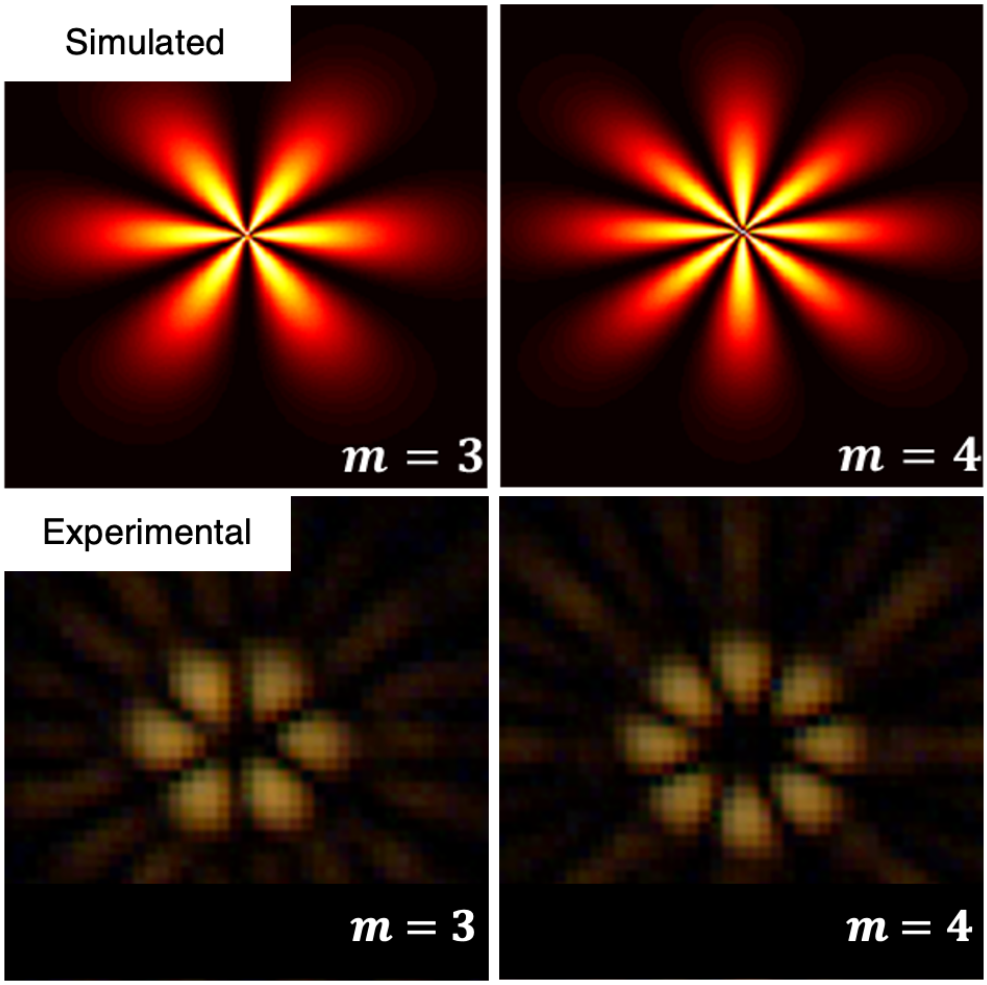


# Annual Report 2020
# Photonics Research Laboratory

Prepared by

Nathaniel P. Hermosa, PhD
Program Coordinator
(August to December, 2020)
Photonics Research Laboratory

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University Research Associate 1
Photonics Research Laboratory

Submitted: January 26, 2021

Contents

# 1. Executive Summary

## 1.1. Activities of the research group

### 1.1.1. Organization

| | | |
|---|---|---|
| Regular members | | 3 |
| Adjunct member | | 1 |
| Student members | | 30 |
| | PhD students | 10 |
| | MS students | 3 |
| | MSE students | 2 |
| | BS students | 15 |
| Apprentices | | 0 |
| | Total | 34 |

### 1.1.2. Mentoring

| | Number of graduates |
|---|---|
| BS Physics | 4 |
| BS Applied Physics | 7 |
| MS Physics | 1 |
| MS MSE | 0 |
| PhD Physics | 0 |
| Total | 12 |

## 1.2. Research highlights

| | |
|---|---|
| International peer-reviewed journals | 3 |
| Local peer-reviewed journals | 0 |
| International conference papers | 1 |
| International conference presentations | 7 |
| Local conference papers /presentations | 27 |
| Other invited talks | 3 |
| Chapter in books | 0 |
| Patents | 0 |

| | |
|---|---|
| NIP funded projects | 3 |
| Non-NIP funded projects | 3 |
| Major equipment acquired/ upgraded | 0 |
| Research travels abroad | 0 |
| Visiting researchers | 0 |
| MOA's entered with local and foreign institutions | 0 |

1.3. Extension work highlights

| | |
|---|---|
| Extension work activities | 13 |
| Research interns/ OJT's for training held at NIP | 1 |

1.4. Main challenges encountered and proposed solutions

1.5. Awards or accreditations received/ positions of responsibility held and other accomplishments

| | |
|---|---|
| National awards or accreditation received, positions of responsibility held | 0 |
| International awards or accreditations received, positions of responsibility held | 1 |
| Other accomplishments | 2 |

## 2. Technical Report

2.1. Activities of the research group

- The Photonics Research Laboratory has 34 research members. The group helped graduate 11 BS students, and 1 MS student. It also welcomed 6 new student members.
- The group had published 3 ISI/ Scopus-indexed papers.
- The group had 0 research-related travels abroad due to the 2019 novel coronavirus disease (COVID-19) pandemic.
- The group continue to host student from different high schools and universities in the Philippines.
- Two graduates of AY 2019 – 2020 received special awards from NIP.
- Dr. Percival Almoro resigned as the Program Coordinator because of his appointment as Director of the Office of International Linkages Diliman. Dr. Nathaniel Hermosa was assigned as the Program Coordinator for the rest of Dr. Almoro's term.
- Dr. Almoro is the President of the Samahang Pisika ng Pilipinas this year.
- Dr. Almoro continues to be a Topical Editor for Applied Optics.

### 2.1.1. Organizations

#### 2.1.1.1. Group members

Regular members (3)

1. Almoro, Percival
2. Garcia, Wilson
3. Hermosa, Nathaniel II

Adjunct member (1)

1. Dasallas, Lean

Student members (30)

PhD students (10)

1. Abregana, Timothy Joseph (P6)
2. Banguilan, Dina Grace (P2)
3. Binamira, Jonel (P2)
4. Buco, Christian (P1)
5. Cabanilla, Jayson (P2)
6. De Mesa, Joseph (P5)
7. Emperado, Rommil (P4)
8. Miranda, Jessa Jayne (P3)
9. Olaya, Cherrie May (P4)
10. Onglao, Mario III (P4)
11. Zambale, Niña Angelica (P2)

MS students (3)

1. Pablico, Dennis Angelo (M3)
2. Revilla, Miguel (M2)
3. Tabuzo, Rigil (M2)

MSE students (2)

1. Sagisi, Jenny Lou (P4)
2. De Mata, Joy Kristelle (P2)
3. Operaña, Jared (M1)

BS Applied Physics students (8)

1. Gloria, Gelli Mae (B5)
2. Manuel, Janelle (B5)
3. Ofina, Edrien Dominick (B5)
4. Parales, Ares Amable (B6)
5. Tinte, Bienica Yzabelle (B5)
6. Hermosa, Christian Robic (B3)
7. Ambrioso, Benjamin (B3)
8. Grefal, Jess Rudyll (B3)

BS Physics students (7)

1. Jamilarin, Roger (B5)
2. Lorenzo, Joshua Cesar (B7)
3. Suelto, Nathan (B6)
4. Valdeavilla, Charlyn (B6)

5. Sarayan, Juan Gabriel (B4)
6. Cabalar, Vincent (B3)
7. Borromeo, John Carlo (B3)

2.1.1.2. Summary

| | | | |
|---|---|---|---|
| Regular members | | | 4 |
| Student members | | | 30 |
| | PhD students | 10 | |
| | MS students | 3 | |
| | MSE students | 2 | |
| | BS students | 15 | |
| Apprentices | | | 0 |
| | | Total | 34 |

2.1.2.

### 2.1.3. Mentoring

#### 2.1.3.1. List of graduates

1st semester 2019 – 2020 (1 MS, 2 BS)

1. Abesa, Alvaro (Applied Physics)
   Design, construction and operation of a vacuum thermal evaporator for metal thin film deposition (Adviser: W. O. Garcia)

2. Alemania, Marielle (Applied Physics)
   Deposition of aluminum thin films on glass substrate via thermal evaporation (Adviser: W. O. Garcia)

3. Onglao, Mario Juvenal S.
   Non-Thesis MS Physics
   (Adviser: P. F. Almoro)

2nd semester 2019 – 2020 (8 BS)

1. Argonza, Ma. Liana O. (BS Applied Physics)
   Crystal patterns from symmetric and anti-symmetric beams
   (Adviser: N. P. Hermosa II)

2. Dela Cruz, Mary Nathalie G. (BS Applied Physics)
   Fringe analysis: topological charge determination, nonlinearity error reduction in profilometry, and focal length measurement of a tunable lens.
   (Adviser: N. P. Hermosa II)

3. Estrada, Viron Gil A. (BS Applied Physics)
   Diffraction of vortex beams from Hadamard coded aperture
   (Adviser: N. P. Hermosa II)

4. Gaffud, Ymmanuel P. (BS Applied Physics)
   LiDAR system at the National Institute of Physics for ranging
   (Adviser: W. O. Garcia)

5. Manzo, Agatha Jill D. (BS Applied Physics)
   Phase retrieval of test objects with unknown obstructions using unordered
   (Adviser: P. F. Almoro)

6. Depasucat, Cyrill Hope T. (BS Physics)
   Speckle pattern formation using polydimethylsiloxane (PDMS) diffusers: simulations and experiments
   (Adviser: P. F. Almoro)

7. Operaña, Jared Joshua C. (BS Physics)
   Observation of Goos Hanchen Shifts in low loss dielectrics
   (Adviser: N. P. Hermosa II)

8. Tolentino, Meara Noelle A. (BS Physics)
   Detecting polarization and spatial modes using vector vortex beams

(Adviser: N. P. Hermosa II)

9. Villareal, Mark Roan Elrae T. (BS Physics)
   Enhanced single beam multiple intensity reconstruction using wavelength distance transformation
   (Adviser: P. F. Almoro)

2.1.3.2. Summary

| | Number of graduates |
|---|---|
| BS Physics | 4 |
| BS Applied Physics | 7 |
| MS Physics | 1 |
| MS MSE | 0 |
| PhD Physics | 0 |
| Total | 12 |

## 2.2. Research highlights

### 2.2.1. Publication in ISI/SCI and Scopus indexed journals (3)

1. Narag, Jadze Princeton C., Niña Angelica F. Zambale, and Nathaniel Hermosa. “Scale Distortion Correction of a Digital Micromirror Device Using Diffraction Caustics.” Optics and Lasers in Engineering 134 (November 2020): 106122. DOI: https://doi.org/10.1016/j.optlaseng.2020.106122.

2. Simon, Rhenish C., Jenny Lou B. Sagisi, Niña Angelica F. Zambale, and Nathaniel Hermosa. “Is a Single Layer Graphene a Slab or a Perfect Sheet?” Carbon 157 (February 1, 2020): 486–94. DOI: https://doi.org/10.1016/j.carbon.2019.10.044

3. Olaya, Cherrie May, Norihiko Hayazawa, Nathaniel Hermosa, and Takuo Tanaka, “Angular Goos-Hänchen Shift Sensor Using a Gold Film Enhanced by Surface Plasmon Resonance,” Phys. Chem. A (December 22, 2020), XXXX, XXX, XXX-XXX, DOI: https://doi.org/10.1021/acs.jpca.0c09373

### 2.2.2. Publication in local peer reviewed journals (0)

### 2.2.3. International conference presentations with full papers (1)

1. Simon, R., & Hermosa, N., "Optical Response Function and Modified Fresnel Coefficients of a 2D material as Perfect Sheet", 2020 FiO + LS Conference (The 2020 Virtual Conference), September 14-17, 2020, URL: https://www.osapublishing.org/abstract.cfm?URI=FiO-2020-JTu1B.51

### 2.2.4. International conference presentations without full papers (7)

1. Almoro P., "Unordered Propagations: Breakthrough Algorithm in Multiple-Intensity Phase Retrieval", (Online) OSA Imaging Conference, June 22-26, 2020.

2. Dasallas, N., "Computational and experimental works in pulsed laser ablation and deposition," The 40th PAASE Annual Meeting and Symposium, 23 July 2020, Online.

3. Hermosa, N. "Structured light optics for engineering and automation," The 40th PAASE Annual Meeting and Symposium, 23 July 2020, Online.

4. Dasallas, L., De Mata, J.K., Lacaba, A., and Garcia, W., "Infuence of Oxygen and Nitrogen Background Gas in Femtosecond Pulsed Laser Deposition of Nd:YAG Laser Crystal," The 81st JSAP Autumn meeting 2020, JSAP-OSA Joint Symposia (Online) (2020.9.9) (2020).

5. Olaya, CM., Hayazawa, N., Hermosa, N., and Tanaka, T., "Surface plasmon resonance-induced Goos-Hanchen shift due to gold film", The 81st JSAP Autumn meeting 2020, JSAP-OSA Joint Symposia (Online) (2020.9.9) (2020).

6. Almoro, P., "Multiple-Intensity Phase Retrieval: Theory and Applications", (Online) Information Photonics, September 11-12, 2020

7. Sagisi, J., Garcia, W. O., and Dasallas, L. L., "Temporal modification of laser source term in TTM calculations," The 81st JSAP Autumn meeting 2020, JSAP-OSA Joint Symposia (Online) (2020.9.9) (2020).

### 2.2.5. Local conference papers

#### 2.2.5.1. With full paper (24)

1. AJD Manzo and P Almoro, Phase retrieval of test objects with unknown obstructions using unordered propagations, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3G-08 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3G-08.

2. BYG Tinte, J De Mesa, A Rillera, R Sarmago, and W Garcia, Surface morphology of cerium oxide ablated by femtosecond-pulsed laser with varying target scanning speeds, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3A-09 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3A-09.

3. CHT Depasucat and P Almoro, Modified Strehl ratio for quantitative evaluation of speckle development, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3G-03 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3G-03.

4. DA Pablico, JP Cabanilla, and N Hermosa, Control of spatial coherence of off-the-shelf red LED, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-2D-06 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-2D-06.

5. DGC Banguilan and N Hermosa, Generation of "perfect" petal beams using spatial light modulator, *Proceedings of the Samahang Pisika ng Pilipinas* **38**, SPP-2020-1D-02 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-1D-02.

6. GMP Gloria and PF Almoro, Model for phase retrieval under partially coherent illumination, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3G-07 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3G-07.

7. JA De Mesa, L Dasallas, and W Garcia, Numerical investigation of heat transfer in ultrafast laser processing of silicon material, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3A-06 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3A-06.

8. JC Operaña, RC Simon, and N Hermosa, An approach to thin film oxide detection in GaAs substrate using Goos-Hanchen shift, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3G-04 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3G-04.

9. JCM Lorenzo and N Hermosa, Quantitative analysis of the self-healing property of structured beams using energy flow, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3G-05 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3G-05.

10. JF Binamira and PF Almoro, Enhanced reconstruction of axially extended objects using phase retrieval with unordered propagations and compressive sensing, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-1D-06 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-1D-06.

11. JKC De Mata, W Garcia, and L Dasallas, Fourier transform infrared spectoscopy of Nd:YAG thin films by fs-PLD with nitrogen and oxygen as background gas, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-4F-04 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-4F-04.

12. JL Sagisi, W Garcia, and L Dasallas, Temporal laser source term from experimental data for laser-matter interaction simulations, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-2D-09 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-2D-09.

13. JP Cabanilla, DM Estacio, and N Hermosa, Fourier transform profilometry of millimeter-scale surface distortions with added lens setup, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-2D-08 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-2D-08.

14. MAP Alemania, AJ Abesa, J De Mesa, and W Garcia, Optical transmission spectroscopy of Al thin films deposited on glass substrates via thermal evaporation, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3A-08 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3A-08.

15. MJG Manuel and N Hermosa, Folded Transit: A proposed exoplanet detection method, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-5A-07 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-5A-07.

16. MJS Onglao and PF Almoro, Single-plane diffuse illumination phase retrieval, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-1D-03 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-1D-03.

17. ML Revilla and NP Hermosa, Vortex beams and quadrant detection for detecting barycenter motion of stars with polar orbiting exoplanets, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-5A-03 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-5A-03.

18. MN Tolentino and N Hermosa, Detecting the polarization and spatial modes using vector vortex beams, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3G-10 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3G-10.

19. NAF Zambale and N Hermosa, Imbert-Fedorov shifts of electromagnetic waves due to the ionosphere, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-2F-05 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-2F-05.

20. R Jamilarin, DGC Banguilan, and N Hermosa, Generation of higher-order Bessel beams by spiral slits using digital micromirror device, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3G-02 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3G-02.

21. RB Emperado, MAH Zosa, LL Dasallas, and WO Garcia, Thickness calculations of thin films prepared by pulsed laser deposition on revolved and rotated substrates, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-2C-03 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-2C-03.

22. RC Simon and N Hermosa, Improved visibility of boron nitride on oxidized silicon substrates at pseudo-Brewster incidence, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3G-06 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3G-06.

23. RC Simon and N Hermosa, Response function and transfer matrix for a perfect sheet, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-1D-04 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-1D-04.

24. RG Tabuzo and P Almoro, Enhanced reconstruction in mask translation-phase retrieval using two recording planes, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-3G-09 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-3G-09.

25. TJ Abregana and P Almoro, Sampling volume considerations for amplitude diffuser-based phase retrieval, Proceedings of the Samahang Pisika ng Pilipinas 38, SPP-2020-2D-07 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-2D-07.

2.2.5.2. Without full paper (2)

1. NP Hermosa, Kung saan hinuhugot ang ideya, Proceedings of the Samahang Pisika ng Pilipinas38, SPP-2020-INV-3C-02 (2020). URL: https://proceedings.spp-online.org/article/view/SPP-2020-INV-3C-02.

2. RC Simon, NA Zambale, LV Sayson, JM Mateo and M Salvador, Barrio Agham Series and Pueblo Science Philippines, 38th SPP Physics Conference – Online, October 19 – 23, 2020.

2.2.5.3. Other invited talks (3)

1. NP Hermosa, PAASE Webinar 30: Structured Light, Un-structured Lab Life. 11 December 2020

2. NP Hermosa, Structured Light. Philippine Science Communication Festival. 13 December 2020.

3. NP Hermosa, A Generalized Multidirectional Paraxial Optical Cloak, Saliksikhay 2020. 17 January 2020.

2.2.6. Chapters in books (0)

2.2.7. Patents (0)

2.2.8. NIP funded projects (3)

| Project proponent | Project title | Period | Amount | Project grantor |
|---|---|---|---|---|
| Almoro, Percival | Algorithm for Enhanced Reconstruction in Phase Retrieval | January 2020 to December 2020 | Php 105, 600.00 | NIP, UP Diliman |
| Garcia, Wilson | Film Deposition System for Undergraduate and Graduate Advanced Physics Laboratory | January 2020 to December 2020 | Php 105, 600.00 | UP Diliman |
| Hermosa, Nathaniel | Coherence Control of an LED light source | 01 January 2020 - 31 December 2020 | PhP 105,600.00 | UP Diliman |

2.2.9. Non-NIP funded projects (3)

| Project proponent | Project title | Period | Amount | Project grantor |
|---|---|---|---|---|
| Hermosa, Nathaniel | Fast Rotation and Translation Sensing with Spatial Mode Projection | 01 July 2020 – 31 December 2021 | PhP 600,000.00 | UP System |
| Dasallas, Lean | Investigation of material surface modification made by femtosecond pulsed laser ablation from multiple pulses. | July 2020 to December 2021 | PhP 500,000.00 | OVPAA, UP Diliman |
| Dasallas, Lean and Garcia, Wilson. | Investigating the influence of background gases in the pulsed laser deposition of laser crystals with femtosecond pulsed laser as excitation source | January 2020 to December 2020 | PhP 763,179.49 | NSRI, UP Diliman |

2.2.10. Major equipment acquired (0)

| Equipment | Cost (PhP) | Source of fund | Project proponent |
|---|---|---|---|

2.2.11. Research travels abroad (0)

| NIP Personnel | Purpose | Place | Dates | Mode of exchange |
|---|---|---|---|---|

2.2.12. Visiting researchers (0)

2.2.13. MOA's entered with local or foreign institutions (0)

2.3. Extension work highlights

2.3.1. Extension work activities (13)

| | |
|---|---|
| Abregana, Timothy Joseph | Reviewer, 38th Samahang Pisika ng Pilipinas Physics Congress |
| Almoro, Percival | President, Samahang Pisika ng Pilipinas<br>Topical Editor, Optics and Image Processing, 38th Samahang Pisika ng Pilipinas Physics Congress<br>Reviewer, Optics Letters, Applied Optics |
| Banguilan, Dina Grace | Reviewer, 38th Samahang Pisika ng Pilipinas Physics Congress<br>Reviewer, OSA Journals |
| Binamira, Jonel | Reviewer, 38th Samahang Pisika ng Pilipinas Physics Congress<br>Reviewer, Applied Optics and Optics Letters |
| Cabanilla, Jayson | Reviewer, 38th Samahang Pisika ng Pilipinas Physics Congress |
| Dasallas, Lean | Topical Editor, Photonics and Materials Physics, 38th Samahang Pisika ng Pilipinas Physics Congress |
| De Mesa, Joseph | Reviewer, 38th Samahang Pisika ng Pilipinas Physics Congress |
| Emperado, Rommil | Reviewer, 38th Samahang Pisika ng Pilipinas Physics Congress |
| Hermosa, Nathaniel | Topical Editor, Photonics and Optics, 38th Samahang Pisika ng Pilipinas Physics Congress<br>Reviewer, OSA Journals, Applied Physics Letters<br>Journal of Physics D: Applied Physics |
| Miranda, Joseph | Reviewer, 38th Samahang Pisika ng Pilipinas Physics Congress |

| | |
|---|---|
| Onglao, Mario | Reviewer, 38th Samahang Pisika ng Pilipinas Physics Congress |
| Sagisi, Jenny Lou | Reviewer, 38th Samahang Pisika ng Pilipinas Physics Congress |
| Zambale, Nina Angelica | Reviewer, 38th Samahang Pisika ng Pilipinas Physics Congress |

2.3.2. Research interns/OJT's (1)

SSIP

1. Estacio, Damien
   Philippine Science High School – Main Campus

2.4. Main challenges encountered and proposed solutions

Maintaining laboratory productivity is the main challenge due to the COVID - 19 quarantine protocols. Restricted access to the laboratory facilities, limited transportation options, and stress of uncertainties are some of the main problems faced by all research members.

Weekly virtual meetings are arranged to have maintained open communications among the members. Research discussions have been around schedule flexibility and remote work. The group is now prioritizing research problems that can be addressed through computational work.

2.5. Awards or accreditations received/ positions of responsibility held and other accomplishments (2)

1. Dela Cruz, Mary Nathalie G.
   Most Outstanding BS Applied Physics Thesis award (SY 2019 – 2020)
   National Institute of Physics – UP Diliman

2. Villareal, Mark Roan Elrae T.
   Most Outstanding BS Physics Student (SY 2019 – 2020)
   National Institute of Physics – UP Diliman

3. Prof. Percival F. Almoro
   Topical Editor, Applied Optics

## 4. Photos, ISI/SCI Publications and other appendices

### a. Photos

*Figure 1. Apprenticeship Interview through virtual conference for 2nd Sem AY 2020 – 2021*


*Figure 2. Virtual Christmas Party Christmas last December 07, 2020.*

### 3.2. ISI/SCI Publications

Simon, Rhenish C., Jenny Lou B. Sagisi, Niña Angelica F. Zambale, and Nathaniel Hermosa. "Is a Single Layer Graphene a Slab or a Perfect Sheet?" Carbon 157 (February 1, 2020): 486–94. https://doi.org/10.1016/j.carbon.2019.10.044.


Carbon

Is a single layer graphene a slab or a perfect sheet?

Rhenish C. Simon*, Jenny Lou B. Sagisi, Niña Angelica F. Zambale, Nathaniel Hermosa

Narag, Jadze Princeton C., Niña Angelica F. Zambale, and Nathaniel Hermosa. "Scale Distortion Correction of a Digital Micromirror Device Using Diffraction Caustics." Optics and Lasers in Engineering 134 (November 2020): 106122. https://doi.org/10.1016/j.optlaseng.2020.106122.


Optics and Lasers in Engineering

Scale distortion correction of a digital micromirror device using diffraction caustics

Jadze Princeton C. Narag*, Niña Angelica F. Zambale, Nathaniel Hermosa

Olaya, Cherrie May, Norihiko Hayazawa, Nathaniel Hermosa, and Takuo Tanaka, "Angular Goos-Hänchen Shift Sensor Using a Gold Film Enhanced by Surface Plasmon Resonance," Phys. Chem. A (December 22, 2020), XXXX, XXX, XXX-XXX, DOI: https://doi.org/10.1021/acs.jpca.0c09373


THE JOURNAL OF PHYSICAL CHEMISTRY A

Angular Goos–Hänchen Shift Sensor Using a Gold Film Enhanced by Surface Plasmon Resonance

Cherrie May Olaya, Norihiko Hayazawa, Nathaniel Hermosa, and Takuo Tanaka*