

# Cristóbal Sifón

Profesor Auxiliar

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<https://github.com/cristobal-sifon/>

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## Research Interests

I focus on the interplay between luminous and dark matter, with a focus on galaxy clusters. Specific questions I address include observable–mass scaling relations for cosmological analyses and the transformation of galaxies in and around galaxy clusters. I use various tools and techniques, most prominently weak gravitational lensing and the Sunyaev-Zel'dovich effect, taking advantage of large-scale surveys, targeted optical and near-infrared observations, and hydrodynamical simulations.

**Collaborations:** 4MOST Chilean Cluster Galaxy Evolution Survey (CHANCES, *proposal Co-I*) — 4MOST Hemisphere Survey (4HS, *proposal Co-I*) — Atacama Cosmology Telescope (ACT) — Canadian Cluster Comparison Project (CCCP) — Cerro Chajnantor Atacama Telescope (CCAT) — CMB-S4 — Galaxy Cluster Mass Reconstruction Project — Kilo-Degree Survey (KiDS) — KMOS ATLAS Environment MultiObject Spectroscopic Survey (KateMOSS, *proposal Co-I*) — Legacy Survey of Space and Time Dark Energy Science Collaboration (LSST-DESC) — LSST-Galaxies — Multi-Epoch Nearby Cluster Survey (MENeCS) — Simons Observatory.

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## Employment

[2022 – Present] Profesor Auxiliar, Pontificia Universidad Católica de Valparaíso (PUCV), Chile

[2019 – 2022] Profesor Asociado, PUCV

[2016 – 2019] Postdoctoral Research Associate, Princeton University, USA

## Education

[2012 – 2016] Ph.D. Astrophysics, Universiteit Leiden, The Netherlands

[2010 – 2012] M.Sc. Astrophysics, Pontificia Universidad Católica de Chile (PUC), Chile

[2005 – 2010] B.Sc. Astronomy, PUC

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## Teaching & Mentoring

### Graduate Research Mentoring

[2025 – present] Gabriel Pichihueche, PUCV: MSc thesis advisor.

[2023 – 2024] Javier Urrutia, PUCV: MSc thesis advisor.

[2020 – 2022] Camila Aros, PUCV: MSc thesis advisor.

[2017 – 2019] Naomi Robertson, Oxford University (UK): co-advised PhD thesis project (Advisor: Joanna Dunkley).

[2013 – 2014] Joshua Albert, Universiteit Leiden: co-advised MSc thesis project (Advisor: Huub Röttgering).

### Undergraduate Research Mentoring

[PUCV: 2020 – present] 4 Senior theses and 4 Summer projects.

[Flatiron: Institute 2025] Simons Foundation–National Society of Black Physicists Mentoring Program.

[Princeton: 2018 – 2019] Summer project and Junior project.

[Others: 2021] Four-month research project through the Central American-Caribbean Bridge in Astrophysics ([URL](#)).

## Courses Taught (all at PUCV)

**Graduate:** Data Analysis, Techniques of Observational Astrophysics, Observational Cosmology

**Undergraduate:** Introductory Astronomy, Astronomical Instrumentation, Galactic Astronomy, Programming, Cosmology

**Non-Physics Major:** Basic Astronomy

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## Grants

[2024] “Núcleos Amplios para Investigación Asociativa en Inteligencia Artificial y Astrofísica (NAIA<sup>2</sup>)” (ANID-FONDEQUIP midsize equipment grant, **Co-I**, US\$400,000)

[2020] “Developing Chilean infrastructure for early imaging and analysis of extragalactic sources in cosmic microwave background surveys” (ALMA-ANID Fund to hire a post-doctoral researcher, **Co-PI**, 2 years, US\$77,000)

[2019] “Physics and Cosmological Implications of Galaxy Clusters with Optical and CMB Surveys” (FONDECYT Iniciación research grant, **PI**, 4 years, US\$125,000)

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## Observing Proposals and Experience

I have spent roughly 180 hours observing with optical and near infrared instruments, performing both imaging and spectroscopy. I have been the PI of 17 different successful observing proposals: [VLT/MUSE] 2h

[Blanco/DECam] 11 nights

[T80-South] 18 nights

[Magellan/FourStar] 2 proposals, 6 nights

[Very Large Array] 4.5 h

[Giant Metrewave Radio Telescope] 2 proposals, 44 h

[Gemini South/GMOS] 24 h

[VLT Survey Telescope/OmegaCAM] 6h

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## Community Activity

**Journal referee:** Astronomy & Astrophysics, The Astrophysical Journal, Monthly Notices of the Royal Astronomical Society, Nature Astronomy.

**Telescope Allocation Committees:** ALMA, Canadian Astronomical Society, *Chandra* X-ray Observatory

**Grant Allocation Committees:** Swiss National Science Foundation, Chilean National Agency for Research and Development (ANID)

## Press Articles Authored

[July 2017] *Galaxy clusters: Falling into line* (Nature Astronomy News & Views)

[July 2013] *Featured Science: Dynamical masses of galaxy clusters discovered with the Sunyaev-Zel'dovich effect* (Gemini Focus)

## Outreach (past 5 years)

[Nov. 2023] Guest in “Diálogos Cósmicos” podcast (in Spanish, available [here](#)).

[Aug. 2023] Guest in “Conversemos de Astronomía” podcast (in Spanish, available [here](#)).

[Nov. 2022] Guest in “Rockstars” podcast by Radio TXS (in Spanish, available [here](#)).

[Oct. 2022] Interview for Radio Valentín Letelier, Valparaíso, to talk about CHANCES.

[Mar. 2021] Online public talk in the context of the Chilean *Day of Astronomy* (in Spanish, available [here](#)).

[2018 – 2019] Assisted with *Public Astronomical Observations in Spanish*, Princeton University.

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## Technical skills

I am an experienced Python programmer. I am one of the lead developers and maintainers of the galaxy-galaxy lensing pipeline used by the KiDS collaboration (written in python, but which is not public at the moment). Much of the functionality can be found in [profiley](#), an open-source software I wrote and maintain. Other codes I have written are posted at my [github](#) page.

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## Other Relevant Work Experience

[2020 – 2021] Data science & Machine Learning consultant, Minera Centinela, Chile.

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## References (in order of relevance)

- Prof. Henk Hoekstra (*PhD advisor*)  
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  - Prof. L. Felipe Barrientos (*MSc advisor*)  
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# Selected recent publications (All including **C. Sifón**)

I have co-authored 165 scientific articles intended for peer-reviewed publication, including 9 first-author papers. They have been cited more than 9,900 times, with more than 400 citations on my first-author papers. The full list of publications can be accessed at the [SAO/NASA Astrophysics Data System](#). This document is maintained live on [github](#).

15. **C. Sifón**, and 45 colleagues, “**CHANCES, the Chilean Cluster Galaxy Evolution Survey: Selection and initial characterisation of clusters and superclusters**”, 2025, [A&A](#), 697, A92 [2411.13655]
14. E. Calabrese, and 171 colleagues, “**The Atacama Cosmology Telescope: DR6 Constraints on Extended Cosmological Models**”, 2025, [arXiv:2503.14454](#) submitted to JCAP
13. T. Louis, and 167 colleagues, “**The Atacama Cosmology Telescope: DR6 Power Spectra, Likelihoods and  $\Lambda$ CDM Parameters**”, 2025, [arXiv:2503.14452](#) submitted to JCAP
12. S. Naess, and 165 colleagues, “**The Atacama Cosmology Telescope: DR6 Maps**”, 2025, [arXiv:2503.14451](#) submitted to JCAP
11. The Simons Observatory Collaboration, “**The Simons Observatory: Science Goals and Forecasts for the Enhanced Large Aperture Telescope**”, 2025, [arXiv:2503.00636](#) submitted to JCAP
10. M. Shirasaki, **C. Sifón**, and 15 colleagues, “**Masses of Sunyaev-Zel’dovich Galaxy Clusters Detected by The Atacama Cosmology Telescope: Stacked Lensing Measurements with Subaru HSC Year 3 data**” 2024, [PhRvD](#), 110, 103006, [2407.08201]
9. **C. Sifón** and J. Han, “**The history and mass content of cluster galaxies in the EAGLE simulation**”, 2024, [A&A](#), 686, A163, [2312.12529]
8. N. C. Robertson, **C. Sifón**, and 23 colleagues, “**ACT-DR5 Sunyaev-Zel’dovich Clusters: Weak Lensing Mass Calibration with KiDS**”, 2024, [A&A](#), 681, 87 [2304.10219]
7. W. Coulton, and 153 colleagues, “**Atacama Cosmology Telescope: High-resolution component-separated maps across one third of the sky**”, 2024, [PhRvD](#), 109, 063530 [2307.01258]
6. M. S. Madhavacheril, and 158 colleagues, “**The Atacama Cosmology Telescope: DR6 Gravitational Lensing Map and Cosmological Parameters**”, 2024, [ApJ](#), 962, 113 [2304.05203]
5. Dark Energy Survey and Kilo-Degree Survey Collaborations, and 160 colleagues, “**DES Y3 + KiDS-1000: Consistent cosmology combining cosmic shear surveys**”, 2023, [The Open Journal of Astrophysics](#), 6, 36 [2305.17173]
4. M. Hilton, **C. Sifón**, and 133 colleagues “**The Atacama Cosmology Telescope: a Catalog of >4000 Sunyaev-Zel’dovich Galaxy Clusters**”, 2021, [ApJS](#), 253, 3 [2009.11043]
3. M. Aguena, and 24 colleagues, “**CLMM: a LSST-DESC cluster weak lensing mass modeling library for cosmology**”, 2021, [MNRAS](#), 508, 6092 [2107.10857]
2. M. S. Madhavacheril, **C. Sifón**, and 61 colleagues “**The Atacama Cosmology Telescope: Weighing Distant Clusters with the Most Ancient Light**”, 2020, [ApJL](#), 903, 13 [2009.07772]
1. R. Herbonnet, **C. Sifón**, H. Hoekstra, Y. Bahé, R. F. J. van der Burg, J.-B. Melin, A. von der Linden, D. Sand, S. Kay, D. Barnes, “**CCCP and MENeCS: (Updated) Weak-Lensing Masses for 100 Galaxy Clusters**”, 2020, [MNRAS](#), 497, 4684 [1912.04414]