

Cristóbal Sifón

Profesor Auxiliar

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

Research Interests

I focus on the interplay between luminous and dark matter by studying 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) — Emission-line Mapping of galaxy POpulations in the cosmicWeb Environmental Regimes (EMPOWER, *proposal Co-I*) — Galaxy Cluster Mass Reconstruction Project — Kilo-Degree Survey (KiDS) — Legacy Survey of Space and Time Dark Energy Science Collaboration (LSST-DESC) — LSST-Galaxies Science Collaboration — Multi-Epoch Nearby Cluster Survey (MENeCS) — Simons Observatory.

Employment

[2022 – Present] Profesor Auxiliar, PUCV

[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

Teaching & Mentoring

Graduate Research Mentoring

[PUCV] 3 MSc theses advised (2 completed, 1 ongoing).

[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] 6 Senior theses and 4 Summer projects.

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

[Others: 2021] Central American-Caribbean Bridge in Astrophysics ([URL](#)). Semester research project.

[Princeton: 2018 – 2019] 1 Summer project and 1 Junior project.

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

Grants

[2024] "Núcleos Amplios para Investigación Asociativa en Inteligencia Artificial y Astrofísica (NAIA²)" (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)

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 more than 20 successful observing proposals in optical (VLT, Blanco, T80-South, Gemini, VST), near infrared (Magellan), and radio (GMRT, JVLA) telescopes.

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.

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.

Other Relevant Work Experience

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

References (in order of relevance)

- Prof. Henk Hoekstra (*PhD advisor*)
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Selected recent publications

(All including **C. Sifón**)

I have co-authored 181 scientific articles intended for peer-reviewed publication, including 9 first-author papers. They have been cited more than 11,000 times, with more than 2,200 citations on papers in which I am the first author or a leading co-author. The full list of publications can be accessed at the [SAO/NASA Astrophysics Data System](#). This document is maintained live on [github](#).

1. **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](#)]
2. E. Calabrese, and 171 colleagues, “**The Atacama Cosmology Telescope: DR6 Constraints on Extended Cosmological Models**”, 2025, [arXiv:2503.14454](#) submitted to *JCAP*
3. T. Louis, and 167 colleagues, “**The Atacama Cosmology Telescope: DR6 Power Spectra, Likelihoods and Λ CDM Parameters**”, 2025, [arXiv:2503.14452](#) submitted to *JCAP*
4. S. Naess, and 165 colleagues, “**The Atacama Cosmology Telescope: DR6 Maps**”, 2025, [arXiv:2503.14451](#) submitted to *JCAP*
5. The Simons Observatory Collaboration, “**The Simons Observatory: Science Goals and Forecasts for the Enhanced Large Aperture Telescope**”, 2025, [arXiv:2503.00636](#) submitted to *JCAP*
6. 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](#)]
7. **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](#)]
9. 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](#)]
10. M. S. Madhavacheril, and 158 colleagues, “**The Atacama Cosmology Telescope: DR6 Gravitational Lensing Map and Cosmological Parameters**”, 2024, *ApJ*, 962, 113 [[2304.05203](#)]
11. 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](#)]
12. 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](#)]
13. M. Aguena, and 24 colleagues, “**CLMM: a LSST-DESC cluster weak lensing mass modeling library for cosmology**”, 2021, *MNRAS*, 508, 6092 [[2107.10857](#)]
14. 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](#)]
15. 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 MENeacs: (Updated) Weak-Lensing Masses for 100 Galaxy Clusters**”, 2020, *MNRAS*, 497, 4684 [[1912.04414](#)]