MJ Diaz, CA Pagtalunan, DA Bruzon and GA Tapang, "Photo-Controlled [4+4] Cycloaddition of Anthryl-Polymer Systems: A Versatile Approach to Fabricate Functional Materials," Chemistry - An Asian Journal 17(12), e202200193 (2022) https://doi.org/10.1002/asia.202200193
4. JL Gan, GA Tapang and C Española, "First description of the breeding biology of the North Philippine Hawk-Eagle (Nisaetus philippensis)," The Wilson J. of Ornithology, 134(1):77-85 (2022). https://doi.org/10.1676/21-00018
5. RXA Ramos, JC Dominguez and JY Bantang, "Young and Aged Neuronal Tissue Dynamics With a Simplified Neuronal Patch Cellular Automata Model," Front. Neuroinform. 15 – 2021 (2022) https://doi.org/10.3389/fninf.2021.763560

D.2. Other publications in SCOPUS-Indexed journals (2)

1. C. Saloma, "Going back" Philip J Sci 151 (2), pp vii – viii (April 2022)
2. C. Saloma, "Three PH Laws for Ethical Conduct of Scientific Research" Philip J Sci 151 (4), pp vii – ix (August 2022)

D.3. International conference presentations (with full paper in print proceedings): 1

P. G. Pangilinan, W. D. G. D. Improso, and G. A. Tapang, "Deep learning augmented holographic optical tweezers for 3D autofocusing," Digital Holography and 3-D Imaging 2022, D. Chu, J. Park, C. Cheng, and P. Ferraro, eds., Technical Digest Series (Optica Publishing Group, 2022), paper W5A.44. Joint Poster Session II: Virtual (W5A)

D.4. International conference presentations (without full paper): 0

D.5. Conference presentations with full paper in conference proceedings: 15

1. MA Dorado, CJP Magsigay, JAF Balista and CA Saloma, "Time of flight of intruder in a vertically vibrated granular material: Brazil Nut Effect and its reverse," Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, Art. ID SPP-2022-2G-04. https://proceedings.spp-online.org/article/view/SPP-2022-2G-04
2. MJV Recentes and CA Saloma, "Measuring social behavior changes in Tagaytay City during the COVID-19 pandemic," Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, Art. ID SPP-2022-3C-07. https://proceedings.spp-online.org/article/view/SPP-2022-3C-07
3. BD Movido and CA Saloma, "Robustness of MERALCO network against incidental substation shutdowns and power-line disconnections," Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, Art. ID SPP-2022-3G-07. https://proceedings.spp-online.org/article/view/SPP-2022-3G-07
4. CJP Magsigay, JAF Balista and CA Saloma, "Modified inelastic bouncing ball model for vertically vibrated granular materials: Transmissibility and its dependence on particle diameter," Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, Art. ID SPP-2022-3G-04. https://proceedings.spp-online.org/article/view/SPP-2022-3G-04
5. ATD Cusi and CA Saloma, "Scaled Brownian motion as transient behavior of individual particle diffusion due to multiple probe-to-probe collisions," Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, Art. ID SPP-2022-3G-02. https://proceedings.spp-online.org/article/view/SPP-2022-3G-02
6. RL Principe and MN Soriano, "Revisiting the disaster impact and recovery in the aftermath of Typhoon Yolanda using Black Marble nighttime lights," Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, SPP-2022-3C-04 (2022). URL: https://proceedings.spp-online.org/article/view/SPP-2022-3C-04.
7. DBC Lao and MN Soriano, "Investigating Chladni patterns through a tabletop point-driven Chladni setup: Simulations and experiments, Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, SPP-2022-3D-04 (2022). URL: https://proceedings.spp-online.org/article/view/SPP-2022-3D-04.
8. MJG Narag, RL Principe, and MN Soriano, "Reconstructing the source modulated camera sensitivity of smartphone from principal component-driven Wiener estimation," Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, SPP-2022-PA-08 (2022). URL: https://proceedings.spp-online.org/article/view/SPP-2022-PA-08.
9. MLD Badua, MG Cayetano and MT Lim, "Pre-ECQ versus ECQ: a comparison of PM1 measurements," Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, SPP-2022-3F-05 (2022). URL: https://proceedings.spp-online.org/article/view/SPP-2022-3F-05.
10. ACM Balingit and MT Lim. "Temporal trends in the interaction network formed using the public Twitter stream," Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, SPP-2022-3G-06 (2022). URL: https://proceedings.spp-online.org/article/view/SPP-2022-3G-06.
11. OD Desabelle, DN Dailisan and MT Lim, "Ride-hailing driver behavior in single-lane traffic," Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, SPP-2022-3G-05 (2022). URL: https://proceedings.spp-online.org/article/view/SPP-2022-3G-05.

12. LJM Rubio and MT Lim, ”Estimating nutrient content variety from food imports data,” Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, SPP-2022-PB-20 (2022). URL: https://proceedings.spp-online.org/article/view/SPP-2022-PB-20.
13. RFD Jalandoni and JY Bantang, “Physical and mechanical effects of cancer growith in 3D volume, Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, SPP-2022-2F-06
14. JMM Teope and JY Bantang, “Classification of group composition based on diversity-cohesiveness space, Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, SPP-2022-PB-16.
15. GD Fornan and JY Bantang, Optimizing the spatial point sampling for population migration dynamics modeling in Siargao Island, Philippines,” Proc. 40th Samahang Pisika ng Pilipinas Physics Conference, 19-21 October 2022, SPP-2022-PB-18.

D.5. Book Chapter (0)

D.6. Patents (0)

D.7. NIP Funded Projects (4)

1. Saloma, C. Emergence of anomalous diffusion processes in an ensemble of colliding microscopic Brownian particles, NIP Research Project (1 January - 31 December 2022)
   Project Cost: PhP 105,600.00
2. Soriano, M. 3D Imaging in a Small Cavity, NIP Research Project (1 January - 31 December 2022)
   Project Cost: PhP 105,600.00
3. Lim, M. Analysis of interaction in online social network, NIP Research Project (1 January - 31 December 2022)
   Project Cost: PhP 105,600.00
4. Bantang, J. Dynamical characterization of interacting complex systems, NIP Research Project (1 January - 31 December 2021)
   Project Cost: PhP 92,400.00

D.8. Non-NIP Funded Projects (4)

1. Operating Room Programmable Electronically Targeted Active Lighting System (OR PETALS)
   Funding Agency: DOST - PCHRD
   Year 2 Funding (March 16, 2022 - March 15, 2023): Php15,463,961.25
   Collaborating Agencies: NIP UPD, UPM College of Medicine
   Project Leader: Dr. Catherine S. Co (UPM-College of Medicine)
   Project Co-investigator: Dr. Giovanni A. Tapang (UPD - National Institute of Physics)

2. Field-Integrated Novel Diagnostics - Microfluidic Diagnostic Assay (FIND-MIDAS)
   Funding Agency: DOST - PCHRD
   Extension Period: September 1, 2021 to August 31, 2022.
   Project Leader: Dr. Giovanni A. Tapang
   Funding: Php 24,932,536.18

3. VISSER::REFRESH (Extension)
   Funding Agency: DOST-PCIEERD

Period: October 1, 2021 - September 30, 2022
Project Leader: Dr. Giovanni A. Tapang
Funding: Php 8,571,920.00

4. CATFish
Funding Agency: DOST-PCIEERD
Period: September 1, 2019 -
Project Leader: Dr. Giovanni A. Tapang
Funding: Php 4,999,576.96

D.9. Major Equipment Acquired/Upgraded (0)
D.10. Research Travels Abroad (Outbound) (0)
D.11. Visiting Researchers (0)
D.12. Memoranda of Agreement entered into with local or foreign institutions and other external collaborators (0)

E. Extension Work Highlights

Caesar Saloma
Editor-in-Chief (2011 – present)
Philippine Journal of Science
Publisher: Department of Science and Technology
www.philjournalsci.gov.ph

Maricor Soriano
Technical Panel in Photonics (2011 - present)
DOST-PCIEERD

Giovanni Tapang
Early Warning System Specialist (January 8, 2020 - December 31, 2022)
PlanManila2030
City of Manila
City of Manila, UP Resilience Institute

May Lim
Academic Editor (October 2020 – present)
Complexity
www.hindawi.com/journals/complexity/editors

Johnrob Y. Bantang
1st Vice President (January - December 2022)
Samahang Pisika ng Pilipinas

F. Development of PhD Applied Physics (Instrumentation Physics Concentration)

The IPL Faculty started on 8 February 2021 to develop the proposed curriculum for the PhD Applied Physics (Instrumentation Physics Concentration) degree program. They held regular (almost weekly) meetings. On 8 October 2022 the draft proposal for the institution of the Doctor of Philosophy (Applied Physics) [Instrumentation Physics Concentration] was crafted with inputs from Dr Percival Almoro (Photonics Research Laboratory), Dr Nathaniel Hermosa (PRL) and Dr Ian Vega (GANAP).

The 88-page proposal consists of the following sections as prescribed by the University: I. Academic Merit, II. Brief Description of the Program, III. Needs Assessment, IV. Budget and Effect on Resources, and V. Projected Income. The latest version of the proposal was presented by Professor Saloma to the NIP Graduate Committee on 6 October 2022.

Getting a PhD degree is the best route towards becoming an independent and competent scientist as well as a successful supervisor and mentor of future PhD and MS students in science, technology, engineering, and mathematics (STEM). The PhD Applied Physics (Instrumentation Physics Concentration) program proposed by the National Institute of Physics (NIP), College of Science (CS), University of the Philippines (UP) Diliman if duly approved, will be the first of its kind in the country.

Applied Physics with concentration in Instrumentation Physics, deals with the application of established physical principles and theories allowing for a deeper exploration of novel physical phenomena through the development of advanced measurement techniques that improve the accuracy, precision, and efficiency of signal sampling and data gathering, information processing, and signal recovery. Cutting-edge scientific research and development is not possible without access to accurate and precise measurement techniques.

The availability of a PhD Applied Physics program will increase the number of Filipino STEM PhD graduates that is produced by NIP which has been offering the BS Applied Physics (Instrumentation Physics Concentration) and BS Applied Physics (Materials Physics Concentration) since the middle of the 1980's. The NIP has been offering the BS Physics, MS Physics, and PhD Physics degree programs at a much earlier time.

Figures 1 and 2 present the graduate production of the four existing academic programs offered by the NIP (from AY 1985 – 1986 to AY 2021-2022): BS Applied Physics, BS Physics, MS Physics and PhD Physics.

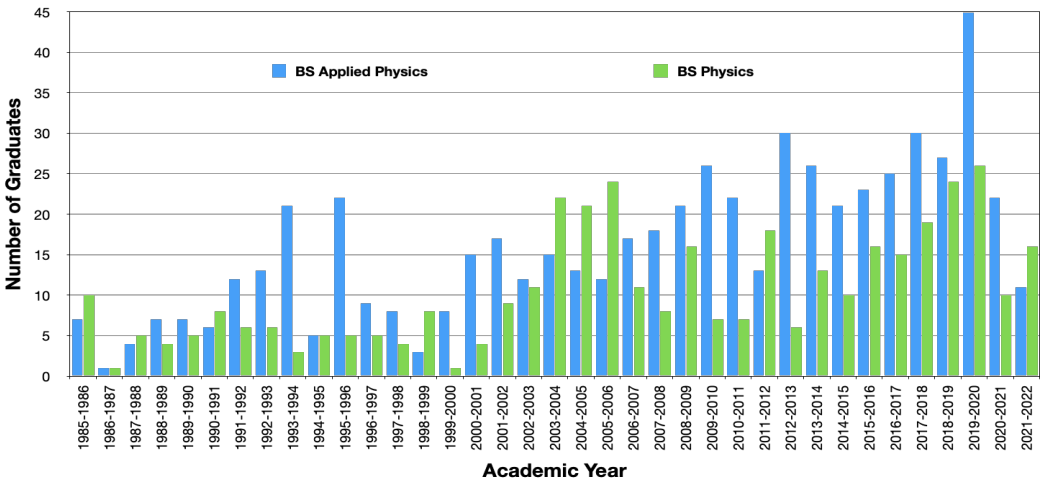

Figure 1. Number of BS Applied Physics and BS Physics graduates produced per year from AY 1985-1986 to AY 2021-2022. Statistical comparison of graduates: BS Applied Physics: 621 (65.9% since AY 2005-06; 24.47 ± 8.1 p.a.), BS Physics: 398 (64.1%; 14.5 ± 6.3 p.a.). The Instrumentation Physics Laboratory produced 42.44% (40) of BS Applied Physics graduates (94) in FY 2018-2020 (three years).

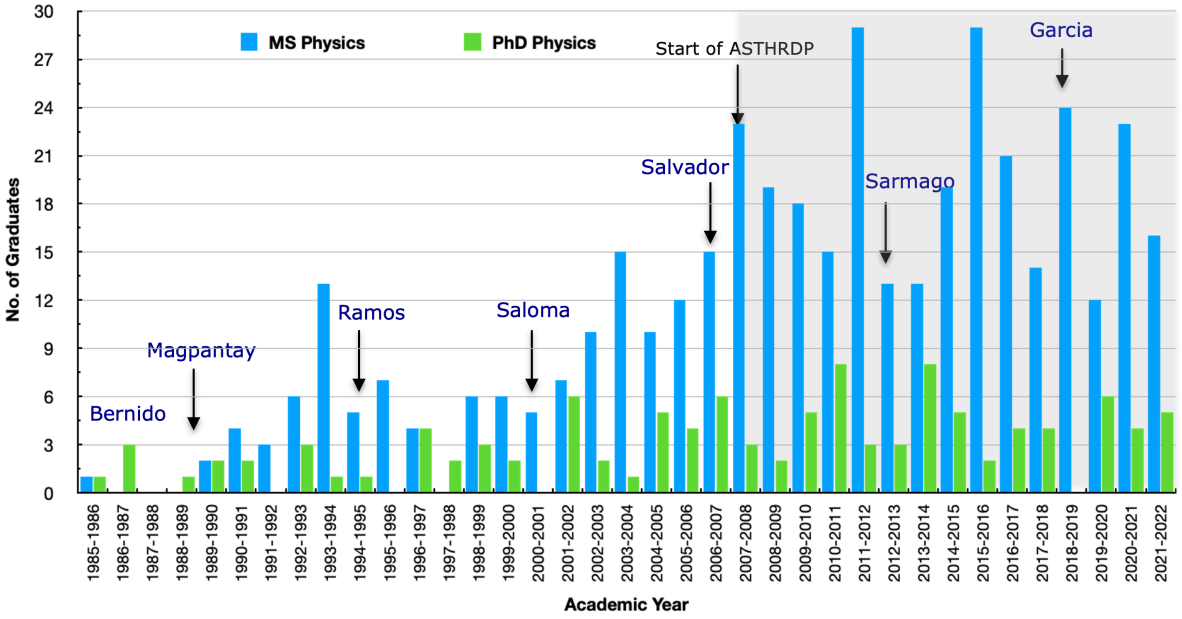

Figure 2. Number of PhD Physics graduates produced per year from AY 1985-1986 to AY 2021-2022. Statistical comparison of graduates: PhD Physics: 1 (64.8% produced from AY 2005-06 onwards; 4.2 ± 2.1 p.a.) and MS Physics: 403 (74.19%; 18.5 ± 5.6 p.a.). Graduate ratio since AY 1985-1986 (includes PhD and MS graduates with non NIP BS degrees): 8.86 BS: 3.77 MS: 1 PhD. Graduate ratio since AY 2005-2006:8.82 BS: 4.38 MS: 1 PhD.

Figures 3 illustrates the potential of the proposed straight PhD Applied Physics program in terms of the number of BS graduates with the necessary academic and research preparation to handle the requirements of the said doctoral program. Figures 4 summarizes the core (18 units) and other required courses (6 units) featured. Other academic requirements for the completion of the PhD degree include: Passing the comprehensive examination and candidacy examination, approval of dissertation research proposal, publication of dissertation research result in a SCI-indexed peer-reviewed journal and successful defense of dissertation research.

Degree Program	Graduates from AY 1985-86 to AY 2019-20 (35 years)	Graduates with BS Applied Physics degrees from NIP	Graduates from AY 2005-06 to AY 2019-20 (15 years)	Graduates with BS Applied Physics degrees from NIP
BS Applied Physics	561	N/A	356 (63.46% of total)	N/A
BS Physics	363	N/A	220 (60.61%)	N/A
MS Physics	380	122 (32.1%)	276 (72.63%)	108 (39.13%)
PhD Physics	102	35 (34.31%)	63 (61.76%)	33 (52.38%)

Figure 3. Potential of PhD Applied Physics Program. Only 10% of BS Applied Physics graduates (33 out of 356) obtained a PhD degree from NIP in the last 15 years ending AY 2019-2020. From AY 1990-91 to AY 2019-20, CS produced 376 PhD graduates (12.2 ± 3.8 p.a.) with NIP contributing 25.26% (95; 3.3 ± 2.5 p.a.). CS is offering a total of ten (10) PhD programs as of AY 2019-2020.

Core Courses (Total: 18 units @ 3 units per course)	
Applied Physics 215	Computational Methods for Applied Physics
Applied Physics 221	Physics of Continuous and Granular Media
Applied Physics 241	Applied Quantum Mechanics and Quantum Optics
Applied Physics 251	Physics of Complex Systems
Applied Physics 265	Advanced Fourier Optics
Applied Physics 281	Modern Instrumentation Physics

Other Required Courses (Total: 6 units)		
Applied Physics 201.1	(1 u)	Ethical Conduct in Applied Physics Research
Applied Physics 201.2	(1 u)	Latest Trends in Applied Physics Research.
Applied Physics 210*	(1 u)	Research Practicum
Applied Physics 296	(1 u)	Graduate Seminar
* To be taken three (3) times during midyears		

New Electives	
Applied Physics 267	Ultrafast Nonlinear Optics
Applied Physics 286	Multidimensional Signal Processing I
Applied Physics 287	Multidimensional Signal Processing II

Figure 4. Course titles in the proposed straight PhD Applied Physics (Instrumentation Physics Concentration) curriculum. Other academic requirements include: Passing the comprehensive examination and candidacy examination, approval of dissertation research proposal, publication of dissertation research result in a SCI-indexed peer-reviewed journal and successful defense of dissertation research.

G. Main Challenge and it Proposed Solution

The primary challenge of IPL and NIP in 2023 will be securing the approval of the University for the offering of a degree in PhD Applied Physics (Instrumentation Physics Concentration) program. The process for approval of the new PhD degree program and its proper implementation is tedious and would require academic vision, technical competence and experience as well as collective patience on all parties concerned.

A PhD Applied Physics program is urgent and long overdue not only for UP but for the whole country. The BS Applied Physics program produced its first batch of graduates in AY 1985-1986 and the program has been its the main producer of BS graduates in NIP since AY 2005-2006 (see Figure 1).

The offering of a PhD Applied Physics Program is crucial in accomplishing the strategic goal of producing more PhD graduates from NIP. Since AY 2005-2006, it has produced only one PhD Physics graduate for every 8.82 BS and 4.38 MS graduates, respectively (see Figure 2). This relatively low BS-to-PhD graduate turnover ratio has to be improved in order to utilize the pool of talented and well-trained BS Applied Physics graduates produced each academic year.

The Philippine Higher Education System only produces about a hundred PhD graduates per year in all areas of science, technology, engineering and mathematics. In contrast, it produces 1,532.55 new lawyers, 1,924 (period: 2000 - 2019) certified public accountants and 2,875 (2014 - 2016) new medical doctors per year. For the 2020 and 2021, a total of 8, 241 examinees (passing rate: 72.26%) passed the bar.

I. Awards or Accreditations Received / Positions of Responsibility Held

1. Dr. Tapang, Dean, College of Science, UP Diliman
2. Dr. Bantang, Director, Computational Science Research Center, College of Science
3. Dr. Lim, Deputy Director for Research and Extension, NIP
4. Dr. Saloma, Editor-in-Chief, Philippine Journal of Science

III. Photos, ISI/SCI Publications and Other Appendices

Figure 2. IPL PhD Faculty (left to right): C. Saloma, M. Soriano, M. Lim, G. Tapang, J. Bantang and RA Aguilar

END.