Cristóbal Sifón

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Research Interests

I am an observational astrophysicist. My research spans various aspects of galaxy cluster physics including observable–mass scaling relation for cosmological analyses, brightest cluster galaxies, the mass content of cluster galaxies. I am also interested in intrinsic galaxy alignments, both as contaminants for cosmic shear and as a physical mechanism in its own right. I use various tools and techniques to study these phenomena, including weak gravitational lensing, spectroscopy (for both galaxy velocities and physical properties), and the exploitation of optical surveys in general.

I am an active member of the Atacama Cosmology Telescope (ACT), the Kilo-Degree Survey (KiDS) and the Hyper-Suprime Cam Survey (HSC) collaborations.

Employment and Education

2016 – present	Postdoctoral Research Associate, Princeton University
Sep. 2016	Ph.D. Astrophysics, Universiteit Leiden, The Netherlands **Thesis Title:** *The Connection Between Mass and Light in Galaxy Clusters*
Jan. 2012	M.Sc. Astrophysics, P. Universidad Católica de Chile, Chile **Thesis Title:** *The Atacama Cosmology Telescope: Dynamical Masses and Scaling Relations for a Sample of Massive Sunyaev-Zel'dovich Selected Galaxy Clusters*
Jan. 2010	B.Sc. Astronomy, P. Universidad Católica de Chile, Chile **Thesis Title:** *Abell 1882: A New Supergroup in the Nearby Universe?*

Grants & Internships

2011	Science Intern at Gemini South Observatory, La Serena, Chile (6 months). Worked on the development of the FLAMINGOS-2 data reduction pipeline.
2011	Internship at Rutgers University, NJ, USA (5 weeks).
2011	ALMA-CONICYT grant for an international conference.
2009	Science Intern at Gemini South Observatory, La Serena, Chile (5 months). Worked on my undergraduate thesis project under the supervision of Dr. Percy Gómez.

Scientific Meetings

Contributed Talks

2016 Jul. 11-15	*Subhaloes in the real Universe: satellite galaxy-galaxy lensing* From Theory to Applications: Celebrating a Century of Gravitational Lensing, Leiden, Netherlands
2016 Jul. 4-8	*Subhaloes in the real Universe: satellite galaxy-galaxy lensing* Probing New Frontiers with Cluster Lenses, EWASS 2016, Athens, Greece
2015 Jul. 13-16	*Satellite galaxy-galaxy lensing in KiDS×GAMA* Accurate Astrophysics, Correct Cosmology. London, UK
2015 Jun. 22-26	*Galaxy-galaxy lensing of satellite galaxies in KiDS×GAMA* The Many Pathways to Galaxy Growth, Prato, Italy
2011 Sep. 19-22	*Dynamical Scaling Relations of ACT SZE-selected galaxy clusters* Cosmology with X-ray and Sunyaev-Zel'dovich Effect Observations of Galaxy Clusters, Huntsville, AL, USA

Accepted Observing Proposals (as PI)

2015A	VLT/FORS2	095.A-0009	20h	*Strong lensing in the most extreme galaxy cluster at high redshift*
2015A	VST/OmegaCam	095.A-0077	6h	*Unbiased mass measurement of a merging, strong lensing cluster hosting a radio relic at* $z = 0.52$
2013B	GMRT	25_036	14h	*Dissecting the extended radio emission in the strong lensing cluster PLCK G4.5−19.5 at* $z = 0.52$

Visiting Observer

2014 Jan	Project: *RELICS: The REd Lens Infrared Cluster Survey* (PI: J. van de Sande). IR imaging, New Technology Telescope, La Silla Observatory, Chile, 5 full nights
2012 Jul	Project: *Mass Calibration of a Sample of ACT SZE-selected Galaxy Clusters* (PI: F. Menanteau). Optical imaging & spectroscopy, Gemini South Observatory, Cerro Pachón, Chile, 3 full nights
2011 Oct	Project: *Mass Calibration of a Sample of ACT SZE-selected Galaxy Clusters* (PI: F. Menanteau). Optical spectroscopy, Gemini South Observatory, Cerro Pachón, Chile, 5 full nights
2010 Dec	Project: *Mass Calibration and Gas Physics of a Complete Sample of ACT SZE-selected Galaxy Clusters* (PI: L.F. Barrientos/F. Menanteau). Optical spectroscopy, Gemini South Observatory, Cerro Pachón, Chile, 5 full nights

Teaching Assistant Experience

2013-B	Stellar Dynamics (Leiden, Prof. S. Portegies Zwart)
2012-A	Extragalactic Astrophysics (PUC, Prof. L. F. Barrientos)
2011-A	Extragalactic Astrophysics (PUC, Prof. L. F. Barrientos)
2011-A	Laboratory of Thermodynamics and Kinetic Theory (PUC, Prof. U. Volkmann)
2010-B	Experimental Astrophysics (PUC, Prof. L. F. Barrientos)

Outreach

2012	Co-taught an "Astronomy Course for Seniors" organized by PUC.
2011	Participated in "Star Night", an interactive astronomy workshop organized by people at ESO-Santiago for elementary and secondary school students in social risk.
2010	Invited talk for the "FFG14 Almirante Latorre" Chilean navy ship crew on board the ship in the Valparaiso port.
2010	Overview talk for students of ages 10-15 at "Juan de Dios Aldea" school in La Pintana, Santiago, as part of a series of presentations called "The Universe", organized by PUC for students in social risk.

Technical Expertise

Programming skills: I am an experienced python programmer, and I am also familiar with IRAF/PyRAF, C, FORTRAN and IDL (although the latter three rather vaguely). I have written `pygmos`, a Python/PyRAF pipeline to reduce Gemini-GMOS spectra which is available at http://www.strw.leidenuniv.nl/~sifon/pygmos/. Other Python routines I have written are posted at my homepage and at https://github.com/cristobal-sifon.

Language skills: Native Spanish, fluent English, basic Dutch.

Others: I have served as a referee for A&A and ApJ.

Other Work Experience

Dec. 2007 - Mar. 2008	Ski instructor at Homewood Mountain Ski Resort in Lake Tahoe, CA. Obtained the certification as Level I ski instructor by the Professional Ski Instructors of America (PSIA).
Dec. 2006 - Mar. 2007	Lift operator at Sun Valley Resort, Sun Valley, ID.

References

- Prof. David Spergel
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- Prof. Henk Hoekstra (*PhD advisor*)
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- Prof. John Hughes
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- Dr. Felipe Menanteau
  Department of Astronomy
  University of Illinois at Urbana-Champaign
  1002 W. Green St., Urbana, IL 61801, USA
  E-mail: felipe@illinois.edu

- Prof. L. Felipe Barrientos (*MSc advisor*)
  Departamento de Astronomía y Astrofísica
  P. Universidad Católica de Chile
  Casilla 306, Santiago 22, Chile
  E-mail: barrientos@astro.puc.cl

Publication list

I have co-authored 37 papers, including 5 first-author papers. They have been cited more than 1,000 times and have an h-index of 18, with more than 120 citations on my first-author papers. They also include three companion reviews on galaxy alignments written for a special issue of Space Science Reviews (B. Joachimi et al. 2015, A. Kiessling et al. 2015, D. Kirk et al. 2015). The full list of publications is summarized below, and can be accessed at this url.

First-Author Papers

5. **C. Sifón**, N. Battaglia, M. Hasselfield, et al. (25 co-authors), **"The Atacama Cosmology Telescope: Dynamical Masses for 44 SZ-Selected Galaxy Clusters over 755 Square Degrees"**, 2016, MNRAS, 461, 248

4. **C. Sifón**, M. Cacciato, H. Hoekstra, et al. (26 co-authors), **"The Masses of Satellites in GAMA Galaxy Groups from 100 Square Degrees of KiDS Weak Lensing Data"**, 2015, MNRAS, 454, 3938

3. **C. Sifón**, H. Hoekstra, M. Cacciato, M. Viola, F. Köhlinger, R. F. J. van der Burg, D. J. Sand, M. L. Graham, **"Constraints on the Alignments of Galaxies in Galaxy Clusters from ∼14,000 Spectroscopic Members"**, 2015, A&A, 575, A48

2. **C. Sifón**, F. Menanteau, J. P. Hughes, M. Carrasco, L. F. Barrientos, **"Strong Lensing Analysis of PLCK G004.5−19.5, a Planck-Discovered Cluster Hosting a Radio Relic at $z = 0.52$"**, 2014, A&A, 562, A43

1. **C. Sifón**, F. Menanteau, M. Hasselfield, et al. (36 co-authors), **"The Atacama Cosmology Telescope: Dynamical Masses and Scaling Relations for a Sample of Massive Sunyaev-Zel'dovich Effect Selected Galaxy Clusters"**, 2013, ApJ, 772, 25

Major Contributor Papers

8. E. van Uitert, M. Cacciato, H. Hoekstra, M. Brouwer, **C. Sifón**, et al. (29 co-authors), **"The Stellar-to-Halo Mass Relation of GAMA Galaxies from 100 Square Degrees of KiDS Weak Lensing Data"**, 2016, MNRAS, 459, 3251

7. D. Kirk, M. L. Brown, H. Hoekstra, B. Joachimi, T. D. Kitching, R. Mandelbaum, **C. Sifón**, M. Cacciato, A. Choi, A. Kiessling, A. Leonard, A. Rassat, B. Malte Schäfer, **"Galaxy Alignments: Observations and Impact on Cosmology"**, 2015, Space Sci. Rev., 193, 139

6. A. Kiessling, M. Cacciato, B. Joachimi, D. Kirk, T. D. Kitching, A. Leonard, R. Mandelbaum, B. Malte Schäfer, **C. Sifón**, M. L. Brown, A. Rassat **"Galaxy Alignments: Theory, Modelling & Simulations"**, 2015, Space Sci. Rev., 193, 67

5. B. Joachimi, M. Cacciato, T. D. Kitching, A. Leonard, R. Mandelbaum, B. Malte Schäfer, **C. Sifón**, H. Hoekstra, A. Kiessling, D. Kirk, A. Rassat, **"Galaxy Alignments: an Overview"**, 2015, Space Sci. Rev., 193, 1

4. R. F. J. van der Burg, H. Hoekstra, A. Muzzin, **C. Sifón**, M. L. Balogh, S. McGee, **"Evidence for the Inside-Out Growth of the Stellar Mass Distribution in Galaxy Clusters since $z \sim 1$"**, 2015, A&A, 577, 19

3. M. Hilton, M. Hasselfield, **C. Sifón**, et al. (26 co-authors), **"The Atacama Cosmology Telescope: The Stellar Content of Galaxy Clusters Selected Using the Sunyaev-Zel'dovich Effect"**, 2013, MNRAS, 435, 3469

2. F. Menanteau, **C. Sifón**, L. F. Barrientos, et al. (26 co-authors), **"The Atacama Cosmology Telescope: Physical Properties of Sunyaev-Zel'dovich Effect Clusters on the Celestial Equator"**, 2013, ApJ, 765, 67

1. F. Menanteau, J. P. Hughes, **C. Sifón**, et al. (27 co-authors), **"The Atacama Cosmology Telescope: ACT-CL J0102−4915 "El Gordo," a Massive Merging Cluster at Redshift 0.87"**, 2012, ApJ, 748, 7

Contributing Author Papers

24. M. Velliscig, M. Cacciato, H. Hoekstra, et al. (17 co-authors) **"Galaxy-Galaxy Lensing in Eagle: Comparison with Data from 180 Square Degrees of the KiDS and GAMA Surveys"**, 2016, arXiv:1612.04825, submitted to MNRAS

23. M. M. Brouwer, M. R. Visser, A. Dvornik, et al. (22 co-authors), **"First Test of Verlinde's Theory of Emergent Gravity Using Weak Gravitational Lensing Measurements"**, 2016, arXiv:1612.03034, accepted for publication in MNRAS

22. M. M. Brouwer, M. Cacciato, A. Dvornik, et al. (36 co-authors), **"Dependence of GAMA Galaxy Halo Masses on the Cosmic Web Environment from 100 square degrees of KiDS Weak Lensing Data"**, 2016, MNRAS, 462, 4451

21. N. Battaglia, A. Leauthaud, H. Miyatake, et al. (39 co-authors), **"Weak-Lensing Mass Calibration of the Atacama Cosmology Telescope Equatorial Sunyaev-Zel'dovich Cluster Sample with the Canada-France-Hawaii Telescope Stripe 82 Survey"**, 2016, JCAP, 08, 013

20. S. Bellstedt, C. Lidman, A. Muzzin, et al. (16 co-authors), **"The Evolution In the Stellar Mass of Brightest Cluster Galaxies over the Past 10 Billion Years"**, 2016, MNRAS, 460, 2862

19. K. Knowles, H. T. Intema, A. J. Baker, et al. (21 co-authors), **"A Giant Radio Halo in a Low-Mass SZ-Selected Galaxy Cluster: ACT-CL J0256.5+0006"**, 2016, MNRAS, 459, 4240

18. D. Crichton, M. B. Gralla;, K. Hall, et al. (22 co-authors), **"Evidence for the Thermal Sunyaev-Zel'dovich Effect Associated with Quasar Feedback"**, 2016, MNRAS, 458, 1478,

17. J. T. A. de Jong, G. A. Verdoes Kleijn, D. R. Boxhoorn, et al. (49 co-authors), **"The First and Second Data Releases of the Kilo Degree Survey"**, 2015, A&A, 582, 62

16. K. Kuijken, C. Heymans, H. Hildebrandt, et al. (35 co-authors), **"Gravitational Lensing Analysis of the Kilo Degree Survey"**, 2015, MNRAS, 454, 3500

15. K. Y. Ng, W. A. Dawson, D. Wittman, M. J. Jee, J. P. Hughes, F. Menanteau, **C. Sifón**, **"The Return of the Merging Galaxy Subclusters of El Gordo?"**, 2015, MNRAS, 453, 1531

14. M. Viola, M. Cacciato, M. Brouwer, et al. (27 co-authors), **"Dark Matter Halo Properties of GAMA Galaxy Groups from 100 Square Degrees of KiDS Weak Lensing Data"**, 2015, MNRAS, 452, 3529

13. R. R. Lindner, P. Aguirre, A. J. Baker, et al. (25 co-authors), **"The Atacama Cosmology Telescope: the LABOCA/ACT Survey of Clusters at All Redshifts"**, 2015, ApJ, 803, 79

12. B. Kirk, M. Hilton, C. Cress, et al. (23 co-authors), **"SALT Spectroscopic Observations of Galaxy Clusters Detected by ACT and a Type II Quasar Hosted by a Brightest Cluster Galaxy"**, 2015, MNRAS, 449, 4010

11. L. Old, R. Wojtak, G. A. Mamon, et al. (24 co-authors), **"Galaxy Cluster Mass Reconstruction Project: II. Results for Galaxy-Based Techniques with Improved Models"**, 2015, MNRAS, 449, 1897

10. M. B. Gralla, D. Crichton, T. A. Marriage, et al. (41 co-authors), **"A Measurement of the Millimeter Emission and the Sunyaev-Zel'dovich Effect Associated with Low-Frequency Radio Sources"**, 2014, MNRAS, 445, 460

9. L. Old, R. A. Skibba, F. R. Pearce, et al. (21 co-authors), **"Galaxy Cluster Mass Reconstruction Project: I. Methods and First Results on Galaxy-Based Techniques"**, 2014, MNRAS, 441, 1513

8. M. J. Jee, J. P. Hughes, F. Menanteau, **C. Sifón**, L. F. Barrientos, L. Infante, R. Mandelbaum, K. Y. Ng, **"Weighing "El Gordo" with a Precision Scale: Hubble Space Telescope Weak-Lensing Analysis of the Galaxy Cluster ACT-CL J0102−4915 at $z = 0.87$"**, 2014, ApJ, 785, 20

7. M. Hasselfield, M. Hilton, T. A. Marriage, et al. (44 co-authors), **"The Atacama Cosmology Telescope: Sunyaev-Zel'dovich Selected Galaxy Clusters at 148 GHz from Three Seasons of Data"**, 2013, JCAP, 07, 008

6. E. Calabrese, R. A. Hlozek, N. Battaglia, et al. (34 co-authors), **"Cosmological Parameters from Pre-Planck Cosmic Microwave Background Measurements"**, 2013, PhRvD, 87, 103012

5. N. Sehgal, G. E. Addison, N. Battaglia, et al. (36 co-authors), **"The Atacama Cosmology Telescope: Relation Between Galaxy Cluster Optical Richness and Sunyaev-Zel'dovich Effect"**, 2013, ApJ, 767, 38

4. H. Miyatake, A. J. Nishizawa, M. Takada, et al. (28 co-authors), **"Subaru Weak-Lensing Measurement of a $z = 0.81$ Cluster Discovered by the Atacama Cosmology Telescope Survey"**, 2013, MNRAS, 429, 3627

3. B. D. Sherwin, S. Das, A. Hajian, et al. (31 co-authors), **"The Atacama Cosmology Telescope: Cross-correlation of CMB Lensing and Quasars"**, 2012, PhRvD, 86, 083006

2. N. Hand, G. E. Addison, E. Aubourg, et al. (58 co-authors), **"Evidence of Galaxy Cluster Motions with the Kinematic Sunyaev-Zel'dovich Effect"**, 2012, PhRvL, 109, 041101

1. E. D. Reese, T. Mroczkowski, F. Menanteau, et al. (44 co-authors), **"The Atacama Cosmology Telescope: High-Resolution Sunyaev-Zel'dovich Array Observations of ACT SZE-selected Clusters from the Equatorial Strip"**, 2012, ApJ, 751, 12