Elvis Aguero

PhD. Candidate in Engineering. MSc. Applied Mathematics

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Education

2024-2029 **PhD, Fluids and Thermal Sciences**, *Brown University*, Providence, RI. **Brown Diversity Fellow**.
Advancing multidisciplinary research that bridges applied mathematics, scientific computing, and data-driven modeling of complex fluid systems.

2020-2024 **B.Sc., Engineering Physics**, *Universidade Federal da integração Latino-Americana (UNILA)*, Foz do Iguaçu, Brazil. **Summa cum Laude**.

2017–2019 **M. Sc., Applied Maths**, *Instituto de Matemática Pura e Aplicada*, Rio de Janeiro, Brazil.
Completed Master's studies at 18. Advisor: André Nachbin

Publications & Technical Work

2025 E. A. Agüero, C. A. Galeano-Rios, C. T. Gabbard, C. Ragazzo, D. M. Harris, and P. A. Milewski. *Droplet rebounds off a fluid bath: kinematic match simulations and experiments*. **Arxiv preprint under review in the Journal of Fluid Mechanics**. arXiv:2509.22826v1 Led numerical modeling, implementation and analysis.

2025 C. T. Gabbard, E. A. Agüero, R. Cimpeanu, K. Kuehr, E. Silver, J.-W. Barotta, C. A. Galeano-Rios, and D. M. Harris. *Drop rebound at low Weber number*. **Journal of Fluid Mechanics**, vol. 1019, A25. DOI:10.1017/jfm.2025.10589. Led numerical modeling, implementation and analysis.

2022 E. A. Agüero, L. Alventosa, D. M. Harris, and C. A. Galeano-Rios. *Impact of a rigid sphere onto an elastic membrane*. **Proceedings of the Royal Society A**. DOI:10.1098/rspa.2022.0340. Led numerical modeling, implementation and analysis.

Fellowships and Awards

2024 **Brown Diversity Fellowship**, Brown University.

2017 **CNPq Fellowship for M.Sc. Studies**, Instituto de Matemática Pura e Aplicada (IMPA), Brazil.

2017 **Domingo Martínez de Irala Medal**, national order of merit, Asunción, Paraguay.

2016–2015 **International Mathematical Olympiad (IMO)**, Bronze Medals (2015, 2016).

2016–2015 **Ibero-American Mathematical Olympiad**, Bronze Medal (2016) and Honor Mention (2015).

2011–2016 **Paraguayan Mathematical Olympiad**, Gold (2013, 2015, 2016) and Silver (2011, 2012, 2014) Medals.

2016 **Distinguished Citizen of Ciudad del Este Medal**.

Selected Talks

Nov 2025 **APS Division of Fluid Dynamics (78th Annual Meeting)**, Houston, USA. *Wave-Driven Propulsion of a Flexible Raft* — contributed talk.

Oct 2025 **Numerical Methods Seminar, Universidade de São Paulo**, Online. *The Kinematic Matching Method for Deformable Impactors* — invited seminar.

Nov 2024 **APS Division of Fluid Dynamics (77th Annual Meeting)**, Salt Lake City, USA. *Rebound of a Droplet Impacting a Non-Wetting Rigid Surface* — contributed talk. [abstract]

Aug 2024 **Julia for High-Energy Physics Workshop 2024**, Online (host: CERN). *Enabling Julia to Run at Scale with Artifact Caching*. [program]

Jul 2023 **Brazil–China Joint Mathematical Meeting**, Foz do Iguaçu, Brazil. *Impact of a Rigid Sphere onto an Elastic Membrane*. [program]

Experience

2024 **Summer Intern, EP–SFT**, *CERN*, Geneva, Switzerland.
- Developed infrastructure enabling Julia precompilation across heterogeneous clusters; containerized workflows for consistent runtimes. [Pull request contribution]

2020–2023 **Academic Project Manager**, *Piensa Paraguay*, Ciudad del Este, Paraguay.
- Designed math curriculum and built a MongoDB problem bank (>1,000 items).

2019 **Project Intern**, *Parque Tecnológico Itaipu*, Hernandarias, Paraguay.
- Implemented an SVM classifier in MATLAB for high-voltage circuit-breaker faults.

2023 **Scanning Electron Microscope Lab Assistant**, *UNILA*, Foz do Iguaçu, Brazil.
- Assisted sample preparation and lab operations for SEM imaging.

Teaching

University Teaching

Fall 2025 Teaching Assistant, **Data-Driven Design & Analysis of Structures & Materials**, Brown University, School of Engineering. [course site]

Summer 2025 Teaching Assistant, **Soft Matter Physics**, Brown University Pre-College Program.

Fall 2022 Teaching Assistant, **Physics II**, Universidade Federal da Integração Latino-Americana (UNILA), Brazil.

Fall 2021 Teaching Assistant, **Numerical Calculus**, UNILA, Brazil.

Summer 2019 Teaching Assistant, **Functional Analysis (Summer School)**, Instituto de Matemática Pura e Aplicada (IMPA), Brazil.

Outreach & Mentoring

2017–2024 National Instructor, **Young Talents Program**, OMAPA (Paraguay). Delivered advanced mathematics and problem-solving training to national Olympiad winners preparing for international competitions. [videos]

Workshops and Summer Schools

2025 Participant, **Summer School on Soft Matter Physics**, UMass Amherst, Amherst, MA. Topics included: Control Theory in Physics, Physics of Biofilms, Instability, Flocking and Self-assembly.

2024 Participant, **7th Summer School in Advanced Experimental Physics**, CBPF, Rio de Janeiro, Brazil (acceptance rate $\approx 15\%$). Hands-on modules included ferromagnetic resonance, magnetron sputtering, and X-ray reflectivity to study thin-film bilayers.

2024 **7th Summer School in Advanced Experimental Physics**, Centro Brasileiro de Pesquisas Físicas (CBPF), Rio de Janeiro, Brazil. Selected participant (acceptance rate $\approx 15\%$) in hands-on modules on thin-film characterization and magnetization dynamics. [Final report]

Programming & Technical Skills

Languages **Julia**, **Python**, **MATLAB**, **C++** | Java, JavaScript, R

Numerical & ML Sparse/iterative linear algebra; numerical optimization; autodiff (JAX, Zygote/ForwardDiff); scientific Python stack (NumPy/SciPy/Matplotlib); PyTorch; MATLAB optimization & bayesopt.

HPC & Systems Linux, Bash; Git/GitHub; Slurm (cluster workflows); Apptainer/Docker; CI basics.

CFD & Simulation OpenFOAM; Basilisk; PDE modeling and solver development; data-driven modeling/ROM.

Data & Scripting SQL, MongoDB; Google Apps Script; HTML/JS for lightweight tools.

Leadership & Outreach

2017– **OMAPA (NGO)**, *Organizer, Trainer, Coordinator, Jury Member, Team Leader*.
- Authored 200+ mathematics competition problems; instructed the Young Talents Program.
- Served on delegations and juries for international olympiads (e.g., Cyberspace Mathematical Competition 2020; Ibero-American MO 2021; International Mathematical Olympiad 2022, Oslo).

2022–2023 **UNILA**, *Engineering Physics Student Council*.

- Elected representative; supported course coordination and student–faculty communication.

2019–2022 **Mathura (NGO)**, *Board Member; Teaching Staff*.

- Supported an NGO providing free Mathematics and Spanish instruction to underserved high school students; contributed to curriculum and classroom teaching.

2019–2021 **ReAcción Paraguay (NGO)**, *Volunteer Data Analyst*.

- Used Python and Google Apps Script to analyze thousands of public contracts on education spending before/after COVID-19; contributed to published reports [reports].
- Delivered public seminars on open data and worked on automating contract-data analysis.

Languages

Spanish	CEFR C2	Portuguese	CEFR C2
English	CEFR C1	French	CEFR A1

Other Activities

- Problem solving - ranked within the top 0.4 % on Project Euler.
- Chess - active player on Lichess; regular participation in online tournaments.
- Sports - recreational running and soccer.