

Carlos Sebastián Monago Díaz

PhD candidate in Physics | UNED

csmonago@fisfun.uned.es | ORCID 0009-0005-9552-6666

RESEARCH PROFILE

I am a PhD candidate in Physics at UNED studying how microscopic interactions shape the dynamics of soft matter and biomolecular systems. I develop coarse-grained stochastic models that reproduce equilibrium structure and dynamical correlations from microscopic simulations.

My published work focuses on internal friction in proteins and self-averaging methods to estimate interaction potentials, friction coefficients and configuration-dependent mobilities. My current work extends this approach to colloidal hydrodynamics and dynamic fluid mappings, examining translation-rotation couplings and the microscopic material retained by moving coarse-grained particles.

Research interests: dynamic coarse-graining; stochastic dynamics; parameter estimation; internal friction; colloidal hydrodynamics; molecular simulation; scientific machine learning.

PEER-REVIEWED PUBLICATIONS

2026 Self-averaging parameter estimation for coarse-grained particle models

Carlos Monago, J. A. de la Torre and Pep Español

The Journal of Chemical Physics **165**, 044103. doi:10.1063/5.0340034

Open manuscript: arXiv:2604.18068

2025 Unraveling internal friction in a coarse-grained protein model

Carlos Monago, J. A. de la Torre, Rafael Delgado-Buscalioni and Pep Español

The Journal of Chemical Physics **162**, 114115. doi:10.1063/5.0255498

Open manuscript: arXiv:2606.27133

RESEARCH EXPERIENCE AND PROJECTS

Predoctoral Researcher (FPI) · UNED

Sep 2022 – Aug 2026

Department of Fundamental Physics, Madrid. Coarse-grained modeling and stochastic dynamics.

FPI grant PRE2021-099773, Spanish State Research Agency (AEI); associated project PID2020-117080RB-C54.

Visiting Scholar · University of Pennsylvania

14 Apr – 17 Jul 2025

Deep learning and neural networks for modeling fluids under hydrodynamic flow.

Department of Mechanical Engineering and Applied Mechanics, Philadelphia, USA.

Host: Prof. Nathaniel Trask. Research stay funded through PRE2021-099773.

Research Assistant · Virtual QCM, UNED

Mar – Aug 2022

Dissipation in quartz crystal microbalance experiments on biological samples and soft matter.

Project PDC2021-121441-C22, Spanish State Research Agency (AEI).

Research team member · PRETHEXP, UNED

Project period: 2025–2028

Dynamic coarse-graining of biological and soft matter systems.

PID2024-158994OB-C43, Spanish State Research Agency (AEI).

EDUCATION

PhD in Physics · UNED

Sep 2022 – Present

Universidad Nacional de Educación a Distancia (UNED), Madrid. In progress.

Supervisors: Pep Español and J. A. de la Torre. Tentative defence: 2027.

MSc in Theoretical Physics · Universidad Complutense de Madrid

Sep 2020 – Sep 2021

Research on Brownian motion using holographic optical tweezers.

Master's thesis: Detailed equilibrium and entropy creation in biological systems. Supervisors: Francisco Monroy and Niccolò Caselli.

BSc in Physics · Universidad Complutense de Madrid

Sep 2016 – Sep 2020

Final project: Transport phenomena in porous media. Supervisor: Carmen García Payo.

TEACHING EXPERIENCE

Teaching Assistant · UNED**180 certified hours**

COURSE	PERIOD	HOURS
Classical Mechanics BSc Physics, second year	Oct 2024 – Jan 2025	30
Physical Foundations of the Environment BSc Environmental Sciences, first year	Oct 2024 – Jan 2025	30
Classical Mechanics BSc Physics, second year	Oct 2023 – Jan 2024	60
Electromagnetism and Optics BSc Chemistry, first year	Jan – Jun 2023	60

TEACHING INNOVATION

Member · Physics Teaching Innovation Group (GIDF), UNED

Group GID2016-25. Member of the teaching innovation project “Blog de Física de la UNED” (academic years 2024–2025, 2025–2026), directed by Adolfo Vázquez Quesada.

CONFERENCE PRESENTATIONS

Parameter Estimation for Coarse-Grained Models via Self-Averaging FisEs Joven'24 · 13–14 November 2024 · Online · GEFENOL, RSEF.	Talk
A Self-Averaging Method to Fit Parameters in Coarse-Grained Models 2nd Spanish Soft Matter 1 1/2 Day · 3–6 November 2024 · Benasque, Spain · GEFES, RSEF.	Poster
Self-averaging method for parameter estimation of coarse-grained models 12th Liquid Matter Conference · 22–27 September 2024 · Johannes Gutenberg University Mainz, Germany.	Poster

RESEARCH SCHOOLS AND TRAINING

LAMMPS Workshop and Symposium Temple University, Philadelphia, USA. Online attendance.	8–11 Aug 2023
MolSim 2023 University of Amsterdam, Netherlands. Molecular simulation school.	9–20 Jan 2023
ESPresSo Summer School University of Stuttgart, Germany. Online attendance.	10–14 Oct 2022

SCIENTIFIC COMPUTING AND SOFTWARE

Programming	C++, Python.
Simulation	LAMMPS, GROMACS.
Analysis	Mathematica, MATLAB, Matplotlib, Gnuplot, VMD.
Environment	Linux, shell scripting, Vim, LaTeX.

LANGUAGES AND CERTIFICATES

Spanish: native. **English:** C2 Proficiency, Cambridge English (March 2023).**Mandarin Chinese:** HSK 1.**Artificial Intelligence and Data Science for Leaders** · University of Chicago (February 2022). [Credential](#).**Cloud Support Associate** · Amazon Web Services (December 2021).