

Rafael S. de Souza

Curriculum vitae

PROFESSIONAL ACTIVITIES

Head Cosmostatistics Initiative

Vice-President International Astrostatistics Association

Co-editor Astrostatistics and Astroinformatics Portal (ASAIP)

Elected Member COST action, Big Data Era in Sky and Earth Observation

Elected Member SKA Science Working group on Cosmic Dawn and Epoch of Reionization

Elected Member Brazilian Astronomical Society

Elected Member Brazilian Physics Society

Elected Member International Astronomical Union

Referee MNRAS, ApJ, AJ, A&A, Phys. Rev. D, Astrophys. Space Sci., Modern Phys. Lett. A,

AWARDS

2016 International Astrostatistics Association Award for Outstanding publications in Astrostatistics

2014 Best postdoc of the year at Korea Astronomy and Space Science Institute

EDUCATION

2004 **PhD in Astrophysics**, USP - Brazil.
2009

Title: *Origin and Evolution of Cosmic Magnetic Fields*
Supervisor: Reuven Opher
Summa cum laude

1999 **BSc in Astronomy**, UFRJ - Brazil.
2004

Title: *Cosmic Acceleration and matter creation*
Supervisor: Ioav Waga
Cum laude

CHAIR OF SCIENTIFIC EVENTS

Aug 21-28/2015

III COIN Residence Program (CRP#3), Hungary
Oct 18-25/2015

II COIN Residence Program (CRP#2), UK
Aug 17-24/2014

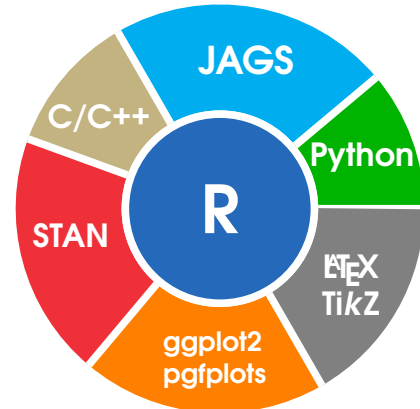
I COIN Summer Residence Program (CRP#1), Portugal

BOOKS

J. Hilbe, **R. S. de Souza**, E. E. O. Ishida, *Bayesian Models for Astrophysical Data: R/JAGS and Python/STAN*, Cambridge University Press, in press

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PROGRAMMING SKILLS



AUTHORED SOFTWARE

Python DRACULA: Dimensionality Reduction And Clustering for Unsupervised Learning in Astronomy, Agüena, M.; Busti, V. C.; Camacho, H.; Sasdelli, M.; Ishida, E. E. O.; Vilalta, R.; Trindade, A. M. M.; Gieseke, F.; **de Souza, R. S.**; Fantaye, Y. T.; Mazzali, P. A., Astrophysics Source Code Library, 2015, [ascl:1512.009](https://ascl.net/1512.009)

R/Shiny AMADA: Analysis of Multidimensional Astronomical Datasets, **de Souza, R. S.** and Ciardi, B., Astrophysics Source Code Library, 2015, [ascl:1503.006](https://ascl.net/1503.006)

R/Shiny/Python CosmoPhotoz: Photometric redshift estimation using GLMs, **de Souza, R. S.**, Elliott, J., Krone-Martins, A., Ishida, E. E. O.; Hilbe, J., Cameron, E., Astrophysics Source Code Library, 2015, [ascl:1408.018](https://ascl.net/1408.018)

R LOGIT: Functions, Data and Code for Binary and Binomial Data, Hilbe, J. and **de Souza, R. S.**, CRAN, 2015, [LOGIT](https://CRAN.r-project.org/web/packages/LOGIT/)

Python cosmoabc: Likelihood-free inference for cosmology, Ishida, E. E. O., Vitenti, S. D. P., Penna-Lima, M., Cisewski, J., **de Souza, R. S.**, et al. Astrophysics Source Code Library, 2015, [ascl:1505.013](https://ascl.net/1505.013)

RESEARCH EXPERIENCE

Post-Doctoral Fellow

2014	ELTE, Hungary.
2012-2014	KASI, South-Korea.
2011-2012	MPA, Germany.
2010-2011	Kavli-IPMU, Japan.
2009-2010	USP, Brazil.
2015	Ondrejov Obs., Czech Rep.
2015	MSSL, UK.
2015	NCAC, Poland.
2014	MPA, Germany.
2013	MPA, Germany.
2013	UL, Portugal.
2013	MPA, Germany.
2011	SNS, Italy.
2011	Excellence Cluster, Germany.
2011	HST, Hong Kong.

INVITED TUTORIAL

July 12-13/2016

Mini-course of Astrostatistics

Porto Alegre - Brazil

Tutorial: *Bayesian Methods for Astrophysics*

May 22-24/2016

Astronomical Data Analysis Summer School

Chania - Greece

Tutorial: *Bayesian Methods for Astrophysics*

GRANTS / FELLOWSHIPS

2014-	MTA Fellowship	€ 50,000
2012-2014	KASI-Fellowship	€ 80,000
2011-2012	FAPESP Fellowship	€ 45,000
2010-2011	CNPq-Fellowship	€ 47,000
2009-2010	FAPESP Fellowship	€ 40,000
2004-2009	FAPESP Scholarship	€ 20,000

GRANTS TRAVEL / CONFERENCES

2015	COIN residence Programme 2015	€ 1,800
2015	2015 COST Action Big-Sky-Earth	€ 750
2012	XXVIII IAU General Assembly	€ 500
2008	Onassis Foundation	€ 400

CATALOGUE

GLADE Galaxy List for the Advanced Detector Era

A full-sky galaxy catalogue for identifying gravitational wave sources and support electromagnetic follow-ups of the LIGO/Virgo Collaboration.

SCIENTIFIC INTERESTS



SELECTED CONTRIBUTED TALKS

Oct 31/2012	The 5th KIAS Workshop on Cosmology Seoul-Korea talk: <i>Dark Matter Halo Environment for Primordial Star Formation</i>
Aug 30/2012	XXVIII IAU General Assembly Beijing-China talk: <i>Probing cosmic star formation up to $z = 9.4$ with GRBs</i>
Nov 15/2010	Population III Gamma-Ray Burst Chiba-Japan talk: <i>Dark Matter Halo Environment for Primordial Star Formation</i>

SELECTED INVITED TALKS

Jul 26/2015	60th World Statistics Congress Rio de Janeiro - Brazil talk: <i>The Cosmostatistics Initiative</i>
May 07/2015	NCAC Torun-Poland talk: <i>The Astrostatistics Awakens</i>
May 07/2014	Bayes Forum-MPA Garching-Germany talk: <i>AMADA</i>
Jan 10/2014	Kyung Hee University Suwon-South-Korea talk: <i>Probing the Pop-III IMF</i>
Jun 09/2013	Chungnam National University Daejeon-South-Korea talk: <i>Detectability of the Pop-III stars</i>
Apr 27/2013	Max Planck Institute for Astrophysics Garching-Germany talk: <i>Detectability of the First stars</i>
Apr 19/2011	Hong Kong University Clear Water Bay-Hong Kong talk: <i>Cosmic Explosions-GRBs</i>

⚖️ POSTGRADUATE PANELS

Master thesis

April 29th, 2016 Kunal Parmar,
University of Houston - USA
*Cluster Validation of WHAN Galaxy Classification
Using a Novel Approach to External Cluster Validation*

✚ MENTORING EXPERIENCE

Co-supervision of PhD students

2007 - 2009 Rodrigues, L. F. S., USP - Brazil
On the missing satellites problem

📖 ACADEMIC REFERENCES

J. Hilbe	ASU	hilbe@asu.edu
R. Vilalta	UH	vilalta@cs.uh.edu
B. Ciardi	MPA	ciardi@mpa-garching.mpg.de
A. Ferrara	SNS	andrea.ferrara@sns.it
E. Feigelson	PennState	e5f@psu.edu

🔗 OTHERS

LACAN Survey of working environment in the Brazilian astronomical Community, **de Souza, R. S.**, et al., Jul/2015 [LACAN](#)

Navegando rumo à Ilha, de Souza, R. S., and Ishida, E. E. O., *Art i Literatura*, v. 47, serie ALPHA, Valencia, Spain, September 2010 (ISSN 1989-3590)

📖 PUBLICATION LIST

- R. S. de Souza**, M. L. Dantas, A. Krone-Martins, E. Cameron, P. Coelho, M. W. Hattab, M. de Val-Borro, J. Hilbe, J. Elliott, A. Hagen, for the COIN collaboration, *Is the cluster environment quenching the Seyfert activity in elliptical and spiral galaxies?* [MNRAS 461, 2, 2115-2125, 2016](#)
doi: 10.1093/mnras/stw1459
- M. Sasdelli, E. E. O. Ishida, R. Vilalta, M. Agüena, V. C. Busti, H. Camacho, A. M. M. Trindade, F. Gieseke, **R. S. de Souza**, Y. T. Fantaye, P. A. Mazzali, *Exploring the spectroscopic diversity of type Ia SNe with DRACULA: a machine learning approach*, [MNRAS 461, 2, 2044-2059, 2016](#)
doi: 10.1093/mnras/stw1228
- R. S. de Souza**, B. Ciardi, *AMADA-Analysis of multidimensional astronomical datasets*, [Astronomy & Computing 12 100-108, 2015](#)
doi: 10.1016/j.ascom.2015.06.006
- R. S. de Souza**, E. Cameron, M. Killedar, J. Hilbe, R. Vilalta, U. Maio, V. Biffi, B. Ciardi, J. D. Riggs, *The overlooked potential of Generalized Linear Models in astronomy, I: Binomial regression*, [Astronomy & Computing, 12, 21-32, 2015](#)
doi:10.1016/j.ascom.2015.04.002
- J. Elliott, **R. S. de Souza**, A. Krone-Martins, E. Cameron, E. E. O. Ishida, J. Hilbe, *The overlooked potential of Generalized Linear Models in astronomy-II: Gamma regression and photometric redshifts*, [Astronomy & Computing, 10 61-72, 2015](#)
doi:10.1016/j.ascom.2015.01.002
- R. S. de Souza**, J. M. Hilbe, B. Buelens, J. D. Riggs, E. Cameron, E. E. O. Ishida, A. L. Chies-Santos, M. Killedar, *The Overlooked Potential of Generalized Linear Models in Astronomy-III: Bayesian, Negative Binomial Regression and Globular Cluster Populations*, [MNRAS, 453, 2, 1928, 2015](#)
doi:10.1093/mnras/stv1825
- E. E. O. Ishida, S. D. P. Vitenti, M. Penna-Lima, J. Cisewski, **R. S. de Souza**, A. M. M. Trindade, E. Cameron, V. C. Busti, *cosmoabc: Likelihood-free inference via Population Monte Carlo Approximate Bayesian Computation*, [Astronomy & Computing, 13, 1-11, 2015](#)
doi:10.1016/j.ascom.2015.09.001
- L. Koopmans, J. Pritchard, G. Mellema, J. Aguirre, K. Ahn, R. Barkana, I. van Bemmel, G. Bernardi, A. Bonaldi, F. Briggs, A. G. de Bruyn, T. C. Chang, E. Chapman, X. Chen, B. Ciardi, P. Dayal, A. Ferrara, A. Fialkov, F. Fiore, K. Ichiki, I. T. Illiev, S. Inoue, V. Jelic, M. Jones, J. Lazio, U. Maio, S. Majumdar, K. J. Mack, A. Mesinger, M. F. Morales, A. Parsons, U. L. Pen, M. Santos, R. Schneider, B. Semelin, **R. S. de Souza**, R. Subrahmanyam, T. Takeuchi, H. Vedantham, J. Wagg, R. Webster, S. Wyithe, K. K. Datta, C. Trott, *The Cosmic Dawn and Epoch of Reionisation with SKA*, [PoS, p. 1, 2015](#)
issn:1824-8039
- R. S. de Souza**, E. E. O. Ishida, *Making sense of massive unknowns*, [Significance 11 59-60, 5, 2014](#)
doi:10.1111/j.1740-9713.2014.00785.x
- A. Krone-Martins, E. E. O. Ishida, **R. S. de Souza**, *The first analytical expression to estimate photometric redshifts suggested by a machine*, [MNRASL, 443 L34-L38, 2014](#)
doi:10.1093/mnrasl/slu067
- R. S. de Souza**, E. E. O. Ishida, D. J. Whalen, J. L. Johnson, A. Ferrara *Probing the stellar initial mass function with high-z supernovae*, [MNRAS, 442 1640-1655, 2014](#)
doi:10.1093/mnras/stu984
- R. S. de Souza**, U. Maio, V. Biffi, B. Ciardi, *Robust PCA and MIC statistics of baryons in early mini-haloes*, [MNRAS, 440 240-248, 2014](#)
doi:10.1093/mnras/stu274
- R. S. de Souza**, E. E. O. Ishida, J. L. Johnson, D. J. Whalen, A. Mesinger, *Detectability of the first cosmic explosions*, [MNRAS, 436 1555-1563, 2013](#)
doi:10.1093/mnras/stt1680
- R. S. de Souza**, A. Mesinger, A. Ferrara, Z. Haiman, R. Perna, N. Yoshida, *Constraints on warm dark matter models from high-redshift long gamma-ray bursts*, [MNRAS, 432, 3218-3227, 2013](#)
doi:10.1093/mnras/stt674
- E. E. O. Ishida, **R. S. de Souza**, *Kernel PCA for Type Ia supernovae photometric classification*, [MNRAS, 430, 509-532, 2013](#)
doi:10.1093/mnras/sts650

16. **R. S. de Souza**, B. Ciardi, U. Maio, A. Ferrara *Dark matter halo environment for primordial star formation*, [MNRAS](#), **428**, 2109-2117, 2013
doi:10.1093/mnras/sts181
17. **R. S. de Souza**, A. Krone-Martins, E. E. O. Ishida, B. Ciardi, *Searching for the first stars with the Gaia mission*, [A&A](#) **545**, A102, 2012
doi:10.1051/0004-6361/201118746
18. **R. S. de Souza**, R. Opher, *Origin of intense magnetic fields near black holes due to non-minimal magnetic-gravitational coupling*, [Phys. Lett. B.](#) **705**, 292-293, 2011
doi:10.1016/j.physletb.2011.10.045
19. E. E. O. Ishida, **R. S. de Souza**, A. Ferrara *Probing cosmic star formation up to $z=9.4$ with gamma-ray bursts*, [MNRAS](#), **418**, 500-504, 2011
doi:10.1111/j.1365-2966.2011.19501.x
20. **R. S. de Souza**, N. Yoshida, K. Ioka, *Populations III.1 and III.2 gamma-ray bursts: constraints on the event rate for future radio and X-ray surveys*, [A&A](#) **533**, A32, 2011
doi:10.1051/0004-6361/201117242
21. **R. S. de Souza**, L. F. S. Rodrigues, E. E. O. Ishida, R. Opher, *The effect of a single supernova explosion on the cuspy density profile of a small-mass dark matter halo*, [MNRAS](#), **415**, 2969-2973, 2011
doi:10.1111/j.1365-2966.2011.18916.x
22. E. E. O. Ishida, **R. S. de Souza**, *Hubble parameter reconstruction from a principal component analysis: minimizing the bias*, [A&A](#) **527**, A49, 2011
doi:10.1051/0004-6361/201015281
23. **R. S. de Souza**, L. F. S. Rodrigues, R. Opher, *Random primordial magnetic fields and the gas content of dark matter haloes*, [MNRAS](#), **410**, 2149-2155, 2011
doi:10.1111/j.1365-2966.2010.17588.x
24. **R. S. de Souza**, R. Opher, *Are the magnetic fields of millisecond pulsars $\sim 10^8$ G?*, [Ap&SS](#) **330**, 267-271, 2010
doi:10.1007/s10509-010-0411-1
25. **R. S. de Souza** and E. E. O. Ishida, *An analytical approach to the dwarf galaxies cusp problem*, [A&A](#) **524**, A74, 2010
doi:10.1051/0004-6361/201015330
26. L. F. S. Rodrigues, **R. S. de Souza**, R. Opher, *Suppression of small baryonic structures due to a primordial magnetic field*, [MNRAS](#), **406**, 482-485, 2010
doi:10.1111/j.1365-2966.2010.16677.x
27. **R. S. de Souza**, R. Opher, *Origin of magnetic fields in galaxies*, [Phys. Rev. D](#) **81**, 6, 067301, 2010
doi:10.1103/PhysRevD.81.067301
28. **R. S. de Souza**, R. Opher, *Origin of $10^{15} - 10^{16}$ G magnetic fields in the central engine of gamma ray bursts*, [JCAP](#) **2**, 22, 2010
doi:10.1088/1475-7516/2010/02/022
29. T. F. Laganá, **R. S. de Souza** and G. R. Keller, *On the influence of non-thermal pressure on the mass determination of galaxy clusters*, [A&A](#) **510**, A76, 2010
doi:10.1051/0004-6361/200911855
30. **R. S. de Souza**, R. Opher, *The Origin of primordial magnetic fields*, [Phys. Rev. D](#) **77**, 4, 043529, 2008
doi:10.1103/PhysRevD.77.043529
31. M. P. Freaza, **R. S. de Souza**, I. Waga, *Cosmic acceleration and matter creation*, [Phys. Rev. D](#) **66**, 10 103502, 10, 103502, 2002
doi:10.1103/PhysRevD.66.103502

Refereed Proceedings

1. J. Elliott, **R. S. de Souza**, A. Krone-Martins, E. Cameron, E. E. O. Ishida, J. Hilbe, *Using gamma regression for photometric redshifts of survey galaxies*, [The Universe of Digital Sky Surveys, Astrophysics and Space Science Proceedings](#), INAF - Observatory of Capodimonte, Naples, 2015
2. E. E. O. Ishida, F. B. Abdalla, **R. S. de Souza**, *Improved KPCA for supernova photometric classification*, [IAU Symposium pp. 326329](#), 2014
doi:10.1017/S1743921314010928
3. K. Ioka, Y. Suwa, H. Nagakura, **R. S. de Souza**, N. Yoshida, *Population III Gamma-Ray Burst*, [IAU Symposium pp. 326329](#), 2014
doi:10.1017/S1743921314010928
4. **R. S. de Souza**, *Pop III GRBs: an estimative of the event rate for future surveys*, [Gamma-Ray Bursts 2012 Conference \(GRB 2012\) p. 85](#), 2012