Gustavo Valdivia-Mera

Department of Physics and Texas Center for Superconductivity,
University of Houston, Houston, TX, USA

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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
QFT 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 112, 125008 (2025).
- (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

- **Strange Metals and Black Holes: A Holographic Correspondence**
  Research Day, Department of Physics, University of Houston, TX, USA *March 2026*
- **Thermal Nature of the Causal Diamond Horizon**
  TINKUY 2026: "Un Panorama de la Física Teórica en el Perú", Lima, Peru *Feb 2026*
- **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, LaTeX, Mathematica