

# Alejandro Garcia Soria

✉ agarcias002@gmail.com | ✉ alejandro.garciasoria@estudiante.uam.es | ☎ +34 692 583 861 |  agarciasoria.github.io

## PROFILE

Theoretical physicist with dual undergraduate training in Physics and Mathematics and an M.Sc. in Theoretical Physics from the Instituto de Física Teórica (IFT, CSIC-UAM). My research focuses on holography and gauge/gravity duality, with emphasis on strongly coupled quantum field theories, transport phenomena, and higher-derivative gravitational models relevant for QCD-like systems. I am seeking PhD training in theoretical physics within a mathematically rigorous research environment.

## RESEARCH INTERESTS

- Gauge/gravity duality and holography
- Strongly coupled quantum field theory and QCD-like systems
- Transport phenomena and relativistic hydrodynamics
- Higher-derivative and effective theories of gravity
- Black hole physics and gravitational backgrounds

## RESEARCH EXPERIENCE

### INSTITUTO DE FÍSICA TEÓRICA (IFT-CSIC) | MASTER'S THESIS 2024 – 2025 | Madrid, Spain

- Thesis: *Higher Derivative Gravity and Holographic QCD*.
- Used the AdS/CFT correspondence to study strongly coupled plasmas via gravitational duals.
- Analysed transport properties in higher-derivative gravity models, focusing on the shear viscosity ratio  $\eta/s$ .
- Derived a general master formula for  $\eta/s$  in dilatonic quasi-topological gravity, valid beyond perturbative curvature expansions.
- Computed the speed of sound by numerically solving coupled black hole equations of motion.
- Investigated the role of higher-curvature corrections beyond Einstein gravity in holographic models.

### JAE INTRO -- CSIC | RESEARCH INTERN IN THEORETICAL PHYSICS Oct 2024 – Feb 2025 | IFT-CSIC, Madrid

- Competitive research fellowship funded by the Spanish National Research Council (CSIC).
- Worked on holography, gravity, and strongly coupled quantum systems.
- Studied transport coefficients in higher derivatives holographic models.
- Applied numerical and symbolic methods to coupled gravitational systems.

## ACADEMIC PROJECTS

### BACHELOR'S THESIS -- PHYSICS | GENERAL RELATIVITY AND COMPACT OBJECTS 2023 | University of Oviedo

- Studied exact solutions of Einstein's equations and their physical interpretation.

### BACHELOR'S THESIS -- MATHEMATICS | DYNAMICAL SYSTEMS AND HOPF BIFURCATION 2023 | University of Oviedo

- Analytical study of nonlinear dynamical systems and bifurcation theory.
- Title: *Slow Passing Through a Hopf Bifurcation*.

## EDUCATION

### AUTONOMOUS UNIVERSITY OF MADRID (UAM)

M.Sc. IN THEORETICAL PHYSICS  
(IFT-CSIC)

2024 – 2025 | Madrid  
Specialisation in particle physics and cosmology.

Master's thesis in holography, gravity, and relativistic hydrodynamics.

### UNIVERSITY OF OVIEDO

DUAL B.Sc. IN PHYSICS AND MATHEMATICS

2018 – 2023 | Oviedo  
Final GPA: 8.78 / 10 (Physics).  
Bachelor's theses in General Relativity and Dynamical Systems.

## TECHNICAL SKILLS

### PROGRAMMING

Python • Matlab • R  
LaTeX • Git • Mathematica

### SCIENTIFIC COMPUTING

Symbolic tensor computations  
Black hole backgrounds and gravitational solutions  
ODE/PDE solvers and shooting methods

## LANGUAGES

Spanish (Native)  
English (C1 – Cambridge Certified)  
French (Basic)

## AWARDS & FUNDING

- JAE Intro Research Fellowship (CSIC, 2024)
- Academic Excellence Scholarship for Master's Studies (UAM, 2024)
- Gold Medal – Regional Chemistry Olympiad (La Rioja, 2018)
- Silver Medal – Regional Physics Olympiad (La Rioja, 2018)