

CÉSAR ROJAS-BRAVO

Ph.D. candidate, Astronomy & Astrophysics
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PRIMARY RESEARCH INTERESTS

- Cosmology with type Ia Supernovae: constraining Dark Energy properties using the Ia Supernovae data from the Swope Supernova Survey, using the 1.0 m Swope telescope in Las Campanas Observatory, Chile.
- Gravitational wave optical follow-up with multiple telescopes, mainly the Swope telescope.
- Study of interesting/rare/peculiar transients.

EDUCATION

Ph.D. candidate, Astronomy & Astrophysics *2017-present*
Advisor: Ryan J. Foley
University of California, Santa Cruz. USA.

M.Sc., Astronomy & Astrophysics *2019*
Advisor: Ryan J. Foley
University of California, Santa Cruz. USA.

B.S. in Physics *2016*
Universidad de Costa Rica. Costa Rica.

B.A. Honors in Classical Philology *2016*
Universidad de Costa Rica. Costa Rica.

Exchange Physics student - Erasmus Mundus Scholarship *August 2010 – June 2011*
Universitat Autònoma de Barcelona. Spain.

FELLOWSHIPS AND AWARDS

- Osterbrock Fellow, UC Santa Cruz *2020-present*
- LSST travel award for 2019 LSST DESC meeting *2019*
- Osterbrock Scholar. Trip to Space Telescope Science Institute, Baltimore, to sit at the Hubble Space Telescope's Time Allocation Committee *2018*
- Part of the scientific Breakthrough of the Year discovery. *2017*
- Regents' Fellowship, University of California, Santa Cruz *2017*
- Erasmus Mundus Scholarship *2010*

PUBLICATIONS

- **1 first author, 42 Nth author. Total h-index: 24.**
- [ADS publication list.](#)

First author Journal Publications:

1. **Rojas-Bravo, C.** & Araya, M. , 2016: “Search for gamma-ray emission from star-forming galaxies with Fermi LAT”. *MNRAS* 463, 1068-1073 [12 citations]. [ADS link.](#)

Nth Author Journal Publications:

1. Coulter, D. et al. (*incl. Rojas-Bravo, C.*), 2017: “Swope Supernova Survey 2017a (SSS17a), the Optical Counterpart to a Gravitational Wave Source”. *Science*. 358, 1556-1558. [ADS link.](#)
2. Kilpatrick, C. et al. (*incl. Rojas-Bravo, C.*), 2017: “Electromagnetic Evidence that SSS17a is the Result of a Binary Neutron Star Merger”. *Science*. 358, 1583-1587. [ADS link.](#)
3. Drout, M.R. et al. (*incl. Rojas-Bravo, C.*), 2017: “Light Curves of the Neutron Star Merger GW170817/SSS17a: Implications for R-Process Nucleosynthesis”. *Science*. 358, 1570-1574. [ADS link.](#)
4. Siebert, M. et al. (*incl. Rojas-Bravo, C.*), 2017: “The Unprecedented Properties of the First Electromagnetic Counterpart to a Gravitational Wave Source”. *ApJL* 848: L26. [ADS link.](#)
5. Murguia-Berthier, A. et al. (*incl. Rojas-Bravo, C.*), 2017: “A Neutron Star Binary Merger Model For GW170817/GRB170817A/SSS17A”. *ApJL* 848: L34. [ADS link.](#)
6. Pan, Y-C. et al. (*incl. Rojas-Bravo, C.*), 2017: “The Old Host-Galaxy Environment of SSS17A, The First Electromagnetic Counterpart to a Gravitational Wave Source”. *ApJL*. 848:L30. [ADS link.](#)
7. Abbott, B.P. et al. (*incl. Rojas-Bravo, C.*), 2017. “A gravitational-wave standard siren measurement of the Hubble constant”. *Nature*. 551, 85–88. [ADS link.](#)
8. Abbott, B.P. et al (*incl. Rojas-Bravo, C.*), 2017. “Multi-messenger Observations of a Binary Neutron Star Merger”. *ApJL*. 848: L12. [ADS link.](#)
9. Tartaglia, L. et al. (*incl. Rojas-Bravo, C.*), 2018. “The early detection and follow-up of the highly obscured Type II supernova 2016ija/DLT16am”. *ApJ*. 853: 62. [ADS link.](#)
10. Kilpatrick, C. et al. (*incl. Rojas-Bravo, C.*), 2018. “X-ray Limits on the Progenitor System of the Type Ia Supernova 2017ejb”. *MNRAS*. 481, 4123–4132. [ADS link.](#)
11. Dimitriadis, G. et al. (*incl. Rojas-Bravo, C.*), 2019. “K2 Observations of SN 2018oh Reveal a Two-Component Rising Light Curve for a Type Ia Supernova”. *ApJL*. 870:L1. [ADS link.](#)
12. Li, W. et al. (*incl. Rojas-Bravo, C.*), 2018. “Photometric and Spectroscopic Properties of Type Ia Supernova 2018oh with Early Excess Emission from the Kepler 2 Observations”. *ApJ*. 870:12L. [ADS link.](#)
13. Dimitriadis, G. et al. (*incl. Rojas-Bravo, C.*), 2019. “Nebular Spectroscopy of Kepler’s Brightest Supernova”. *ApJL*. 870:L14. [ADS link.](#)
14. Nicholl, M. et al. (*incl. Rojas-Bravo, C.*), 2019. “The tidal disruption event AT2017eqx: spectroscopic evolution from hydrogen rich to poor suggests an atmosphere and outflow”. *MNRAS*. 488, 1878–1893. [ADS link.](#)
15. Neustadt, J. M. M. et al. (*incl. Rojas-Bravo, C.*), 2019. “To TDE or not to TDE: The luminous transient ASASSN-18jld with TDE-like and AGN-like qualities”. *MNRAS*. 494, 2538–2560. [ADS link.](#)

16. Jacobson-Galan, Wynn V. et al. (*incl. Rojas-Bravo, C.*), 2019. “Ca hnk: Calcium-rich Transient SN 2016hmk from the Helium Shell Detonation of a Sub-Chandrasekhar White Dwarf”. *ApJ*. 896:165J. [ADS link](#).
17. Holoien, Thomas W. -S. et al. (*incl. Rojas-Bravo, C.*), 2020. “The Rise and Fall of ASASSN-18pg: Following a TDE from Early To Late Times”. *ApJ*. 898:161H. [ADS link](#).
18. Burns, Christopher R. et al. (*incl. Rojas-Bravo, C.*), 2020. “SN 2013aa and SN 2017cbv: Two Sibling Type Ia Supernovae in the spiral galaxy NGC 5643”. *ApJ*. 895:118B. [ADS link](#).
19. Jacobson-Galan, Wynn V. et al. (*incl. Rojas-Bravo, C.*), 2020. “SN 2019ehk: A Double-Peaked Ca-rich Transient with Luminous X-ray Emission and Shock-Ionized Spectral Features”. *ApJ*. 898:166J. [ADS link](#).
20. Stein, Robert et al. (*incl. Rojas-Bravo, C.*), 2020. “A high-energy neutrino coincident with a tidal disruption event”. *Nature Astronomy*. 5:510S. [ADS link](#).
21. Jones, D. O. et al. (*incl. Rojas-Bravo, C.*), 2020. “The Young Supernova Experiment: Survey Goals, Overview, and Operations”. *ApJ*. 908:143J. [ADS link](#).
22. Hammerstein, Erica et al. (*incl. Rojas-Bravo, C.*), 2020. “TDE Hosts are Green and Centrally Concentrated: Signatures of a Post-Merger System”. *ApJL*. 908L:20H. [ADS link](#).
23. Hung, Tiara et al. (*incl. Rojas-Bravo, C.*), 2020. “Double-peaked Balmer Emission Indicating Prompt Accretion Disk Formation in an X-Ray Faint Tidal Disruption Event”. *ApJ*. 903:31H. [ADS link](#).
24. Hung, Tiara et al. (*incl. Rojas-Bravo, C.*), 2020. “Discovery of a Fast Iron Low-ionization Outflow in the Early Evolution of the Nearby Tidal Disruption Event AT2019qiz”. *ApJ*. 917:9H. [ADS link](#).
25. Hinkle, Jason T. et al. (*incl. Rojas-Bravo, C.*), 2021. “Discovery and follow-up of ASASSN-19dj: an X-ray and UV luminous TDE in an extreme post-starburst galaxy”. *MNRAS*. 500, 1673-1696. [ADS link](#).
26. Kilpatrick, Charles D. et al. (*incl. Rojas-Bravo, C.*), 2021. “A Cool and Inflated Progenitor Candidate for the Type Ib Supernova 2019yvr at 2.6 Years Before Explosion”. *MNRAS*. 504, 2073-2093. [ADS link](#).
27. Barna, Barnabás et al. (*incl. Rojas-Bravo, C.*), 2021. “SN 2019muj - a well-observed Type Iax supernova that bridges the luminosity gap of the class”. *MNRAS*. 501, 1078-1099. [ADS link](#).
28. Kilpatrick, Charles D. et al. (*incl. Rojas-Bravo, C.*), 2021. “The Gravity Collective: A Search for the Electromagnetic Counterpart to the Neutron Star-Black Hole Merger GW190814”. *ApJ*. 923:258K. [ADS link](#).
29. Jencson, Jacob E. et al. (*incl. Rojas-Bravo, C.*), 2021. “AT 2019qyl in NGC 300: Internal Collisions in the Early Outflow from a Very Fast Nova in a Symbiotic Binary”. *ApJ*. 920:127J. [ADS link](#).
30. Armstrong, Patrick et al. (*incl. Rojas-Bravo, C.*), 2021. “SN2017jgh: a high-cadence complete shock cooling light curve of a SN IIb with the Kepler telescope”. *MNRAS*. 507, 3125-3138. [ADS link](#).
31. Wang, Qinan et al. (*incl. Rojas-Bravo, C.*), 2021. “SN 2018agk: A Prototypical Type Ia Supernova with a Smooth Power-law Rise in Kepler (K2)”. *ApJ*. 923:167W. [ADS link](#).
32. Kenworthy, W. D. et al. (*incl. Rojas-Bravo, C.*), 2021. “SALT3: An Improved Type Ia Supernova Model for Measuring Cosmic Distances”. *ApJ*. 923:265K. [ADS link](#).

33. Kilpatrick, Charles D. et al. (*incl. Rojas-Bravo, C.*), 2021. “Updated Photometry of the Yellow Supergiant Progenitor and Late-time Observations of the Type IIb Supernova 2016gkg ”. Submitted to *ApJ*. [ADS link](#).
34. Gagliano, Alexander et al. (*incl. Rojas-Bravo, C.*), 2022. “An Early-Time Optical and Ultraviolet Excess in the type-Ic SN 2020oi”. *ApJ*. 924:55G. [ADS link](#).
35. Jacobson-Galán, W. V. et al. (*incl. Rojas-Bravo, C.*), 2022. “Final Moments. I. Precursor Emission, Envelope Inflation, and Enhanced Mass Loss Preceding the Luminous Type II Supernova 2020tlf ”. *ApJ*. 924:15J. [ADS link](#).
36. Scolnic, Dan et al. (*incl. Rojas-Bravo, C.*), 2022. “The Pantheon+ Analysis: The Full Dataset and Light-Curve Release ”. *ApJ*. 938:110B. [ADS link](#).
37. Brout, Dillon et al. (*incl. Rojas-Bravo, C.*), 2022. “The Pantheon+ Analysis: Cosmological Constraints ”. *ApJ*. 938:110B. [ADS link](#).
38. Pastorello, Andrea et al. (*incl. Rojas-Bravo, C.*), 2022. “Panchromatic evolution of three luminous red novae: Forbidden hugs in pandemic times – IV ”. Submitted to *A&A*. eprint arXiv:2208.02782. [ADS link](#).
39. Ward, Sam et al. (*incl. Rojas-Bravo, C.*), 2022. “SN 2021hpr and its two siblings in the Cepheid calibrator galaxy NGC 3147: A hierarchical BayeSN analysis of a Type Ia supernova trio, and a Hubble constant constraint ”. Submitted to *MNRAS*. eprint arXiv:2209.10558. [ADS link](#).
40. Vazquez, Jason et al. (*incl. Rojas-Bravo, C.*), 2022. “The Type II-P Supernova 2019mhm and Constraints on Its Progenitor System ”. Submitted to *ApJ*. eprint arXiv:2210.05131. [ADS link](#).
41. Angus, Charlotte et al. (*incl. Rojas-Bravo, C.*), 2022. “A fast-rising tidal disruption event from a candidate intermediate-mass black hole”. *Nature Astronomy*: 240A. [ADS link](#).
42. Aleo, Patrick et al. (*incl. Rojas-Bravo, C.*), 2022. “The Young Supernova Experiment Data Release 1 (YSE DR1): Light Curves and Photometric Classification of 1975 Supernovae”. Submitted to *ApJ*. eprint arXiv:2211.07128. [ADS link](#).

44 Astronomer Telegrams: [List](#).

SCIENTIFIC PRESENTATIONS

1. **Oral presentation:** “The Swope Supernova Survey: Cosmology with Type Ia Supernovae”
First Central American Astronomy Meeting (virtual meeting) 2020
2. **Oral presentation:** “Type Ia Supernova Cosmology with the Swope Supernova Survey” 2019
UC Santa Cruz FLASH Seminar; Santa Cruz, USA
3. **Oral presentation:** “The Swope Supernova Survey” 2019
JuDO Lightning Talk at the DESC Winter Meeting; Berkeley, USA
4. **Oral presentation:** “The Swope Supernova Survey: an Overview” 2018
UCSC Filippenkopalooza Pre-Meeting; Santa Cruz, USA
5. **Oral presentation:** “The experience and discovery of the electromagnetic counterpart of neutron star merger GW170818” 2017
Invited and closing talk at *24 Hours of Physics* at Universidad de Costa Rica; San Pedro, Costa Rica
6. **Oral presentation:** Search for gamma-ray emission from star-forming galaxies with Fermi LAT” 2016
School on Dark Matter; São Paulo, Brazil.

7. **Oral presentation:** “Extragalactic Gamma-ray Astronomy with the Fermi Telescope and HAWC”
2015
37th International School for Young Astronomers, ISYA 2015; Tegucigalpa, Honduras
8. **Oral presentation:** “Search for gamma-ray emission from star-forming galaxies with Fermi LAT”
2015
6th International Symposium on High-Energy Gamma-ray Astronomy (Gamma2016); Heidelberg, Germany
9. **Poster:** Search for gamma-ray emission from star-forming galaxies with Fermi LAT” 2015
International School of Cosmic Ray Astrophysics “Maurice M. Shapiro”; Erice, Italy

RESEARCH GRANTS

1. **NASA HST:** *Measuring the Effect of Progenitor Metallicity on Type Ia Supernova Distance Estimates* as Co-I. PI: Matthew Siebert. 2022
2. **NASA HST:** *Reducing Type Ia Supernova Distance Biases by Separating Reddening and Intrinsic Color* as Co-I. PI: Ryan Foley. 2022
3. **NASA HST:** *Feeling Blue: Creating an Industry Standard SALT3 Model that is Robust at UV Wavelengths* as Co-I. PI: Justin Pierel. 2022
4. **NASA JWST:** *Nucleosynthesis, Astrophysics, and Cosmology with IR Observations of a Gravitational Wave Counterpart* as Co-I. PI: Ryan Foley. 2021
5. **NASA JWST:** *Detecting the Synthesis of the Heaviest Elements with Photometry of a Kilonova in the Optically Thin Phase* as Co-I. PI: Maria Drout. 2021
6. **NASA JWST:** *Nebular Spectroscopy of a Kilonova with JWST* as Co-I. PI: Charlie Kilpatrick. 2021
7. **NASA HST:** *Snapshot Observations of Nearby, Recent Transients and Their Environments* as Co-I. PI: Ryan Foley. 2021
8. **NASA HST:** *Measuring the Effect of Progenitor Metallicity on Type Ia Supernova Distance Estimates* as Co-I. PI: Ryan Foley. 2021
9. **NASA ADAP:** *Building A Holistic Picture of the Host Galaxy Environments of Supernovae with the NASA Archive* as Co-I. PI: David Jones. 2020
10. **NASA HST:** *Tension at the Breaking Point: Uncovering New Physics Through a Two-Rung Distance Ladder Measurement of the Hubble Constant* as Co-I. PI: David Jones. 2020
11. **NASA HST:** *Snapshot Observations of Nearby, Recent Supernovae and Their Environments* as Co-I. PI: Ryan Foley. 2020
12. **NASA HST:** *Measuring the Effect of Progenitor Metallicity on Type Ia Supernova Distance Estimates* as Co-I. PI: Ryan Foley. 2020
13. **NASA HST:** *Using the full power of the HST Archive to Address the Red Supergiant Problem”* as Co-I. PI: Charlie Kilpatrick. 2020
14. **NASA HST:** *Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS”* as Co-I. PI: Ryan Foley. 2019

PRESS

1. [Physicist from Alajuela worked in team that discovered collision of neutron stars.](#) 2017.
Interview in *La Nación*, Costa Rican’s most prestigious newspaper, about my experience on the discovery of SSS17a [in Spanish].

2. [Costa Rican changed the academia from the University of Costa Rica to join group that observed the binary neutron star \(BNS\) merger.](#) *2017.*
Radio interview in *Nuestra Voz*, a very popular radio show in Costa Rica. Interview starts at minute 10. Written article found [here](#) [in Spanish].
3. [Costa Rican was part of the scientific event of the year.](#) *2017.*
Article about my involvement on the BNS merger on *Semenario Universidad*, the newspaper of Universidad de Costa Rica, my alma mater [in Spanish].
4. [Giant! Costa Rican was part of key finding in Astronomy.](#) *2017.*
[Costa Rican went from working in a call center to achieve a scientific milestone](#)
A couple of articles from Costa Rican online newspaper *crhoy.com* about the BNS merger [in Spanish].
5. [24 hours of exchanging Physics knowledge.](#) *2017.*
Report on the *24 hours on Physics* event at Universidad Costa Rica, highlighting my contribution as the closing talk [in Spanish].
6. [Neutron Stars, Gravitational Waves and all the gold in the Universe.](#) *2017.*
Full media report from UC Santa Cruz regarding the binary neutron star merger event
7. [A discovery in the dark.](#) *2021.*
Article in the LIGO magazine on my scientific journey and involvement in the kilonova discovery in 2017.
8. [Costa Rican Scientific Talent of the Month.](#) *2021.*
Interview for Ticotal, a network of scientists of the Costa Rican Academy of Sciences.

INTERNATIONAL COLLABORATIONS

- Swope Supernova Survey - Member *2017 - Present*
- Foundation Supernova Survey - Member *2017 - Present*
- 1 Meter 2 Hemisphere (1M2H) Gravitational Wave Follow-up – Member *2017 - Present*
- Young Supernova Experiment (YSE) - Member *2019 - Present*
- LSST Dark Energy Science Collaboration - Junior Member *2019 - Present*
- History of Science Society - Member *2015*

OBSERVING EXPERIENCE

- Lick Observatory – Optical Spectroscopy (Kast) *37 nights*
- Keck Observatory – Optical Spectroscopy (LRIS) *6 nights*
- SOAR - National Optical Astronomy Observatory - Optical Spectroscopy (Goodman) *3 nights*
- Kitt Peak Observatory – Optical Spectroscopy (Mayall/KOSMOS) *4 nights*
- Las Campanas Observatory - Optical photometry (Swope) *11 nights*
- Lick Observatory - Optical photometry (Nickel) *5 nights*

TEACHING EXPERIENCE

Teaching Assistant: *Introduction to the Cosmos* *2021*
 Professor: Alexie Leauthaud.
 Department of Astronomy, UC Santa Cruz.

Teaching Assistant: *Physics of Stars* 2018
Professor: Ryan Foley.
Department of Astronomy, UC Santa Cruz.

Lecturer: *Fundamentals of Astronomy, Physics I, Physics III* 2017
Department of Physics, Universidad de Costa Rica

Teaching Assistant of multiple Physics, Astronomy and Classical Philology courses. 2012-2016
Universidad de Costa Rica: Department of Physics and Department of Classical Studies

TECHNICAL STRENGTHS

Computer Languages Python

ASTRONOMY OUTREACH

- Promoting **La Noche de las Estrellas**, outreach Spanish-speaking event at Lick Observatory, and giving Astronomy talks at local Santa Cruz primary schools. [Website](#) 2017 - 2022
- Talk at San Francisco State University as part of their **Noche de Estrellas: El Origen de la Energía Oscura**. More info [here](#) 2022
- Tutor in Raja GuhaThakurta's PyaR tutorial (Python and research tutorial). [Website](#) Spring 2019
- Collaborated at the Planetarium of University of Costa Rica in several activities: 2015-2016
 - giving popular Astronomy talks to local public schools
 - guiding the general public in our "Observational Astronomy Nights" at the Planetarium.
 - taking telescopes to rural communities and guiding them on observation nights.
 - coauthor of the 2017 Astronomical Calendar of the Planetarium of University of Costa Rica.

OTHER INTERESTS

- J.R.R. Tolkien admirer & collector. I have a blog related to all things inspired by him: [Tolkien inspiration](#).
- A movie review of mine was published in *Mallorn: The Journal of the Tolkien Society* in 2013. [Website](#).
- Language lover: I speak fluent Spanish, English and Portuguese, intermediate Italian, I have a professional knowledge of Classical Latin and Ancient Greek, and have some basic knowledge of Catalan.