Philip Caesar M. **Flores**

PhD Candidate · Physicist · Researcher

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"Study hard what interests you the most in the most undisciplined, irreverent and original manner possible."- Richard Feynmann

Education

University of the Philippines Diliman — *Quezon City*

PH.D. IN PHYSICS - ADVISER: ERIC A. GALAPON, PH.D. — *Aug. 2019 - present*

- Approved Thesis Proposal Title: Relativistic time of arrival operators
- Candidacy Exam Title: Problem of time - from standard quantum mechancis to quantum gravity
- Scholarship: Department of Science and Technology-Accelerated Science and Technology Human Resource Development Program (DOST-ASTHRDP)

University of the Philippines Diliman — *Quezon City*

M.S. IN PHYSICS - ADVISER: ERIC A. GALAPON, PH.D. — *Aug. 2017 - Jun. 2019*

- Thesis title: Weak equivalence principle in the quantum regime: Compatibility with quantum mechanics, and tunneling effects via the different quantizations of the time of arrival operator
- Studied the quantum violation of the weak equivalence principle for a structureless particle fired upward. This was done by quantizing the classical expression of the classical time of arrival using various quantization schemes, as well as supraquantization, to construct a time of arrival operator. The violation of the weak equivalence principle was demonstrated by showing mass-dependent quantum correction terms to the classical time of arrival as well as mass dependence on the time of arrival distribution.

University of the Philippines Diliman — *Quezon City*

B.S. IN PHYSICS - ADVISER: ERIC A. GALAPON, PH.D. — *Jun. 2012 - Jun. 2017*

- Thesis title: Synchronization of quantum and classical clocks, and energy translation using resolvent functional calculus for the confined time of arrival operators
- The thesis aimed to study some physical and mathematical aspects of the time of arrival operator. The first half deals with eliminating the effects of quantum correction terms up to an arbitrary order for the classical time of arrival of a free particle. By doing so, we are able to synchronize a classical and quantum clock that uses the time of arrival of the free particle as time interval markers. The second half deals with the energy translation properties of the confined time of arrival operators.

Experience

National Institute of Physics, University of the Philippines Diliman — *Quezon City*

SCIENCE RESEARCH SPECIALIST — *Aug. 2019 - Dec. 2019*

- Project: Standards and Testing Automated Modular Platform (Stamp)
- Principal Investigator: Giovanni Tapang, Ph.D.
- Develop a cheap alternative for existing ISO methodologies implemented in Regional Standards and Testing Laboratories (RSTLs).

National Institute of Physics, University of the Philippines Diliman — *Quezon City*

INSTRUCTOR — *Aug. 2017 - Jul. 2019*

- Taught recitation classes on Classical Mechanics (Physics 71), Optics and Electricity and Magnetism (Physics 72), Thermodynamics, Special Relativity, and Quantum Mechanics (Physics 73), and Modern Physics (Physics 104).
- Taught laboratory classes on Classical Mechanics (Physics 71.1), Optics Electricity and Magnetism (Physics 72.1), and Thermodynamics, Special Relativity, and Quantum Mechanics (Physics 73.1).
- Checked problem sets for Mathematical Physics (Physics 112), Statistical Physics (Physics 151 and 152), and Quantum Mechanics (Physics 241 and 242).

Research

Preprints

2022 **Relativistic free motion time of arrival operator for massive spin-0 particles with positive energy**, PCM Flores and EA Galapon, arXiv preprint arXiv:2203.00898 (2022) — *NIP, UPD*

Publications

2019 **Quantum free-fall motion and quantum violation of the weak equivalence principle**, PCM Flores and EA Galapon, Physical Review A 99, 042113 (2019). *NIP, UPD*

2016 **Synchronizing quantum and classical clocks made of quantum particles**, PCM Flores, RCF Caballar, and EA Galapon, Physical Review A 94, 032123 (2016). *NIP, UPD*

Proceedings

2019 **Violation of the weak equivalence principle via the Born-Jordan quantized TOA operator**, PCM Flores and EA Galapon, Proceedings of the Samahang Pisika ng Pilipinas *Tagbilaran City*

2018 **Violation of the weak equivalence principle via the time of arrival operator**, PCM Flores and EA Galapon, Proceedings of the Samahang Pisika ng Pilipinas *Puerto Prinsesa City*

2017 **Covariance property of the confined time of arrival operators**, PCM Flores and EA Galapon, Proceedings of the Samahang Pisika ng Pilipinas *Cebu City*

2016 **Synchronizing quantum and classical clocks made of quantum particls up to $\hbar^2$**, PCM Flores, RCF Caballar, and EA Galapon, Proceedings of the Samahang Pisika ng Pilipinas *Iloilo City*

2015 **The resolvent operators of the confined time of arrival operators**, PCM Flores, RCF Caballar, and EA Galapon, Proceedings of the Samahang Pisika ng Pilipinas *Vigan City*

In Preparation

The Quantum Time Problem: Time and Particles, PCM Flores and EA Galapon *NIP, UPD*

Tunneling time of a relativistic, massive spin-0 particle using time of arrival operators, PCM Flores and EA Galapon *NIP, UPD*

Referee requests

2022 **The European Physical Journal Plus D**,

Conferences & Workshops

2021 **Poster presentation**, Time in Quantum Theory: from mathematical foundations to operational characterization (Aug 30 - Sept 3) *Switzerland*

2021 **Participant**, Quantizing Time, Perimeter Institute (Virtual Meeting) *Canada*

2021 **Participant**, 7th Les Houches School in Computational Physics: Dynamics of Complex Quantum Systems, from Theory to Computation (Virtual meeting) *France*

2021 **Participant**, Conference on Time Crystals (An ICTP virtual meeting) *Italy*

2019 **Poster presentation**, ICTP Asian Network School and Workshop on Complex Condensed Matter Systems, National Institute of Physics, UP Diliman *Philippines*

2019 **Poster presentation**, 2nd Annual Graduate Students Research Conference, College of Science Administration Building Auditorium, UP Diliman *Philippines*

2019 **Oral presentation**, 37th Samahang Pisika ng Pilipinas International Physics Conference and Annual Meeting, Tagbilaran, Bohol *Philippines*

2019 **Poster presentation**, Time and fundamentals of quantum mechanics, The David Lopatie Conference Centre, Weizmann Institute of Science *Israel*

2018 **Oral presentation**, 36th Samahang Pisika ng Pilipinas International Physics Conference and Annual Meeting, Puerto Princesa, Palawan *Philippines*

2017 **Oral presentation**, 35th Samahang Pisika ng Pilipinas International Physics Conference and Annual Meeting, Cebu City, Cebu *Philippines*

2017 **Oral presentation**, 8th Jagna International Workshop: Structure, Functions and Dynamics from nm to Gm, Jagna, Bohol *Philippines*

2016 **Oral presentation**, 34th Samahang Pisika ng Pilipinas International Physics Conference and Annual Meeting, Iloilo City, Iloilo *Philippines*

2015 **Oral presentation**, 33rd Samahang Pisika ng Pilipinas International Physics Conference and Annual Meeting, Vigan, Ilocos Sur *Philippines*

2014 **Participant**, CERN School Philippines, National Institute of Physics, UP Diliman *Philippines*

Awards and Grants

Grants

2019	**Office of International Linkages (OIL) Travel Grant**, Support for researchers and graduate students for paper presentation at international conferences	*Israel*
2019, 2018	**Office of the Vice President for Academic Affaircs (OVPAA) Research Dissemination Grant**, Awarded to outstanding faculty and REPS researchers who receive invitations or gain acceptance to present their research papers in prestigious international conferences.	*Philippines*

Awards

2019	**International Publication Award**, Awarded by the University of the Philippines to faculty and students who were able to publish papers in ISI journals	*UP Diliman*
2017	**Leticia Shahani Award for Best Undergraduate Thesis in Physics**, College of Science Graduation	*UP Diliman*
2016	**Diliman BPI-DOST Science Award**, Awardees are selected on the basis of their academic and research performance and nomination from the school	*UP Diliman*
2016	**International Publication Award**, Awarded by the University of the Philippines to faculty and students who were able to publish papers in ISI journals	*UP Diliman*
2012-2016	**University Scholar**, Awarded by the University of the Philippines to students who were able to garner a GWA higher than 1.25 for the semester, 1st Sem A.Y. 15-16, 1st Sem A.Y. 12-13	*UP Diliman*
	College Scholar, Awarded by the University of the Philippines to students who were able to garner a GWA higher than 1.75 but lower than 1.25 for the semester, 2nd Sem A.Y. 14-15, 2nd Sem A.Y. 12-13	*UP Diliman*

Affiliations

2018-present	**Samahang Pisika ng Pilipinas**, Professional organization of physicists and physics educators in the Philippines.	*UP Diliman*
2015-present	**UP Alpha Sigma Fraternity**, The UP Alpha Sigma Fraternity is the first Philippine progressive fraternity that was established to form a unique vision that aimed at principled brotherhood, fused with the scholarly pursuit of truth-reason-justice.	*UP Diliman*
2014-present	**Theoretical Physics Group**, Members of the group perform research in mathematical physics, computational physics, statistical mechanics, quantum mechanics, nonlinear problems, gravitational physics, and relativistic astrophysics.	*UP Diliman*

References

Eric A. Galapon, PhD

Professor

- Thesis Adviser, Theoretical Physics Group, National Institute of Physics, University of the Philippines Diliman
- eric.galapon@up.edu.ph

Michael Francis Ian Vega II, PhD

Professor

- Program Coordinator, Theoretical Physics Group, National Institute of Physics, University of the Philippines Diliman
- ivega@nip.upd.edu.ph

Giovanni A. Tapang, PhD

Professor

- Dean, College of Science, University of the Philippines Diliman
- gtapang@nip.upd.edu.ph