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Marco Immanuel Bayle Rivera

Curriculum Vitae

Educational Background

2020	MS (Physics) , <i>National Institute of Physics - University of the Philippines</i> (hereafter NIP-UPD), Diliman, Quezon City, Philippines. (Current) General Weighted Average: 1.0000/1.0000 Expected Graduation: July 2022
2015 2020	BS Physics (5 years) , <i>NIP-UPD</i> , Diliman, Quezon City, Philippines. Magna Cum Laude, Curriculum Weighted Average Grade: 1.4359/1.0000 Conferred: 26 July 2020
2011 2015	High School Graduate (Grade 10) , <i>Marikina Science High School</i> (hereafter MSHS), Marikina City, Philippines. Basic Education Curriculum for Science High Schools Conferred: 30 March 2015

Research Projects

MS Research Project

TITLE	Observational Signatures of Environmental Effects on Gravitational-Wave Signals from Black Hole Binaries
PRINCIPAL INVESTIGATOR	Reinabelle C. Reyes, PhD
FUNDING AGENCY	NIP-UPD, Diliman, Quezon City, Philippines
ROLE	Graduate Student Researcher <i>Performed Fisher matrix and overlap analysis via Mathematica and Python, developed a codebase and prepared a manuscript for a conference proceeding</i>

BS Research Project

TITLE	Orbits influenced by pseudo-Newtonian potentials and their approximate analytical solutions
PRINCIPAL INVESTIGATOR	Jose Perico H. Esguerra, PhD

FUNDING AGENCY	Department of Science and Technology – Science Education Institute (<i>hereafter DOST-SEI</i>), Bicutan, Taguig City, Philippines	
ROLE	Undergraduate Student Researcher	<i>Used Mathematica's built-in functions to solve nonlinear differential equations and plot orbits, developed a codebase and prepared manuscripts for conference proceeding and BS thesis</i>

Research Interests

GRAVITATIONAL WAVE ASTRONOMY	<ul style="list-style-type: none"> ○ Data analysis – Science characterization of gravitational-wave sources ○ Inverse problem – model-dependent and model-independent parameter estimation methods ○ Environmental effects on gravitational radiation of compact binaries ○ Waveform template modelling and parameter space analysis ○ Parametrized tests of General Relativity using gravitational-wave observations
CELESTIAL MECHANICS	<ul style="list-style-type: none"> ○ Bound orbits in classical and relativistic potentials ○ Pseudo-Newtonian potentials
NONLINEAR DYNAMICS	<ul style="list-style-type: none"> ○ Approximation techniques for Nonlinear Oscillators

Thesis

BS Thesis

TITLE	Approximate analytical expressions for bound orbits under the influence of pseudo-Newtonian potentials	
ADVISER	Jose Perico H. Esguerra, PhD	
FUNDING AGENCY	DOST-SEI, Bicutan, Taguig City, Philippines	

Affiliations

Academic

PHILIPPINES	UP Physics Association (<i>hereafter UPPA</i>)	<i>Alumnus</i>
INTERNATIONAL ASSOCIATIONS	The International Honor Society of Phi Kappa Phi Chapter 045	<i>Inducted 2021</i>

Teaching Experience

Instructor

2020

Elementary Physics lecture courses, NIP-UPD, Diliman, Quezon City, Philippines.
Lecturer for Elementary mechanics, electromagnetism (EM) and optics, thermal physics, special relativity, and introductory quantum physics courses for undergraduate engineering and science majors.

2020

Fundamental Physics laboratory courses, NIP-UPD, Diliman, Quezon City, Philippines.

Facilitated laboratory classes for undergraduate physics majors including introductory programming and EM and optics.

Mentoring and Tutoring

2019

Physics & Mathematics, *Summer Science Internship Program (SSIP)*, Philippine Science High School (PSHS).

Served as mentor to incoming Grade 11 students of the PSHS

2017

2020

Elementary and Fundamental Physics, UPPA – *Academic Affairs Committee*, NIP-UPD.

Voluntary work of tutoring students taking Elementary and Fundamental Physics

Private Teaching

2014

2020

Physics & Mathematics.

Private tutoring to high school students (Junior and Senior High)

Languages

Filipino Native

English Fluent

TOEFL iBT Overall Score: 109/120
ETS

Mandarin Chinese Basic Fluency

Youth Chinese Tests I and II (YCT) passer
Confucius Institute Headquarters (Hanban) Administered at MSHS

French Conversational Fluency

Basic Understanding, Basic Speaking, Basic Writing
Elementary Course, UPD

Outreach Projects

DOST-SEI Patriot Scholars Project

Bulacan, Philippines (2017) and Batangas, Philippines (2019)

This project, which is funded by DOST-SEI, had as main goal to develop a pool of scholars instilled with passion for helping their own country through patriotic and nationalist outreach programs throughout the country.

Selected Coursework

GRADUATE

Electrodynamics (Jackson), Quantum Mechanics (Sakurai), Classical Dynamics* (Goldstein), Applications of General Relativity* (Ferrari, Gualtieri, Pani) (*in progress)

UNDERGRADUATE

Statistical Mechanics (Reif), General Relativity (Schutz), Computational Physics (Newman)

ONLINE COURSES

Bayesian Statistics, Introduction to MCMC, Python, Matplotlib, Pandas, Time Management, Introduction to Data Analytics

Skills

PROGRAMMING

Python, Mathematica, LabView, Minitab, R

TOOLS

L^AT_EX, AutoCAD, Git

Program Version Control and Program Repositories

OTHER SKILLS

Oral Communication, Organization, Writing, Microsoft Office Suite

Participation In Events

2021

7th Physics and Astrophysics at the eXtreme (PAX-VII) Workshop, Held [online](#) last 23 to 27 August 2021.

Participated in the discussions regarding the science case for the third generation of gravitational-wave detectors, including the Cosmic Explorer, Einstein Telescope, and Laser Interferometer Space Antenna.

2021

39th Samahang Pisika ng Pilipinas (hereafter *SPP*) Physics Conference and Annual Meeting, Held [online](#) last 20 to 22 October 2021, Philippines.

Presented and participated in the conference.

2020

38th SPP Physics Conference and Annual Meeting, Held [online](#) last 19 to 23 October 2020, Philippines.

Presented and participated in the conference.

2020

(5P's) PISIKA: Pagtuturo at Pananaliksik sa Panahon ng Pandemya, *SPP*, Held last 21st and 28th July 2020, online, Philippines.

Participant in webinar series for Physics instructors nationwide.

2020

The 2nd Gravity Workshop, *Gravity Group, NIP-UPD*, Held online last 10 to 14 and 17 to 21 August 2020, Philippines.

Participated in a two-week workshop comprised of lectures and hands-on coding of various General Relativity topics, geared towards undergraduate and graduate students.

2018

The University Physics Competition, Held [online](#).

[Accomplished competitor](#) in the international competition

2018

International Theoretical Physics Olympiad for Undergraduate Students, Held [online](#).

Accomplished competitor (Team "The Bottom Half")

2014

2nd World Citi Colleges Science Quiz Bee (CHAMPION), Quezon City, Philippines.

2014

Science Month Quiz Bee (CHAMPION - Advanced Physics for Grade 10), *MSHS*, Marikina City, Philippines.

Event Organization

2019

PisikaAlaman 2019, *UPPA*, NIP-UPD, Philippines.

Co-head of the event. PisikaAlaman is the UPPA's flagship event, a Physics quiz bee geared towards Senior High School students.

2018

SCIENCEYE 2018, *UPPA*, NIP-UPD, Philippines.

Head of the event. SCIENCEYE is an event of the UPPA during the Physics Month where they invite students from all over Metro Manila for career talks on Physics as well as exhibits on physics experiments.

Other Professional Experiences

2019

2020

Undergraduate Student Assistant, *Theoretical Physics Group, NIP-UPD*.

Served as a paid student assistant under the laboratory coordinator and the NIP-UPD Management team. Duties and responsibilities include: canvassing of lab supplies and equipment, preparation of lab requisitions, payment, reimbursement vouchers, etc.

2018
2019

2017
2018

Reserve Officers' Training Corps (hereafter ROTC) cadet, *Philippine Army Reserve*, University of the Philippines' National Service Training Program. Voluntary work for one corps year under the UP ROTC program.

Vice President for Academic Affairs, UPPA, NIP-UPD.

Served as vice-president of the organization for one academic year, spearheading events such as Undergraduate Physics tutorials and Physics month planning. Coordinated with the Executive Committee in monitoring academic status of active and inactive members.

Honors and Awards

UNIVERSITY SCHOLAR *BS Physics (1st Sem AY 2019-2020, 2nd Sem AY 2018-2019, 1st Sem AY 2018-2019, 2nd Sem AY 2016-2017, 1st Sem AY 2015-2016)*

NIP-UPD

Equivalent to a President's Lister

COLLEGE SCHOLAR *BS Physics (2nd Sem AY 2017-2018, 1st Sem AY 2017-2018, 1st Sem AY 2016-2017, 2nd Sem AY 2015-2016)*

NIP-UPD

Equivalent to a Dean's Lister

MERIT SCHOLAR *BS Physics (2015-2020)*

DOST-SEI

Recipient of the Science and Technology Scholarship for the whole undergraduate degree, including semestral stipend, book allowance, and other benefits.

PROJECT SPARTA SCHOLAR *Data Scientist Track (2020-)*

DOST and Development Academy of the Philippines

Recipient of the Project Smarter Philippines through data Analytics Research and development, Training and Adoption (SPARTA) scholarship, geared towards mass production of Filipinos who are well-versed in analytics.

OTHERS *World Citi Colleges Best In Science (AY 2014-2015)*

Awarded at MSHS

Best in Natural Science IV - Advanced Physics (AY 2014-2015)

MSHS, Marikina City, Philippines

Publications

- [1] Marco Immanuel Rivera and Jose Perico Esguerra. Linear emulator approach for bound orbits under the influence of the Paczynski-Wiita potential. In *Proceedings of the Samahang Pisika ng Pilipinas*, volume 38, pages SPP-2020-5A-04, 2020.
- [2] Marco Immanuel B. Rivera and Reinabelle C. Reyes. Probing the parameter constraints on astrophysical environments of intermediate and extreme mass ratio inspiral binaries with LISA. In *Proceedings of the Samahang Pisika ng Pilipinas*, volume 39, pages SPP-2021-1C-02, 2021.

References

Available upon request