

Gustavo Diniz, PhD

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Theoretical physicist specializing in quantum phenomena, with expertise in renormalization group techniques for both equilibrium and non-equilibrium systems. Strong background in quantum field theory, Kondo physics, and advanced mathematical and numerical methods applied to condensed matter problems.

Education and Experience

07/2026– Present – Postdoc position - Institute of Physics, Czech Academy of Sciences, Prague, Czech Republic. Supervisor: Dr. Peter Zalom. Title: *Topological and Quantum Phenomena in Strongly Interacting Orbital–Superconductor Heterostructures*.

03/2026–06/2026 – Visiting Researcher – Charles University, Prague, Czech Republic. Supervisor: Prof. Dr. Tomáš Novotný. Title: *Kondo physics in the presence of vibrations*.

2020–2024 – PhD in Theoretical Physics – Institute of Physics of São Carlos, University of São Paulo (USP). Supervisor: Prof. Dr. Luiz Nunes de Oliveira. PhD thesis: *Sticking Coefficient for Atoms Impinging on Metallic Surfaces and X-ray Photoemission by Metals*.

2018–2020 – Master’s degree in Theoretical Physics – Federal University of Uberlândia (UFU). Supervisor: Prof. Dr. Edson Vernek. Master’s thesis: *Reentrant Kondo Effect for a Quantum Impurity Coupled to a Metal-Semiconductor Hybrid Contact*.

2013–2017 – Bachelor’s degree in Mechatronics Engineering – Federal University of Uberlândia (UFU).

Research

Published Papers:

- 1- *Reentrant Kondo effect for a quantum impurity coupled to a metal-semiconductor hybrid contact*. **G. Diniz**, G. S. Diniz, G. B. Martins and E. Vernek. Phys. Rev. B, V. 101, p. 125115, 2020.
- 2- *The Sommerfeld-Watson transformation in teaching condensed matter physics: analytical diagonalization of Fermi gas-like models*. **G. Diniz**, M. P. Lenzarini, and F. D. Picoli. Brazilian Journal of Physics, V. 47, p. e20250103, 2025.
- 3- *Transport in Single Quantum Dots: A Review from Linear Response to Nonlinear Regimes*. **G. Diniz**, S. Quintino and V. V. França. Braz J Phys 56, 27, 2025.
- 4- *Tracking adiabaticity in nonequilibrium many-body systems using x-ray photoemission from metals as a stringent test*. **G. Diniz**, F. D. Picoli, L. N. Oliveira, and I. D’Amico. Phys. Rev. A 113, 022207, 2026.

Preprint Papers:

- 1- *Temporal structures of the X-ray photoemission problem*. F. D. Picoli, **G. Diniz**, M. P. Lenzarini, I. D’Amico, and L. N. Oliveira. ArXiv preprint, 2025.
- 2- *BCS-BEC crossover in trapped one-dimensional Fermi-Hubbard chains: entanglement and correlation signatures from DMRG and effective-pairing theory*. **G. Diniz**, I. M. Carvalho, M. Sanino, F. Iemini and V. V. França. ArXiv preprint, 2026.

3- *Real-space renormalization-group study of decoherence and revival following a sudden quench in a finite system.* **G. Diniz**, F. D. Picoli, and L. N. Oliveira. ArXiv preprint, 2026.

4- *Quantum Electron–Nuclear Dynamics of Hydrogen Sticking on Metal Surfaces*, **G. Diniz**, L. N. Oliveira, R. Requist, A. Schild, E. K. U. Gross, and C. R. C. Rêgo, 2026. ArXiv preprint, 2026.

5- *Symmetry-Induced Weyl Nodes in Interacting Multi-Terminal Josephson Junctions.* P. Zalom, **G. Diniz**, D. C. Ohnmacht, and W. Belzig. ArXiv preprint, 2026.

Grants

1. *Topological and Quantum Phenomena in Strongly Interacting Orbital–Superconductor Heterostructures*. Marie Skłodowska-Curie Postdoctoral Fellowship (MSCA PF). Funding Agency: HORIZON EUROPE - European Innovation Council (Prague, Czech Republic, CZ). Process No. 01081515. Period: 01/07/2026 – 30/06/2028.

2. *Calculation of the Sticking Coefficient for Atoms Colliding with a Metallic Surface.* PhD Scholarship. Funding Agency: CAPES. Process No. 88887.495890/2020-00. Period: 04/01/2020 – 03/30/2024.

3. *Poor Man’s Scaling Analysis of a Magnetic Impurity Coupled to a Structured Conduction Band.* Master’s Scholarship. Funding Agency: CAPES. Process No. 88882.429051/2018-01. Period: 03/01/2018 – 02/30/2020.

4. *Study of Finite-Size Effects in Nanoparticles with Magnetic Properties (Synthesis and Characterization).* Undergraduate Research Scholarship. Funding Agency: FAPEMIG and CNPq. Process Nos. CNPQ2014EXA036, FAPEMIG2016EXA005 and FAPEMIG2017EXA001. Period: 01/08/2014 – 02/30/2018.

Talks

1. *BCS–BEC Crossover in One-Dimensional Fermi-Hubbard Systems.* University of Konstanz, Germany, 2026.

2. *Sticking Coefficient for Atoms Impinging on Metallic Surfaces.* Charles University, Prague, Czech Republic, 2026.

3. *The Photoemission Problem: Time-Dependent Many-Body Dynamics and Satellite Peaks.* ICTP-SAIFR, São Paulo, Brazil, 2025.