

National Institute of Physics

Management Team

Terminal Report for the Structure and Dynamics Research Program

Period covered: 01 January 2020 to 31 December 2020

Prepared by:

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Structure and Dynamics Research Program

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Contents

1 Executive Summary	2
2 Technical Report	3
3 Appendices	9

1 Executive Summary

1.1 Activities of the Research Program

1.1.1 Organization

	Count	Page
Regular Members	3	p. 3
Student Members	26	p. 3
PhD – 5		
MS – 9		
BS – 12		
Apprentices	8	p. 4
Total	37	

1.1.2 Mentoring

Degree Program	Sem 2 AY 19–20 (p. 4)	Midyear 2020	Sem 1 AY 20–21 (p. 5)	Total
BS Physics	1	0	0	1
BS Applied Physics	7	0	0	7
MS Physics	0	0	0	0
Total	8	0	0	8

1.2 Research Highlights

	Count	Page
International peer-reviewed articles	1	p. 5
International conference presentations	0	p. 5
Local conference papers	8	p. 5
Other invited lectures/talks	2	p. 6
NIP funded projects	3	p. 6
Non-NIP funded projects	1	p. 6
Outbound travel abroad	0	p. 6
Inbound visiting researchers	0	p. 6

1.3 Extension Work Highlights

	Count	Page
Extension work activities	12	p. 7
Research interns and trainees	0	p. 8

1.4 Challenges Encountered

	Count	Page
Challenges	2	p. 8

1.5 Awards, Accreditations, and Positions of Responsibilities Held

	Count	Page
National awards and positions held	3	p. 8

2 Technical Report

2.1 Activities of the Research Program

2020 saw eight students graduated and completed their theses. Current membership in SanD (faculty and students) is now 38. There was an international peer-reviewed article and 10 local conference peer-reviewed papers.

Dr. Villagonzalo was on sabbatical from 01 August 2019 to 31 July 2020. She reported for duty on 01 August 2020.

The support for the Samahang Pisika ng Pilipinas and the Asian Network in Condensed Matter and Complex Systems continues.

The COVID-19 pandemic is a challenge that continues to question the means by which we are able to deliver educational targets.

2.1.1 Organization

Regular Members (3)

- 1) Villagonzalo, Cristine – Professor
- 2) Banzon, Ronald – Associate Professor
- 3) Paraan, Francis – Associate Professor

PhD Student Members (5)

- 1) Ilano, Neris – D11
- 2) Villegas, Vladimir D7
- 3) dela Rosa, Rafael – D5, University Research Associate 1 (URA 1)
- 4) Itable, Gene Moses – D5
- 5) Acosta, Geronimo Allan Jerome – D4

MS Student Members (9)

- 1) Mangada, Mykhal – M7
- 2) Guinid, Jammy Rey – M5
- 3) Masbate, Julius – M5
- 4) Ayang-ang, Cleofe Dennielle – M3
- 5) Esperanza, Robertson – M3
- 6) Tan, Apolinario Miguel – M3
- 7) Elegado, Christopher Patrick – M2 [leave]
- 8) Accad, Vincent Rhey – M2 [leave]
- 9) Urbano, Kryss – M1

BS Student Members (12)

- 1) Deleon, Monica Cecilia – B6
- 2) De Guzman, Tristan – B6
- 3) Gomez, Jacob – B6
- 4) Ramos, Aaron Paul – B6
- 5) Calpatura, Jairus Carlo – B5
- 6) Edora, Maria Alena – B5
- 7) Estrada, John Benedick – B5

- 8) Ganding, Jersey Dianne – B5
- 9) Rodriguez, Tim Jeff – B5
- 10) Sacres, Kobe Brian – B5
- 11) Dimacali, Raphael Angelo – B4
- 12) Maddumba, Marc Lesney – B4

Apprentices (8)

- 1) Daquiaoag, Alyana – B3
- 2) Dela Cruz, Leon Sergio – B3
- 3) Espelmado, Faye – B3
- 4) Herman, Gene Michael – B3
- 5) Ordonio, Andrei Espencer – B3
- 6) Rangel, Jerico – B3
- 7) Sorupia, Sven – B3
- 8) Suico, Samuel – B3

2.1.2 Mentoring

Graduated Sem 2 AY 2019–2020

BS Physics (1)

- 1) Dumanjog, Mignon Francis
BS Thesis: Computational fluid dynamics analysis of melting ice blocks
Adviser: Francis Paraan

BS Applied Physics (Instrumentation) (7)

- 1) Adelino, Joanne Mae
Magna cum laude
BS Thesis: Demonstration and characterization of reversible circuits
Adviser: Ronald Banzon
- 2) Ancheta, Sheenah
BS Thesis: Modeling atomic interactions for the characterization of the phonon density of states (DOS) of a silicene junction
Adviser: Cristine Villagonzalo
- 3) Bunagan, Marc Jason
BS Thesis: Monte Carlo approach to two dimensional cell-tissue population growth via agent-based modelling
Adviser: Cristine Villagonzalo
- 4) Castro, Marc Jerrone
BS Thesis: Identifying Potential Therapeutic Protein Targets using Graph Neural Networks
Adviser: Francis Paraan
- 5) Co, Richmond
BS Thesis: Long Waiting Times of 2D Continuous-time Random Walks in External Drift Forces
Adviser: Cristine Villagonzalo
- 6) Delima, Krishna Lyn
BS Thesis: Characterization of the Phonon Density of States of a Graphene Junction Beyond Nearest Neighbor Interactions
Adviser: Cristine Villagonzalo

- 7) Go, Mary Chris
BS Thesis: Detection of colorectal polyps using YOLOv3
Adviser: Francis Paraan

Graduated Sem 1 AY 2020–2021

2.2 Research Highlights

2.2.1 International peer-reviewed articles (1)

- 1) Alexandra B. Santos-Putungan, Natasa Stojic, Nadia Binggeli, & Francis N.C Paraan. 2020. "Selective capture of CO_2 over N_2 and CH_4 : B clusters and their size effects", 22, Article number 100712. DOI: <https://doi.org/10.1016/J.MTCOMM.2019.100712>.

2.2.2 International conference presentations (0)

2.2.3 Local peer-reviewed conference papers (8)

- 1) Go, Mary Chris R. & Francis N.C. Paraan. "Using YOLOv3 to detect colorectal polyps in video" in Proceedings of the 38th Samahang Pisika ng Pilipinas Physics Conference, SPP-2020-2A-05 (Philippines, 2020).
- 2) Guinid, Jammy Rey C. & Ronald S. Banzon. "Age-dependent random deaths by Verhulst factor in an iteroparous Penna Model" in the Proceedings of the 38th Samahang Pisika ng Pilipinas Physics Conference, SPP-2020-2A-10 (Philippines, 2020).
- 3) Adelino, Joanne Mae B. & Ronald S. Banzon. "Characterization and synthesis of classical reversible circuits" in the Proceedings of the 38th Samahang Pisika ng Pilipinas Physics Conference, SPP-2020-4A-04 (Philippines, 2020).
- 4) Calpatura, J.C.F & Cristine Villagonzalo. "Temperature dependence of three-dimensional thermoelectric properties of a free electron gas-like material" in the Proceedings of the 38th Samahang Pisika ng Pilipinas Physics Conference, SPP-2020-4G-01 (Philippines, 2020).
- 5) Ganding, J.D.T. & Ronald S. Banzon. "Cluster behavior in a finite 2D Ising model with central blocked regions" in the Proceedings of the 38th Samahang Pisika ng Pilipinas Physics Conference, SPP-2020-4G-03 (Philippines, 2020).
- 6) Rodriguez, T.J.M. & Cristine Villagonzalo. "Drude model electron motion in 2D space with applied electric fields" in the Proceedings of the 38th Samahang Pisika ng Pilipinas Physics Conference, SPP-2020-4G-04 (Philippines, 2020).
- 7) Delima, Krishna Lyn & Cristine D. Villagonzalo. "Characterization of phonon density of states of graphene junction beyond nearest neighbor interactions" in the Proceedings of the 38th Samahang Pisika ng Pilipinas Physics Conference, SPP-2020-4G-05 (Philippines, 2020).
- 8) Villegas, V.P. & Cristine Villagonzalo. "Free energy in a spin transport among particles in a Fermi-Hubbard optical lattice" in the Proceedings of the 38th Samahang Pisika ng Pilipinas Physics Conference, SPP-2020-5C-03 (Philippines, 2020).

2.2.4 Local conference presentations (2)

- 1) De Guzman, T.S. & Francis N.C. Paraan. "Character-level text generator using a recurrent neural network with long short-term memory" presented at the 38th Samahang Pisika ng Pilipinas Physics Conference, SPP-2020-3E-E11 (Philippines, 2020).

- 2) Edora, M.A. & Francis N.C. Paraan. "Quantifying the performance of a convolutional autoencoder in filtering Gaussian noise from images of handwritten digits" presented at the 38th Samahang Pisika ng Pilipinas Physics Conference, SPP-2020-3E-E12 (Philippines, 2020).

2.2.5 NIP funded projects (3)

- 1) Project Leader: Banzon, Ronald S.
Project Title: Age-dependent Verhulst factor in a Penna Model
Period: 01 January 2020–31 December 2020
- 2) Project Leader: Paraan, Francis Norman C.
Project Title: Biological and medical feature detection by machine learning
Period: 01 January 2020–31 December 2020
- 3) Project Leader: Villagonzalo, Cristine DLR.
Project Title: Spin transport states in fermionic ultracold systems
Period: 01 January 2020–31 December 2020

2.2.6 Non-NIP funded projects (1)

- 1) Project Leader: Paraan, Francis Norman C.
Type: OVPAA ECWRG 2018-1-009
Project Title: Computational and theoretical studies of small molecule binding on nanoclusters and surfaces
Period: 17 September 2018 – 16 March 2020
Amount: P500 000

2.2.7 Other invited lectures/talks (0)

- 1) Title: "Entanglement in a model with power law interactions"
Authors: Francis N.C. Paraan & Cleofe Dennielle P. Ayang-ang.
Book of Abstracts of the 22nd Samahang Pisika ng Visayas at Mindanao National Physics Conference. Presented online.
Date: 24 October 2020
- 2) Speaker: Cristine Villagonzalo
Topic: National Research Council of the Philippines
Event: 38th Samahang Pisika ng Pilipinas Physics Conference. Presented online.
Date: 21 October 2020

2.2.8 Outbound travel abroad (0)

2.2.9 Inbound visiting researchers (0)

2.3 Extension Work Highlights

2.3.1 Extension Work Activities¹ (12)

- 1) Name: Francis Paraan
Extension work: Editor in Chief and Online Journal Manager
Organization: Samahang Pisika ng Pilipinas
- 2) Name: Francis Paraan
Extension work: Web Administration of <http://www.spp-online.org> and sub-domains
Organization: Samahang Pisika ng Pilipinas
- 3) Name: Francis Paraan
Extension work: Referee
Organization: American Physical Society Physical Review Journals
- 4) Name: Francis Paraan
Extension work: Guest Editor
Organization: CMU Journal of Science
Date: October to December 2020
- 5) Name: Francis Paraan
Extension work: Resource person
Organization: DOST
Event: NSTW Forum: Makibalita sa mga Balik Scientist (Maki't Scientists)
Date: 21 November 2020
- 6) Name: Francis Paraan
Extension work: Resource person
Organization: NAST
Event: Forum: 2nd #PilipNAST Virtual Kapehan
Date: 6 July 2020
- 7) Name: Francis Paraan
Extension work: Moderator and emcee
Organization: DOST Region XII
Event: ScienTeach: A Virtual Symposium for the Youth
Date: 2 October 2020
- 8) Name: Cristine Villagonzalo
Extension work: Topical Editor
Organization: Samahang Pisika ng Pilipinas
- 9) Name: Cristine Villagonzalo
Position: Physics Division (Division IX) Chair
Organization: National Research Council of the Philippines, Governing Board
- 10) Name: Cristine Villagonzalo
Position: Network Node Coordinator for the Philippines
Organization: ICTP Asian Network on Condensed Matter and Complex Systems
- 11) Name: Cristine Villagonzalo

¹From the 2003 UP Diliman Faculty Manual 2003 Section 4.3.4: Extension includes services utilizing expertise and talent related to one's discipline, outside instruction and research, such as nondegree training, seminars, workshops, conferences, review classes [except UP College Admission Test (UPCAT)], advisory/technical/information services, exhibits, performances, consultancies (without professional fee), networking, advocacy, and volunteer/community work.

Extension work: Resource Person

Organization: UP Visayas, Tacloban College

Event: Teaching Science and Laboratory Courses in Remote Learning Scenario:

Episode 2: Chemistry and Physics

Date: 18 November 2020 (webinar via Zoom)

12) Name: Ronald Banzon

Extension work: Curriculum consultant

Organization: Philippine Science High School System

2.3.2 Research Interns and Trainees (0)

2.4 Challenges Encountered

1) Current health protocols prevented face-to-face classes. The continuing health crisis modified the implementation of classes.

2) (2020) Repair of the floor-type airconditioning unit did not push through. The Commission on Audit did not approve the repair through a service center as the cost exceeded 30% of the original purchase price of the unit.

Proposed solution: To request the purchase of a new airconditioning unit which will be up to standard of the 2020 new refrigerant regulations using no freon (HCFC-22) in the unit.

2.5 Awards, Accreditations, and Positions of Responsibilities Held

2.5.1 National awards and positions held (3)

1) Name: Francis Paraan

Award: 2020 Outstanding Young Scientist

Organization: National Academy of Science and Technology

2) Name: Francis Paraan

Position: SPP Councilor, Editor-in-Chief

Organization: Samahang Pisika ng Pilipinas

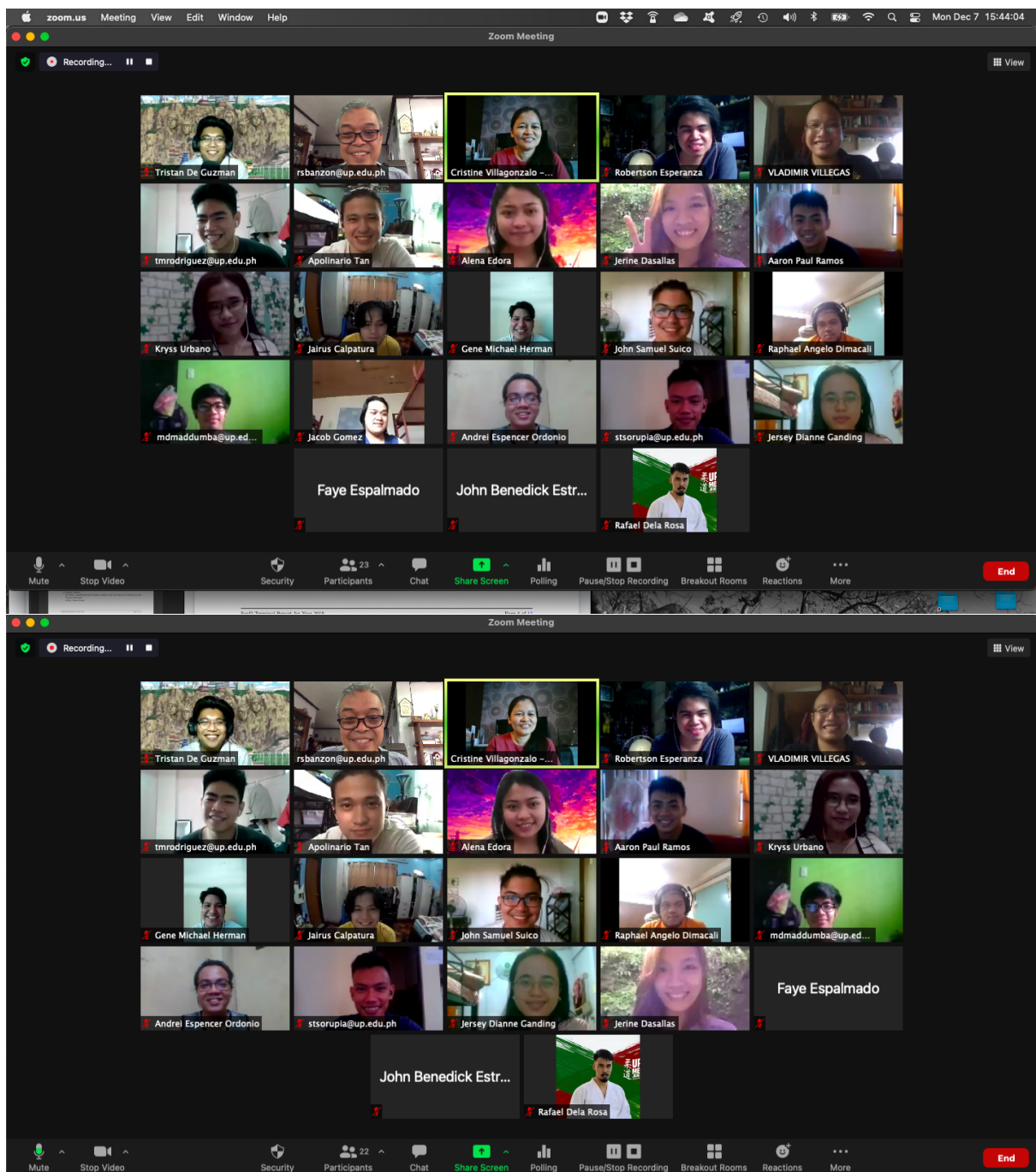
3) Name: Cristine Villagonzalo

Position: Deputy Director for Academic Affairs

Organization: National Institute of Physics

3 Appendices

3.1 Photographs



SanD seminar (07 December 2020).