

# Carlos Eduardo Barbosa

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## Experience

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### FAPESP Postdoctoral Fellow

*University of São Paulo, IAG*

**São Paulo, Brazil**

2016 - 2021

Working as a researcher in the field of observational extragalactic astronomy. Developed an innovative tool to perform modeling of astronomical observations focused in large, multivariate models using Bayesian methods. Heavily involved in a large collaboration, S-PLUS, with involvement in organizational, technical and scientific aspects of the project, delivering software packages that allow the scientific use of the data.

### FAPESP BEPE Research Associate

*University of Arizona, Steward Observatory*

**Tucson, USA**

2019 - 2020

Studied the stellar populations of ultra diffuse galaxies found by the SMUDGEs project using S-PLUS data.

### FAPESP BEPE Research Intern

*European Southern Observatory*

**Munich, Germany**

2013 - 2014

Studied stellar populations of the stellar halo of the giant galaxy NGC 3311.

## Education

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### PhD in Astronomy

*University of São Paulo, IAG*

**São Paulo, Brazil**

2012 - 2016

**Thesis:** *Kinematics and Stellar Populations in the Nearby Universe*

**Supervisor:** Dr. Cláudia Mendes de Oliveira

**Description:** Used photometric and spectroscopic observations of galaxies to determine their kinematics and stellar populations to obtain information about their formation and evolution.

### Master's Degree in Astronomy

*University of São Paulo, IAG*

**São Paulo, Brazil**

2009 - 2011

**Dissertation Title:** *Photometry, Decomposition and Correlations for Nearby Spiral Galaxies from the GHASP Survey*

**Supervisor:** Dr. Cláudia Mendes de Oliveira

**Description:** Determined the structure of spiral galaxies from their images and studied how different morphological properties correlate and scale among systems of different classes.

### Bachelor's in Physics

*University of São Paulo, Institute of Physics*

**São Paulo, Brazil**

2005 - 2009

GPA: 8.0 / 10

### Technical Education in Refrigeration

*SENAI Oscar Rodrigues Alves*

**São Paulo, Brazil**

2002 - 2003

## Memberships

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**International Astronomical Union:** Junior member.

**Brazilian Astronomical Society:** Effective member.

## Organizing Committees

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**LOC member:** 15th S-PLUS Virtual Meeting, June 1-3, 2021.

**LOC member:** SPAnet Workshop on Clusters of Galaxies and the Large-Scale Structure of the Universe, 03/2018

**LOC member:** ESO/NUVA/IAG Workshop on Challenges in UV Astronomy, 10/2013

## Events

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**Invited seminar:** Galaxy Evolution Seminar, University of Oxford, April 29, 2021 (virtual).

**Invited seminar:** Department of Astronomy of UFRGS, February 10, 2021 (virtual).

**Contributed seminar:** 13th S-PLUS meeting, IAG/USP, May 18, 2020 (virtual).

**Contributed seminar:** Lunch Talk, Steward Observatory, Tucson, January 15, 2020.

**Contributed seminar:** The art of measuring physical properties of galaxies, Milano, November 20, 2019.

**Contributed seminar:** 12th S-PLUS meeting, October 30, 2019 (remote).

**Contributed seminar:** SMUDGeFest, Steward Observatory, Tucson, October 23, 2019.

**Poster:** Astroinformatics 2019, Pasadena, June 24-27, 2019.

**Contributed seminar:** 11th S-PLUS meeting, IAG/USP, March 25-26, 2019.

**Invited lectures:** Observatorio Astronómico de La Plata, November, 2018.

**Invited colloquium:** Observatorio Astronómico de La Plata, October 24, 2018.

**Invited seminar:** IME/USP seminar, September 26, 2018 (outreach).

**Invited seminar:** Astronomia ao meio-dia, IAG/USP, September 25, 2018 (outreach).

**Contributed seminar:** 10th S-PLUS meeting, IAG/USP, September 26, 2018.

**Contributed seminar:** Galaxy Groups and Clusters II: Laboratories to study galaxy evolution, La Serena, October 23-26, 2017.

**Contributed seminar:** XLI Annual Meeting of the Brazilian Astronomical Society, São Paulo, September 4, 2017.

**Invited colloquium:** IAG/USP, August, /2017.

**Contributed seminar:** IAG Symposium, September 26, 2016.

**Contributed seminar:** IAG Science Day, São Paulo, March 3-4, 2016.

**Contributed talk:** Baryons at low densities: The stellar halos around galaxies, Munich, February 26, 2015.

**Contributed talk:** Galaxies in 3D accross the Universe, Vienna, July 7th, 2014.

## Mentoring

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**Undergraduate research:** Jessica Silva Amorim (08/2020 - present)

**Undergraduate research:** Matheus Zaghi de Oliveira (08/2017 - 08/2018)

## Languages

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**Portuguese:** Native speaker

**English:** Fluent

**French:** Basic

**Spanish:** Basic

*TOEIC score: 960*

*Basic words and phrases.*

*Basic words and phrases.*

## Technical Skills

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**Python programming:** NumPy, SciPy, Pandas, Scikit-learn, Theano, Keras

*Expert*

**Other programming languages:** R, Octave, C, Fortran.

*Skillful*

**Astronomical packages:** Astropy, IRAF, PyRAF.

**Other:** L<sup>A</sup>T<sub>E</sub>X, Git, GitHub

## Methods

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**Data modeling:** Multivariate regression with classical and Bayesian statistical methods.

**Statistical data analysis:** Bayesian methods in large datasets.

**Machine learning:** Linear Regression, SVD, Naive Bayes, Random Forest.

*Obtaining certification*

**Data visualisation:** Advanced skills in producing graphs and charts.

## References

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**Cláudia Mendes de Oliveira**

Professor

IAG-USP

São Paulo, Brazil

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**Lodovico Coccato**

Science Data Product group

European Southern Observatory

München, Germany

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**Chiara Spiniello**

Hintze Research Fellow

University of Oxford

Oxford, UK

chiara.spiniello@physics.ox.ac.uk

## Publications

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- [1] F. Almeida-Fernandes, L. Sampedro, F. R. Herpich, A. Molino, **C. E. Barbosa**, M. L. Buzzo, R. A. Overzier, E. V. R. de Lima, L. M. I. Nakazono, G. B. Oliveira Schwarz, H. D. Perottoni, G. F. Bolutavicius, L. A. Gutiérrez-Soto, T. Santos-Silva, A. Z. Vitorelli, A. Werle, D. D. Whitten, M. V. Costa Duarte, C. R. Bom, P. Coelho, J. Sodr e L., V. M. Placco, G. S. M. Teixeira, J. Alonso-García, T. C. Beers, A. Kanaan, T. Ribeiro, W. Schoenell, and C. Mendes de Oliveira. “Data Release 2 of S-PLUS: accurate template-fitting based photometry covering  $\sim 1000$  square degrees in 12 optical filters”. In: *arXiv e-prints*, arXiv:2104.00020 (Mar. 2021), arXiv:2104.00020. arXiv: 2104.00020 [astro-ph.IM].
- [2] **C. E. Barbosa**, C. Spiniello, M. Arnaboldi, L. Coccato, M. Hilker, and T. Richtler. “A preserved high-z compact progenitor in the heart of NGC 3311 revealed with MUSE 2D stellar population analysis”. In: *A&A* 649, A93 (May 2021), A93. arXiv: 2012.11609 [astro-ph.GA].
- [3] **C. E. Barbosa**, C. Spiniello, M. Arnaboldi, L. Coccato, M. Hilker, and T. Richtler. “What does (not) drive the variation of the low-mass end of the stellar initial mass function of early-type galaxies?”. In: *A&A* 645, L1 (Jan. 2021), p. L1. arXiv: 2012.01431 [astro-ph.GA].
- [4] M. L. Buzzo, B. Ziegler, P. Amram, M. Verdugo, **C. E. Barbosa**, B. Ciocan, P. Papaderos, S. Torres-Flores, and C. Mendes de Oliveira. “Physical and kinematic conditions of the local merging galaxy NGC 1487”. In: *MNRAS* 503.1 (May 2021), pp. 106–123. arXiv: 2102.05244 [astro-ph.GA].

- [5] M. L. Buzzo, A. Cortesi, J. A. Hernandez-Jimenez, L. Coccato, A. Werle, L. Beraldo e Silva, M. Grossi, M. Vika, **C. E. Barbosa**, G. Lucatelli, L. Santana-Silva, S. Bamford, V. P. Debattista, D. A. Forbes, R. Overzier, A. J. Romanowsky, F. Ferrari, J. P. Brodie, and C. Mendes de Oliveira. “Recovering the origins of the lenticular galaxy NGC 3115 using multiband imaging”. In: *MNRAS* 504.2 (June 2021), pp. 2146–2167. arXiv: 2103.17246 [astro-ph.GA].
- [6] C. G. Escudero, A. V. Smith Castelli, F. R. Faifer, L. A. Sesto, C. L. Mendes de Oliveira, F. R. Herpich, and **C. E. Barbosa**. “Pixel color-magnitude diagrams of galaxies in the Fornax cluster using S-PLUS images”. In: *arXiv e-prints*, arXiv:2104.13496 (Apr. 2021), arXiv:2104.13496. arXiv: 2104.13496 [astro-ph.GA].
- [7] C. Lima-Dias, A. Monachesi, S. Torres-Flores, A. Cortesi, D. Hernández-Lang, **C. E. Barbosa**, C. Mendes de Oliveira, D. Olave-Rojas, D. Pallero, L. Sampedro, A. Molino, F. R. Herpich, Y. L. Jaffé, R. Amorín, A. L. Chies-Santos, P. Dimauro, E. Telles, P. A. A. Lopes, A. Alvarez-Candal, F. Ferrari, A. Kanaan, T. Ribeiro, and W. Schoenell. “An environmental dependence of the physical and structural properties in the Hydra cluster galaxies”. In: *MNRAS* 500.1 (Jan. 2021), pp. 1323–1339. arXiv: 2010.15235 [astro-ph.GA].
- [8] L. M. I. Nakazono, C. Mendes de Oliveira, N. S. T. Hirata, S. Jeram, C. Queiroz, S. S. Eikenberry, A. H. Gonzalez, R. Abramo, M. Overzier R. Espadoto, A. Martinazzo, L. Sampedro, F. R. Herpich, A. Cortesi, F. Almeida-Fernandes, A. Werle, **C. E. Barbosa**, L. Sodr e Jr., E. V. Lima, K. Men endez-Delmestre, S. Akras, A. Alvarez-Candal, A. R. Lopes, E. Telles, W. Schoenell, A. Kanaan, and T. Ribeiro. “On the discovery of stars, quasars, and galaxies in the Southern Hemisphere with S-PLUS”. In: *MNRAS* (2021). Submitted.
- [9] T. Santos-Silva, H. D. Perottoni, F. Almeida-Fernandes, J. Gregorio-Hetem, V. Jatenco-Pereira, C. Mendes de Oliveira, T. Montmerle, E. Bica, C. Bonatto, H. Monteiro, W. S. Dias, **C. E. Barbosa**, B. Fernandes, P. A. B. Galli, M. Borges Fernandes, A. Kanaan, T. Ribeiro, and W. Schoenell. “Canis Major OB1 stellar groups contents revealed by GAIA”. In: *MNRAS* (2021). Under consideration.
- [10] A. V. Smith Castelli, C. Mendes de Oliveira, F. Herpich, **C. E. Barbosa**, C. Escudero, M. Grossi, L. Sodre, C. R. de Bom, L. Zenocratti, M. E. De Rossi, A. Cortesi, R. Cid Fernandes, A. R. Lopes, E. Telles, G. B. Oliveira Schwarz, M. L. L. Dantas, F. R. Faifer, A. Chies Santos, J. Saponara, V. Reynaldi, I. Andruchow, L. Sesto, M. F. Mestre, A. L. de Amorim, E. V. R. de Lima, J. C. R. Abboud, V. Cernic, and I. Souza de Almeida Garcia. “The Fornax Cluster through S-PLUS”. In: *arXiv e-prints*, arXiv:2104.07524 (Apr. 2021), arXiv:2104.07524. arXiv: 2104.07524 [astro-ph.GA].
- [11] D. D. Whitten, V. M. Placco, T. C. Beers, D. An, Y. S. Lee, F. Almeida-Fernandes, F. R. Herpich, S. Daflon, **C. E. Barbosa**, H. D. Perottoni, S. Rossi, P. B. Tissera, J. Yoon, K. Youakim, W. Schoenell, T. Ribeiro, and A. Kanaan. “The Photometric Metallicity and Carbon Distributions of the Milky Way’s Halo and Solar Neighborhood from S-PLUS Observations of SDSS Stripe 82”. In: *ApJ* 912.2, 147 (May 2021), p. 147. arXiv: 2104.00016 [astro-ph.GA].
- [12] **C. E. Barbosa**, D. Zaritsky, R. Donnerstein, H. Zhang, A. Dey, C. Mendes de Oliveira, L. Sampedro, A. Molino, M. V. Costa-Duarte, P. Coelho, A. Cortesi, F. R. Herpich, J. A. Hernandez-Jimenez, T. Santos-Silva, E. Pereira, A. Werle, R. A. Overzier, R. Cid Fernandes, A. V. Smith Castelli, T. Ribeiro, W. Schoenell, and A. Kanaan. “One Hundred SMUDGes in S-PLUS: Ultra-diffuse Galaxies Flourish in the Field”. In: *ApJS* 247.2, 46 (Apr. 2020), p. 46. arXiv: 2002.05171 [astro-ph.GA].
- [13] S. Bonoli et al. “The miniJPAS survey: a preview of the Universe in 56 colours”. In: *arXiv e-prints*, arXiv:2007.01910 (July 2020), arXiv:2007.01910. arXiv: 2007.01910 [astro-ph.CO].

- [14] A. Molino, M. V. Costa-Duarte, L. Sampedro, F. R. Herpich, J. Sodr e L., C. Mendes de Oliveira, W. Schoenell, **C. E. Barbosa**, C. Queiroz, E. V. R. Lima, L. Azanha, N. Mu oz-Elgueta, T. Ribeiro, A. Kanaan, J. A. Hernandez-Jimenez, A. Cortesi, S. Akras, R. Lopes de Oliveira, S. Torres-Flores, C. Lima-Dias, J. L. N. Castellon, G. Damke, A. Alvarez-Candal, Y. Jim nez-Teja, P. Coelho, E. Pereira, A. D. Montero-Dorta, N. Ben tez, T. S. Gonalves, L. Santana-Silva, S. V. Werner, L. A. Almeida, P. A. A. Lopes, A. L. Chies-Santos, E. Telles, T. de Souza, R. C. D. R. Gonalves, R. S. de Souza, M. Makler, M. L. Buzzo, V. M. Placco, L. M. I. Nakazono, R. K. Saito, R. A. Overzier, and L. R. Abramo. “Assessing the photometric redshift precision of the S-PLUS survey: the Stripe-82 as a test-case”. In: *MNRAS* 499.3 (June 2020), pp. 3884–3908. arXiv: 1907.06315 [astro-ph.GA].
- [15] T. Richtler, M. Hilker, M. Arnaboldi, and **C. E. Barbosa**. “Dust and star formation in the centre of NGC 3311”. In: *A&A* 643, A119 (Nov. 2020), A119. arXiv: 2008.10662 [astro-ph.GA].
- [16] M. V. Costa-Duarte, L. Sampedro, A. Molino, H. S. Xavier, F. R. Herpich, A. L. Chies-Santos, **C. E. Barbosa**, A. Cortesi, W. Schoenell, A. Kanaan, T. Ribeiro, C. Mendes de Oliveira, S. Akras, A. Alvarez-Candal, C. L. Barbosa, J. L. N. Castell n, P. Coelho, M. L. L. Dantas, R. Dupke, A. Ederoclite, A. Galarza, T. S. Gonalves, J. A. Hernandez-Jimenez, Y. Jim nez-Teja, A. Lopes, P. A. A. Lopes, R. Lopes de Oliveira, J. L. Melo de Azevedo, L. M. Nakazono, H. D. Perottoni, C. Queiroz, K. Saha, J. Sodr e L., E. Telles, and R. C. Thom de Souza. “The S-PLUS: a star/galaxy classification based on a Machine Learning approach”. In: *arXiv e-prints*, arXiv:1909.08626 (Sept. 2019), arXiv:1909.08626. arXiv: 1909.08626 [astro-ph.GA].
- [17] C. Mendes de Oliveira et al. “The Southern Photometric Local Universe Survey (S-PLUS): improved SEDs, morphologies, and redshifts with 12 optical filters”. In: *MNRAS* 489.1 (Oct. 2019), pp. 241–267. arXiv: 1907.01567 [astro-ph.GA].
- [18] **C. E. Barbosa**, M. Arnaboldi, L. Coccato, O. Gerhard, C. Mendes de Oliveira, M. Hilker, and T. Richtler. “Sloshing in its cD halo: MUSE kinematics of the central galaxy NGC 3311 in the Hydra I cluster”. In: *A&A* 609, A78 (Jan. 2018), A78. arXiv: 1710.08941.
- [19] M. Hilker, T. Richtler, **C. E. Barbosa**, M. Arnaboldi, L. Coccato, and C. Mendes de Oliveira. “The Hydra I cluster core. II. Kinematic complexity in a rising velocity dispersion profile around the cD galaxy NGC 3311”. In: *A&A* 619, A70 (Nov. 2018), A70. arXiv: 1809.01163.
- [20] **C. E. Barbosa**, M. Arnaboldi, L. Coccato, M. Hilker, C. Mendes de Oliveira, and T. Richtler. “The Hydra I cluster core. I. Stellar populations in the cD galaxy NGC 3311”. In: *A&A* 589, A139 (May 2016), A139. arXiv: 1603.02202.
- [21] **C. E. Barbosa**, M. Arnaboldi, M. Hilker, L. Coccato, T. Richtler, and C. Mendes de Oliveira. “A 3D view of the Hydra I cluster core- II. Stellar populations”. In: *IAU Symposium*. Ed. by B. L. Ziegler, F. Combes, H. Dannerbauer, and M. Verdugo. Vol. 309. IAU Symposium. Feb. 2015, pp. 223–224. arXiv: 1410.0696.
- [22] **C. E. Barbosa**, C. Mendes de Oliveira, P. Amram, F. Ferrari, D. Russeil, B. Epinat, V. Perret, C. Adami, and M. Marcellin. “GHASP: an H $\alpha$  kinematic survey of spiral galaxies - X. Surface photometry, decompositions and the Tully-Fisher relation in the R $_c$  band”. In: *MNRAS* 453 (Nov. 2015), pp. 2965–2981. arXiv: 1508.03004.
- [23] M. Hilker, **C. E. Barbosa**, T. Richtler, L. Coccato, M. Arnaboldi, and C. Mendes de Oliveira. “A 3D view of the Hydra I galaxy cluster core - I. Kinematic substructures”. In: *IAU Symposium*. Ed. by B. L. Ziegler, F. Combes, H. Dannerbauer, and M. Verdugo. Vol. 309. IAU Symposium. Feb. 2015, pp. 221–222. arXiv: 1410.0695.
- [24] J. C. Basto Pineda, C. Mendes de Oliveira, **C. E. Barbosa**, P. Amram, and V. Perret. “The CUSP/CORE problem from a 2D view”. In: *Dark Side of the Universe (DSU 2012)*. Jan. 2012, p. 23.