

Gustavo Valdivia-Mera

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EDUCATION

University of Houston

2023–Present

Ph.D. in Physics

GPA: 4.0 (All courses graded A)

- **Core courses:** Methods of Mathematical Physics, Quantum Mechanics I & II, Advanced Mechanics, Classical Electrodynamics, Statistical Physics
- **Electives:** Quantum Field Theory I & II, General Relativity and Cosmology, Quantum Information, Advanced Statistical Mechanics

ICTP-EAIFR/University of Rwanda

2020–2022

M.Sc. in High Energy Physics

Ranked 1st in cohort (HEP section)

- *Thesis:* Bounds on eV-scale sterile neutrinos from neutrinoless double-beta decay.
- During the second year of this program, I also completed the ICTP Diploma Programme in High Energy Physics (online).

Universidad Nacional Mayor de San Marcos

2018–2019

Professional Degree in Physics

Grade: 18/20 (Outstanding)

- *Thesis:* On the underlying relation between Quantum Entanglement and Wormholes

Universidad Nacional Mayor de San Marcos

2012–2017

B.Sc. in Physics

Graduated 1st in Class

- **Advanced coursework:** Quantum Field Theory, General Relativity, Nuclear Physics

RESEARCH EXPERIENCE

University of Houston

2024–Present

Research Assistant

- Quantum field theory in curved spacetime
- Black hole thermodynamics
- Quantum information

Theoretical Physics Group, UNMSM

2015–2019

Undergraduate Research Affiliate

- AdS/CFT correspondence
- Black hole thermodynamics

PUBLICATIONS

- (2025) **Horizon brightened acceleration radiation entropy in causal diamond geometry: A near-horizon perspective.**
Physical Review D 112, 085030 (2025).
- (2025) **Thermal nature of the causal diamond horizon: A hidden property of the inertial propagator.**
Physical Review D (in press).

- (2025) **On the Unruh effect and the thermofield double state.**
International Journal of Modern Physics D 34, 2530002 (2025).
- (2024) **Path integral derivation of the thermofield double state in causal diamonds.**
Classical and Quantum Gravity 42, 025015 (2024).

PRESENTATIONS

Conference Presentations

- **Towards HBAR in the causal diamond near horizon**
IQSE Summer School on Quantum Science, Texas A&M University, Casper, WY *Jul 2025*
- **Near-horizon (conformal) aspects of black holes and the universality (robustness) of HBAR entropy**
AMO/IQSE Seminar, Texas A&M University, College Station, TX *Apr 2025*
- **Path integral derivation of the thermofield double state in causal diamonds**
APS Global Physics Summit, Anaheim, CA *Mar 2025*
- **Quantum Algorithms I & II**
Quantum Scholars Program, QuantumQuipu (Online) *Aug 2023*
- **Bounds on eV-scale sterile neutrinos from neutrinoless double-beta decay**
Summer School on Particle Physics, ICTP, Trieste *Jun 2023*
- **Numerical simulations of particle orbits in Schwarzschild-like spacetime**
II Summer School of Computational Physics (Online) *Mar 2021*

Earlier Presentations

- **ER = EPR: Quantum entanglement and wormholes**
Physics Week, UNMSM, Lima *Nov 2017*
- **Introduction to the AdS/CFT correspondence**
XXV Peruvian Symposium of Physics, PUCP, Lima *Oct 2016*
- **QFT in non-inertial reference frames: Unruh effect**
X Theoretical Physics at the Rimac River, UNI, Lima *Jan 2016*
- **Black hole thermodynamics**
XXIV Peruvian Symposium of Physics, UNMSM *Nov 2015*

TEACHING EXPERIENCE

- **University of Houston**
 - Quantum Mechanics (Undergraduate) *Fall 2025*
 - Quantum Mechanics II (Graduate) *Spring 2025*
 - Physics Laboratory (Undergraduate) *Fall 2023*
- **TECSUP, Lima** *2018*
General Physics

AWARDS AND HONORS

- **Lydia Mendoza Fellowship** *2024–2026*
University of Houston
- **Presidential Fellowship** *2023–2025*
University of Houston
- **1st Place, Quantum Computing Fall Fest** *2023*
University of Houston
- **Research Scholarship** *2018*
UNMSM Vice-Chancellor's Office

TECHNICAL SKILLS

- **Programming:** Python, Fortran, L^AT_EX, Mathematica