Gustavo Cesar Valdivia Mera

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1 Education and achievements

1.1 Ph.D. student in Physics

University of Houston
Department of Physics. Houston, Texas, USA.

Currently in 2nd year (Summer 2024)

1st year grades (Fall 2023 and Spring 2024)

Basic Core Courses	Grade	Qualifying exam
Methods of Math Physics I	A	A
Quantum Mechanics I	A	A
Advanced Mechanics I	A	A
Electrodynamics	A	A
Quantum Mechanics II	A	A
Statistical Physics	A	A

Elective Course	Grade
Selected Topics in Math: Quantum Information	A

Honors and Awards

2023 - 2025	Presidential Fellowship.
11/2023	Winner of the 2023 Quantum Computing Fall Fest competition at University of Houston.
2024 - 2026	Lydia Mendoza Fellowship.

1.2 M.Sc. in High Energy Physics

ICTP-EAIFR
Department of Physics, University of Rwanda.

Thesis: Bounds on eV-scale sterile neutrinos from neutrinoless double-beta decay.
Advisor: Alexei Smirnov.

1st year (09/2020 - 09/2021)
ICTP - East African Institute for Fundamental Research
University of Rwanda. Kigali, Rwanda.

2nd year (09/2021 - 09/2022)

International Centre for Theoretical Physics (ICTP)

Pursued the ICTP-Postgraduate Diploma Program (online) as part of my master's degree at ICTP-EAIFR.

Honors and Awards

Rank: 1st in High Energy Physics.

1.3 Professional degree in Physics

Universidad Nacional Mayor de San Marcos
Faculty of Physical Science. Lima, Peru.

02/2020 Professional title received.

Thesis: On the subjacent relation to Quantum Entanglement and Wormholes: ER = EPR.
Advisor: Teofilo Vargas.

Honors and Awards

03/2019 Thesis defense

Grade : 18 out of 20.
Mention : **Outstanding**.

08/2018 Grant received

Winner of the university's research vice-chancellor's scholarship contest.

1.4 B.Sc. in Physics

5-year program focused on Theoretical Physics.

Universidad Nacional Mayor de San Marcos
Faculty of Physical Science. Lima, Peru.

05/2017 Bachelor degree received.

Majors	**Grade**
◦ Advanced Topics I: General Relativity	16/20
◦ Advanced Topics II: Nuclear Physics	19/20
◦ High Energy Physics: Review of QED and QCD	18/20
◦ Seminar I: Group Theory and Classical Field Theory	18/20
◦ Seminar II: Introduction to Quantum Field Theory	20/20

Honors and Awards

I. Rank: 1st in the graduating class.

II. Recognition for academic excellence awarded at the opening ceremony of the academic year in the Faculty of Physical Sciences:

03/2017 1st place in the academic performance ranking (21 students).

03/2016 1st place in the academic performance ranking (60 students).

03/2015 2 nd place in the academic performance ranking (60 students).

03/2014 3rd place in the academic performance ranking (100 students).

03/2013 2nd place in the academic performance ranking (100 students).

III. The highest grade obtained in a single period:

2016 - 2 20 out of 20.

2 Research experience

2.1 Research groups

2023 - Present **QuantumQuipu**

QuantumQuipu is a group dedicated to the research and promotion of quantum computing. With the invaluable support of prominent entities in the field, we have been able to organize workshops and events to foster knowledge and awareness of quantum computing in Peru and Latin America. In addition to our outreach efforts, we actively engage in research activities to contribute to the advancement of this exciting field. As a team of students and professors, our mission is to explore and share the possibilities of quantum computing, driving innovation and education in our region.

2021 - Present **Python Club for Physicists**

The Python Club for Physicists is a student club created with the purpose of being personalized computer support to the student, incubator, channeler, and promoter of interested people in developing computational physics.

2019 - 2022 Fundamental Physics Group

I have worked in a specialized team focused on theoretical and computational physics, specifically dedicated to the study of gravitation. As part of this research group, we successfully conducted numerical calculations of geodesics for a special black hole solution with hair, leading to a significant preprint publication.

2015 - 2019 Theoretical Physics Group

Universidad Nacional Mayor de San Marcos

During my undergraduate studies, I had the privilege of working in the Theoretical Physics Group of my faculty, which equipped me with the necessary tools to pursue my journey in theoretical physics. This experience greatly aided my understanding of my thesis topic on AdS/CFT correspondence and provided insights into the forefront of theoretical physics.

2.2 Articles

2023 Path integral derivation of the thermofield double state in causal diamonds (e-Print: arXiv)

2021 Anomalous changing angular momentum of hairy black holes geodesics (e-Print: arXiv)

2020 A review on the Unruh Effect and the Thermofield-double state (e-Print: arXiv)

2.3 Speaker Engagements in Academic Event

08/2023 **Quantum Algorithm I and II**
Quantum Scholars 2023 (online)
QuantumQuipu.

06/2023 **Bounds on eV-scale sterile neutrinos from neutrinoless double-beta decay**
Summer School on Particle Physics
ICTP. Trieste, Italy.

03/2021 **Numerical Simulations of Particle Orbits in a Schwarzschild-like Spacetime**
II Summer School of Computational Physics
Python Club for Physicists (online).

11/2017 **On the subjacent relation to Quantum Entanglement and Wormholes: ER = EPR** (First version)
Physics Week 2017
Universidad Nacional Mayor de San Marcos. Lima, Peru.

10/2016 **Introduction to the AdS/CFT correspondence**
XXV Peruvian Symposium of Physics
Pontificia Universidad Católica del Perú. Lima, Peru.

01/2016 **QFT in Non-Inertial Reference Frames: Unruh Effect**
X Theoretical Physics at the Rimac River
Universidad Nacional de Ingeniería. Lima, Peru.

11/2015 **Gravitational Collapse, Black Holes and Thermodynamics**
Physics Week 2015
Universidad Nacional Mayor de San Marcos. Lima, Peru.

11/2015 **Black Hole and Thermodynamics**
XXIV Peruvian Symposium of Physics
Universidad Nacional Mayor de San Marcos. Lima, Peru.

08/2015 **Introduction to General Relativity**
III Regional Symposium of Physics
Universidad Nacional del Callao. Lima, Peru.

3 Conferences and Workshops in Theoretical Physics, Programming, and Quantum Computing

06/2023 **Summer School on Particle Physics**
ICTP. Trieste, Italy.

10/2022 **I Peruvian School on Quantum Computing**
Python Club for Physicists (online).

01/2021 **IV Joint ICTP-Trieste/ICTP-SAIFR School on Cosmology: Challenges for the Standard Cosmological Model**
(online).

11/2020 **African Physical Society International Conference**
(online).

10/2020 **Python for physicists**
Python Club for Physicists (online).

04/2019 **Gravity at UCEN 2019**
Universidad Central. Santiago, Chile.

11/2018 **I School of Holography and Entanglement Entropy**
Faculty of Physical Sciences
Universidad Nacional Mayor de San Marcos. Lima, Peru.

01/2018 **Summer school on Theoretical Physics UACh 2018**
Faculty of Physical and Mathematical Sciences
Universidad Austral de Chile. Valdivia, Chile.

01/2018 **Holography and Supergravity 2018**
Universidad Adolfo Ibañez. Viña del Mar, Chile

09/2017 **Minicourse on Machine Learning for many-body Physics**
IFT-UNESP. S$\tilde{a}$o Paulo, Brasil

06/2017 **UDEC School: String Theory 2017**
Faculty of Physical and Mathematical Sciences
Universidad de Concepción. Concepción, Chile

05/2016 **School on Fundamental Aspects of String Theory**
IFT-UNESP. S$\tilde{a}$o Paulo, Brasil

4 Social and academic responsibilities

2023 **Presentation at the "Health, Fitness, and Education Fair"**

At this event, a group of graduate students from the University of Houston, of Latin heritage, were invited to participate by showcasing homemade experiments, with the aim of motivating local school students to engage in science and potentially consider a career in the scientific field in the future. Such events are of paramount importance for the community, especially for minority groups.

2015/2016 **President** - Physics Student Centre

The Physics Student Centre was established in 2015 as a dedicated entity to provide comprehensive support to students. In my capacity as president, I led my team in successfully achieving all the academic, artistic, and social objectives of the centre.

We organized several significant activities, including:

- Introductory classes for new students.
- Reconstruction of the old student's library.
- Organization of the 1st Meeting of Nuclear and Medical Physics.

2016 **Member of *Campos y Cuerdas* (Fields and Strings)**

This initiative was founded by Alejandro de la Puente, a distinguished Peruvian particle physicist, with the purpose of fostering collaboration among various research groups in Peru. The group facilitates video conferences on topics such as Quantum Field Theory, General Relativity, and related subjects. As an active member, I regularly participated in these video conferences and also took the initiative to organize scientific events in Lima, Peru.

We organized several significant activities, including:

- Juan Maldacena: AdS/CFT Correspondence (video-conference).
- Introduction to General Relativity (video-conference).
- Mini-course on Cosmic Ray Physics (video-conference).

5 Work experience

01/2024 - Present
University of Houston - Houston, Texas, USA
Department of Physics
Research Assistant

08/2023 - 12/2023
University of Houston - Houston, Texas, USA
Department of Physics
Teaching Assistant

03/2020 - 07/2023
Universidad Privada del Norte - Lima, Peru
Department of Science
Physics Teaching Assistant

03/2019 - 12/2019
Academia Olympia - Lima, Peru
Online Mathematics and Physics tutoring

04/2018 - 06/2018
TECSUP - Lima, Peru
Department of General Studies
Professor of Physics

05/2017 - 08/2017
Editorial Santa María - Lima, Peru
Editor of Academic Textbooks with Technical Expertise

03/2017 - 12/2017
Universidad de Ingeniería y Tecnología (UTEC) - Lima, Peru
Department of Mathematics
Mathematics Teaching Assistant

03/2016 - 12/2016
Universidad Nacional Mayor de San Marcos - Lima, Peru
Faculty of Physical Science
Physics Teaching Assistant

03/2015 - 11/2015
Seminario Permanente de Astronomía y Ciencias Espaciales (SPACE)
Universidad Nacional Mayor de San Marcos - Lima, Peru
Results presentation: XXIV Peruvian Symposium of Physics
Junior Researcher in Black Hole Thermodynamics