**CRISTIAN VILLALOBOS-CONCHA**

Postdoctoral Researcher in Soft Matter Physics

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Address: Room N°5100, 166 Cours de l'Argonne, 33000 Bordeaux, France • Email: cristian.villalobos-concha@u-bordeaux.fr • Nationality: Chilean • Born: November 02, 1994

**Researcher Profile:** *Experimental and theoretical physicist with unique expertise combining advanced experimental soft-matter control, active-matter hydrodynamics, computational modeling, and synthetic biological systems. Strategic international mobility experiences in Franco-Chilean partnerships provide exceptional preparation for cutting-edge synthetic cell research and collective transport phenomena.*

**PROFESSIONAL EXPERIENCE & COMPETENCY DEVELOPMENT**

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**January 2025 – Present**

**Postdoctoral Researcher**

*Centre de Recherche Paul Pascal, CNRS, Pessac, France*

* Supervisor: Prof. L. Alvarez | Project: Shaping vesicles via chemical and external stimuli (Physics of Life, €80,000)
* Strategic Positioning: Direct hands-on experience with giant unilamellar vesicles (GUVs) and synthetic membrane manipulation techniques essential for synthetic cell research
* Key Competencies: GUV fabrication/adhesion control, optothermal actuation systems, synthetic cell physics

**2019 – 2024**

**PhD Candidate in Physics**

*Universidad de Chile, Santiago, Chile*

* Thesis: “Bacterial Fluctuation in Confined Spaces” | Funding: Competitive ANID Doctoral Grant No. 21201766
* Core Expertise Developed: Experimental confined biological systems, active matter physics, advanced numerical/theoretical modeling, statistical physics frameworks for biological systems
* Research Output: Breakthrough PNAS publication (2025) demonstrating mastery of confined biological system characterization

**Strategic International Mobility & Technical Mastery**

**2021**

**Research Internship: "Active Emulsion"**

*École Supérieure de Physique et de Chimie Industrielle (PMMH-ESPCI), Paris*

* Funding: Chile-France Program Scholarship, French Institute in Chile
* Technical Mastery Achieved: 3D Lagrangian particle tracking techniques; glass microfluidic system design; droplet manipulation methods

**2019**

**Research Internship: "Bacterial Shells"**

*École Supérieure de Physique et de Chimie Industrielle (PMMH-ESPCI), Paris*

* Foundation Building: International research collaboration protocols; advanced experimental design in biological systems

**RESEARCH PROJECTS & FUNDING**

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**2025 – Present**

**Shaping vesicles via chemical and external stimuli**

Physics of Life Program (€80,000) – Principal investigator role in studying vesicle deformation mechanisms

**2019 – 2024**

**Franco-Chilean Cooperation Program**

ECOS-ANID ECOS210012/ECOS-Sud C21E05 – International collaboration on active matter systems

**2019 – 2024**

**Millennium Science Initiative**

ANID Program No. NCN19\_170 – Contributing researcher in multidisciplinary physics research

**RESEARCH OUTPUT & IMPACT**

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**First Author Publications: 3 | Corresponding Author: 2 | Total Publications: 3**

*All publications demonstrate mastery-expertise progression from microgravity experiments to breakthrough confined biological system characterization*

**1. Villalobos-Concha, Cristian\*. “Active bacterial baths in droplets.”** *Proceedings of the National Academy of Sciences 122.31 (2025): e2426096122.*

Impact Factor: 9.1 | Citations: 0 | \*Corresponding author

Breakthrough Achievement: Demonstrates mastery-expertise of confined biological system characterization using theoretical and numerical statistical physics frameworks

**2. Villalobos, Cristian\*. “Recovering the activity parameters of an active fluid confined in a sphere.”** *Physical Review E 110.1 (2024): 014610.*

Impact Factor: 2.5 | Citations: 2 | \*Corresponding author

Technical Innovation: Advanced numerical/theoretical modeling of active matter in confined geometries

**3. Villalobos, Cristian; Mauricio Housset; Germán Varas. “Geometrical description of impact cratering under microgravity conditions.”** *Granular Matter 24.2 (2022): 64.*

Impact Factor: 2.9 | Citations: 3

Recognition: Experimental image selected for journal cover | Evidence of creativity and rigor in experimental execution

**EDUCATION & FOUNDATION BUILDING**

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**2019 – 2024**

**PhD in Sciences, Physics**

*Universidad de Chile, Santiago, Chile*

Thesis: “Bacterial Fluctuation in Confined Spaces”

Systematic Expertise Development: Experimental confined biological systems, active matter physics, advanced numerical/theoretical modeling

Funding: Competitive ANID Doctoral Grant No. 21201766 (2020-2024)

**2018 – 2019**

**Master of Science in Physics**

*Pontificia Universidad Católica de Valparaíso, Chile*

Thesis: “Crater Formation on Levitating Sands” (microgravity conditions)

Core Competencies Established: High-speed imaging and shape transformation analysis; systematic parameter exploration; precision experimental design

Recognition: Experimental image selected for Granular Matter journal cover (2022)

**2013 – 2017**

**Bachelor of Science in Physics**

*Pontificia Universidad Católica de Valparaíso, Chile*

Foundation: Strong foundation in soft-matter physics and precision experimental design

**AWARDS & SCHOLARSHIPS**

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**2022** Journal Cover Recognition – Granular Matter, Volume 24, Issue 2

**2021** Chile-France Program Scholarship – French Institute in Chile (3-month research visit to PMMH, ESPCI, Paris, Sorbonne University)

**2020–2024** ANID Doctoral Grant No. 21201766 – Competitive national scholarship covering full PhD studies

**2018** Master's Thesis Completion Grant – PUCV competitive scholarship for thesis research

**2018** Second Place 'Un Click al Conocimiento' – PUCV scientific photography contest

**LEADERSHIP, COMMUNICATION & PROFESSIONAL SKILLS**

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**Teaching Excellence & Leadership (2016–2024)**

*Sustained teaching across multiple physics courses demonstrates strong communication and leadership capabilities essential for research collaboration and knowledge transfer.*

**Universidad de Chile (UCH)**

* 2024: Teaching Assistant – Fluid Mechanics | Advanced fluid dynamics instruction
* 2023: Teaching Assistant – Continuum Mechanics | Mathematical physics pedagogy
* 2022: Teaching Assistant – Fluid Mechanics | Laboratory coordination and student mentoring
* 2019–2022: Teaching Assistant – Introduction to Classical Physics | Foundation physics education

**Pontificia Universidad Católica de Valparaíso (PUCV)**

* 2018: Teaching Assistant – Electrodynamics | Advanced theoretical physics
* 2018: Teaching Assistant – Experimental Optics and Waves | Laboratory design and execution
* 2017: Teaching Assistant – Theoretical Physics for Pedagogy | Physics education methodology
* 2016–2018: Teaching Assistant – Experimental Electromagnetism | Experimental design and student supervision

**Conference Presentations & Scientific Communication**

Total Presentations: 11 | International Visibility: High-impact venues

* Featured Oral Presentations: 2025 – International Soft Matter Conference (ISMC), Crete; 2025 – Colloid and Interface Symposium (COINS2025), Bordeaux; 2022 – APS March Meeting

**CONFERENCE PARTICIPATION & DISSEMINATION**

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**Oral Presentations**

* 2025: International Soft Matter Conference (ISMC), Crete
* 2025: Colloid and Interface Symposium (COINS2025), Bordeaux, France
* 2022: APS March Meeting
* 2018: Southern Workshop on Granular Materials
* 2017: XVI International Workshop on Instabilities and Nonequilibrium Structures

**Poster Presentations**

* 2022: School and Conference Physics of Active Matter, Coyhaique, Chile
* 2022: WE-Heraeus Summer School on Active Matter and Complex Media, Cargèse, France
* 2017: XV Latin American Workshop on Nonlinear Phenomena (LAWNP 2017)
* 2015: Southern Workshop on Granular Materials
* 2014: II Congreso Nacional de Estudiantes de Ciencias Físicas y Astronómicas

**Professional Development**

* 2021: The Physics of Living Matter (participant)
* 2020: Complex Fluid Seminar Series (participant)

**TECHNICAL PORTFOLIO & WORK PACKAGE ALIGNMENT**

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*Unique Profile: Advanced experimental expertise combined with strong modeling and simulation skills - exceptional positioning for synthetic cell research*

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| **WP1-Ready: GUV Systems & Soft Matter Control**   * Giant Unilamellar Vesicles (GUVs) – Current CNRS position * Synthetic membrane manipulation – Direct hands-on experience * Soft-matter experimental control – PhD/MSc foundation * Glass microfluidic system design – PMMH-ESPCI mastery | **WP2-Ready: Optothermal & Analysis Systems**   * High-speed imaging & shape analysis – MSc core competency * Quantitative image analysis – Systematic parameter exploration * 3D Lagrangian particle tracking – PMMH-ESPCI expertise * Optics/thermofluidics – Multi-physics experimental design |
| **WP3-Ready: Active Matter & Collective Transport**   * Active matter physics – PhD core expertise * Confined biological systems – Specialized characterization * Statistical physics frameworks – PNAS breakthrough * Crawling-like collective dynamics – Theoretical foundation | **Secondment-Ready: Theory/Simulation Bridge**   * Advanced numerical modeling – PhD systematic development * Computational modeling – Theory-experiment integration * Statistical analysis – Multi-scale parameter studies * Theoretical frameworks – Active matter hydrodynamics |

**Core Research Domains**

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| **Experimental Mastery**   * Bacterial culture & handling * Droplet manipulation methods * Precision experimental design * Multi-physics system control | **Languages & Communication**   * Spanish (Native) * English (Fluent - International conferences) * French (Intermediate - Franco-Chilean mobility) |