Antonio C. Rodriguez

Cahill Center for Astronomy and Astrophysics
1216 E California Blvd.
Pasadena, CA 91125
Research Interests: White Dwarf Stars, Binary Stars, Accretion
X-ray Surveys, Time-domain Astronomy

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Education

Ph.D. in Astrophysics, California Institute of Technology — 2025 (*expected)*
Advisor: Shrinivas R. Kulkarni
Co-Advisors: Kareem El-Badry and Thomas A. Prince

M.S. in Astrophysics, California Institute of Technology — 2023

B.S. in Physics, Stanford University — 2020
Honors Thesis: *Youthful Exuberance of FU Ori Accretion Disks*
Advisors: Lynne A. Hillenbrand and Roger W. Romani

Awards

National Science Foundation Graduate Research Fellowship — 2022
Ford Foundation Predoctoral Fellowship — 2022
LSST-DA (formerly LSSTC) Data Science Research Fellowship — 2022
Neugebauer Scholar, France A. Córdova Research Fund — 2022
Anthony Fellowship, California Institute of Technology — 2020
Ford Foundation Predoctoral Fellowship (Honorable Mention) — 2020
Jeffrey Alan Willick Memorial Award, Stanford University — 2020
Outstanding member of the senior class concentrating in astrophysics.

Awarded Telescope Time

Palomar Observtory, 5 meter Hale Telescope — 25 nights (PI)
Magnetic Cataclysmic Variables: Characterization of X-ray Sources with ZTF Counterparts.
Additional 20+ nights as Co-I.
Instruments Used: DBSP, CHIMERA, WASP, WIRC.

Chandra X-ray Observatory — 260 ks (PI)
Probing Polars with High Resolution X-ray Spectroscopy.
Instruments Used: ACIS/HETG.

Chandra X-ray Observatory — 20 ks (PI)
Flux Limits on The Nearest Black Hole: Gaia BH1.
Instruments Used: ACIS.

Very Large Array — 6 hr (PI)
The First Accreting White Dwarf Pulsar. Additional 4 hr as Co-I (separate proposal).
Observing Mode: Continuum.

Keck Observatory, 10 meter Keck I and II Telescopes — 30+ nights (Co-PI)
ZTF Galactic Science Follow-ups. Instruments Used: LRIS, ESI.

James Webb Space Telescope — 11 hours (Co-I)
Uncovering the cold donors of AM CVn binaries. PI: Kareem El-Badry

Hubble Space Telescope — 9 orbits (Co-I)
Confirming the first strongly asynchronous polar. PI: Ilaria Caiazzo

LICK OBSERVATORY, 3 METER SHANE TELESCOPE 10+ nights (Co-I)
ZTF Galactic Science Follow-ups. Instruments Used: Kast

FIRST AUTHOR (AND MAJOR CONTRIBUTOR) PUBLICATIONS

[1] **Rodriguez, A. C.**, Spectroscopic Detection of a 2.9-hour Orbit in a Long Period Radio Transient, *Submitted to A&A Letters*, (posted to ArXiv on January 8, 2025 (UT); temporary link: https://drive.google.com/file/d/1LwP8QKbQm9W66euP4_xUVDVn9Qr9-RK0/view?usp=sharing).

[2] **Rodriguez, A. C.**, El-Badry, K., et al., A Link Between White Dwarf Pulsars and Polars: Multiwavelength Observations of the 9.36-Minute Period Variable Gaia22ayj, arXiv e-prints, arXiv:2501.01490 (2025), https://ui.adsabs.harvard.edu/abs/2025arXiv250101490R (*Submitted to PASP*)

[3] Ding, J., **Rodriguez, A. C.**, Multi-wavelength Classification of Active and Star-forming Galaxies on the BPT Diagram with Supervised Machine Learning Models, Publications of the Astronomical Society of the Pacific, 136, 124102 (2024), https://ui.adsabs.harvard.edu/abs/2024PASP..136l4102D

[4] **Rodriguez, A. C.**, El-Badry, K., et al., Cataclysmic Variables and AM CVn Binaries in SRG/eROSITA + Gaia: Volume Limited Samples, X-ray Luminosity Functions, and Space Densities, arXiv e-prints, arXiv:2408.16053 (2024), https://ui.adsabs.harvard.edu/abs/2024arXiv240816053R (*Accepted to PASP*)

[5] **Rodriguez, A. C.**, From Active Stars to Black Holes: A Discovery Tool for Galactic X-Ray Sources, Publications of the Astronomical Society of the Pacific, 136, 054201 (2024), https://ui.adsabs.harvard.edu/abs/2024PASP..136e4201R

[6] **Rodriguez, A. C.**, Cendes, Y., et al., No X-Rays or Radio from the Nearest Black Holes and Implications for Future Searches, Publications of the Astronomical Society of the Pacific, 136, 024203 (2024), https://ui.adsabs.harvard.edu/abs/2024PASP..136b4203R

[7] Galiullin, I., **Rodriguez, A. C.**, et al., A joint SRG/eROSITA + ZTF search: Discovery of a 97-min period eclipsing cataclysmic variable with evidence of a brown dwarf secondary, Monthly Notices of the Royal Astronomical Society, 528, 676 (2024), https://ui.adsabs.harvard.edu/abs/2024MNRAS.528..676G

[8] **Rodriguez, A. C.**, Galiullin, I., et al., SRGeJ045359.9+622444: A 55 Minute Period Eclipsing AM Canum Venaticorum Star Discovered from a Joint SRG/eROSITA + ZTF Search, The Astrophysical Journal, 954, 63 (2023), https://ui.adsabs.harvard.edu/abs/2023ApJ...954...63R

[9] **Rodriguez, A. C.**, Kulkarni, S. R., et al., Discovery of Two Polars from a Crossmatch of ZTF and the SRG/eFEDS X-Ray Catalog, The Astrophysical Journal, 945, 141 (2023), https://ui.adsabs.harvard.edu/abs/2023ApJ...945..141R

[10] **Rodriguez, A. C.**, Mróz, P., et al., Microlensing Events in the Galactic Plane Using the Zwicky Transient Facility, The Astrophysical Journal, 927, 150 (2022), https://ui.adsabs.harvard.edu/abs/2022ApJ...927..150R

[11] **Rodriguez, A. C.**, Hillenbrand, L. A., Application of a Steady-state Accretion Disk Model to Spectrophotometry and High-resolution Spectra of Two Recent FU Ori Outbursts, The Astrophysical Journal, 927, 144 (2022), https://ui.adsabs.harvard.edu/abs/2022ApJ...927..144R

ALL OTHER PUBLICATIONS

[1] Zhai, R., **Rodriguez, A. C.**, et al., Microlensing Events in Five Years of Photometry from the Zwicky Transient Facility, The Astrophysical Journal, 978, 76 (2025), https://ui.adsabs.harvard.edu/abs/2025ApJ...978...76Z

[2] Shariat, C., Naoz, S., et al., (incl. **Rodriguez, A. C.**), Once a Triple, Not Always a Triple: The Evolution of Hierarchical Triples That Yield Merged Inner Binaries, The Astrophysical Journal, 978, 47 (2025), https://ui.adsabs.harvard.edu/abs/2025ApJ...978...47S

[3] van Roestel, J., **Rodriguez, A. C.**, et al., Cyclotron emitting magnetic white dwarfs in post common envelope binaries discovered with the Zwicky Transient Facility, arXiv e-prints, arXiv:2412.15153 (2024), https://ui.adsabs.harvard.edu/abs/2024arXiv241215153V

[4] Blomberg, L., El-Badry, K., et al., (incl. **Rodriguez, A. C.**), The Companion Mass Distribution of Post Common Envelope Hot Subdwarf Binaries: Evidence for Boosted and Disrupted Magnetic Braking?, Publications of the Astronomical Society of the Pacific, 136, 124201 (2024), https://ui.adsabs.harvard.edu/abs/2024PASP..136l4201B

[5] Li, M. L., Ho, A. Y. Q., et al., (incl. **Rodriguez, A. C.**), The Nature of Optical Afterglows Without Gamma-ray Bursts: Identification of AT2023lcr and Multiwavelength Modeling, arXiv e-prints, arXiv:2411.07973 (2024), https://ui.adsabs.harvard.edu/abs/2024arXiv241107973L

[6] Galiullin, I., **Rodriguez, A. C.**, et al., Searching for new cataclysmic variables in the Chandra Source Catalog, Astronomy and Astrophysics, 690, A374 (2024), https://ui.adsabs.harvard.edu/abs/2024A&A...690A.374G

[7] Bhattacharjee, S., et al., (incl. **Rodriguez, A. C.**), Variability of Central Stars of Planetary Nebulae with the Zwicky Transient Facility. I. Methods, Short-Timescale Variables, Binary Candidates, and the Unusual Nucleus of WeSb 1, arXiv e-prints, arXiv:2410.03589 (2024), https://ui.adsabs.harvard.edu/abs/2024arXiv241003589B

[8] Oei, M. S. S. L., et al., (incl. **Rodriguez, A. C.**), Black hole jets on the scale of the cosmic web, Nature, 633, 537 (2024), https://ui.adsabs.harvard.edu/abs/2024Natur.633..537O

[9] Pelisoli, I., et al., (incl. **Rodriguez, A. C.**), A survey for radio emission from white dwarfs in the VLA Sky Survey, Monthly Notices of the Royal Astronomical Society, 531, 1805 (2024), https://ui.adsabs.harvard.edu/abs/2024MNRAS.531.1805P

[10] Sarkar, A., et al., (incl. **Rodriguez, A. C.**), Magnetic braking below the cataclysmic variable period gap and the observed dearth of period bouncers, Astronomy and Astrophysics, 686, L19 (2024), https://ui.adsabs.harvard.edu/abs/2024A&A...686L..19S

[11] Schwope, A., et al., (incl. **Rodriguez, A. C.**), Compact white dwarf binaries in the combined SRG/eROSITA/SDSS eFEDS survey, Astronomy and Astrophysics, 686, A110 (2024), https://ui.adsabs.harvard.edu/abs/2024A&A...686A.110S

[12] Sharma, Y., et al., (incl. **Rodriguez, A. C.**), Dramatic Rebrightening of the Type-changing Stripped-envelope Supernova SN 2023aew, The Astrophysical Journal, 966, 199 (2024), https://ui.adsabs.harvard.edu/abs/2024ApJ...966..199S

[13] Mori, K., et al., (incl. **Rodriguez, A. C.**), The high energy X-ray probe (HEX-P): Resolving the nature of Sgr A* flares, compact object binaries and diffuse X-ray emission in the Galactic center and beyond, Frontiers in Astronomy and Space Sciences, 10, 1292130 (2024), https://ui.adsabs.harvard.edu/abs/2024FrASS..1092130M

[14] Ho, A. Y. Q., et al., (incl. **Rodriguez, A. C.**), Minutes-duration optical flares with supernova lumi-

nosities, Nature, 623, 927 (2023), https://ui.adsabs.harvard.edu/abs/2023Natur.623..927H

[15] Miller, D. R., et al., (incl. **Rodriguez, A. C.**), An Extremely Massive White Dwarf Escaped from the Hyades Star Cluster, The Astrophysical Journal, 956, L41 (2023), https://ui.adsabs.harvard.edu/abs/2023ApJ...956L..41M

[16] El-Badry, K., et al., (incl. **Rodriguez, A. C.**), A transiting brown dwarf in a 2 hour orbit, The Open Journal of Astrophysics, 6, 33 (2023), https://ui.adsabs.harvard.edu/abs/2023OJAp....6E..33E

[17] Nagarajan, P., et al., (incl. **Rodriguez, A. C.**), Spectroscopic follow-up of black hole and neutron star candidates in ellipsoidal variables from Gaia DR3, Monthly Notices of the Royal Astronomical Society, 524, 4367 (2023), https://ui.adsabs.harvard.edu/abs/2023MNRAS.524.4367N

[18] Yamaguchi, N., et al., (incl. **Rodriguez, A. C.**), Sodium enhancement in evolved cataclysmic variables, Monthly Notices of the Royal Astronomical Society, 524, 740 (2023), https://ui.adsabs.harvard.edu/abs/2023MNRAS.524..740Y

[19] Caiazzo, I., et al., (incl. **Rodriguez, A. C.**), A rotating white dwarf shows different compositions on its opposite faces, Nature, 620, 61 (2023), https://ui.adsabs.harvard.edu/abs/2023Natur.620...61C

[20] El-Badry, K., et al., (incl. **Rodriguez, A. C.**), The fastest stars in the Galaxy, The Open Journal of Astrophysics, 6, 28 (2023), https://ui.adsabs.harvard.edu/abs/2023OJAp....6E..28E

[21] El-Badry, K., et al., (incl. **Rodriguez, A. C.**), A red giant orbiting a black hole, Monthly Notices of the Royal Astronomical Society, 521, 4323 (2023), https://ui.adsabs.harvard.edu/abs/2023MNRAS.521.4323E

[22] El-Badry, K., et al., (incl. **Rodriguez, A. C.**), A Sun-like star orbiting a black hole, Monthly Notices of the Royal Astronomical Society, 518, 1057 (2023), https://ui.adsabs.harvard.edu/abs/2023MNRAS.518.1057E

[23] Andreoni, I., et al., (incl. **Rodriguez, A. C.**), A very luminous jet from the disruption of a star by a massive black hole, Nature, 612, 430 (2022), https://ui.adsabs.harvard.edu/abs/2022Natur.612..430A

[24] El-Badry, K., et al., (incl. **Rodriguez, A. C.**), Magnetic braking saturates: evidence from the orbital period distribution of low-mass detached eclipsing binaries from ZTF, Monthly Notices of the Royal Astronomical Society, 517, 4916 (2022), https://ui.adsabs.harvard.edu/abs/2022MNRAS.517.4916E

Student Mentoring

Domani Sharkey (Caltech SURF) 2024
Project: X-ray Active Stars with SRG/eROSITA (co-advised w/ Kareem El-Badry)

Ruocheng Zhai (Caltech SURF from Tsinghua Univ; now PhD student at Penn State) 2023
Project: Microlensing with ZTF II (co-advised w/ Shri Kulkarni)

Presentations and Talks

High Energy Astrophysics Seminar 2024
Center for Astrophysics | Harvard & Smithsonian. Cambridge, MA.

Astronomy Department Seminar 2024
Columbia University. New York, NY.

Data Group Meeting 2024

Flatiron Institute Center for Computational Astrophysics (CCA). New York, NY.

Astronomy Department Seminar 2024
Institute of Science and Technology of Austria (ISTA). Vienna, Austria

Celebrating the History of Warwick Astronomy and Legacy of Tom Marsh, Contributed Talk 2024
University of Warwick. Coventry, UK

STARS Group Meeting 2024
Institute of Astronomy, University of Cambridge. Cambridge, UK.

XMM-Newton Science Meeting: From White Dwarfs to Neutron Stars, Contributed Talk 2024
ESA Science Center. Madrid, Spain

Embarrasing Binaries: Symbiotic Stars, Cataclysmic Variables, and More, Contributed Talk 2024
Charles University. Prague, Czechia

High Energy Astrophysics Seminar 2024
Kyoto University. Kyoto, Japan.

University of Hertsfordshire Astronomy Colloquium 2024
University of Hertsfordshire. Hertsfordshire, UK.

IPAC Science Seminar 2024
IPAC/Caltech. Pasadena, CA.

ZTF Team Meeting 2023
Caltech. Pasadena, CA.

The Golden Age of Cataclysmic Variables VI. 2023
La Torre Hotel. Mondello, Palermo, Italy.

AM CVn5: 5th International Workshop on AM CVn Binaries 2023
Armagh Observatory & Planetarium. Armagh, Northern Ireland

Chandra 24th Annual Workshop 2023
MIT. Cambridge, Massachussetts.

Palomar Science Meeting – 75 Years of Palomar 2023
Caltech. Pasadena, CA.

Caltech Tea Talk 2023
Caltech. Pasadena, CA.

KITP Workshop Talk: White Dwarfs as Probes of the Evolution of Planets, Stars, the Milky Way and the Expanding Universe 2022
University of California, Santa Barbara. Santa Barbara, CA

Chandra Lunch Seminar 2022
MIT. Cambridge, Massachusetts.

Theoretical Astrophysics Lunch Seminar 2022
Cornell University. Ithaca, NY.

COSMOS Lunch Talk (fully in Spanish) 2022
Universidad de Guanajuato. Guanajuato, Mexico.

ZTF Team Meeting 2022
Northwestern Univeristy. Evanston, IL

Keck Science Meeting 2022
Caltech. Pasadena, CA.

25th International Microlensing Meeting 2022
Observatoire de Paris. Paris, France.

FLASH Lunch Talk 2022
University of California, Santa Cruz. Santa Cruz, CA

American Astronomical Society Meeting 2022
Pasadena, CA.

High Energy Astrophysics Colloquium 2022
Max Plack Institute for Astrophysics (MPA). Garching, Germany

Astrophysics Lunch Seminar 2022

Radboud University. Nijmegen, Netherlands

ZTF Stellar Group Conference 2022
University of Warwick. Coventry, UK

ZTF Team Meeting 2022
IN2P3. Paris, France

American Astronomical Society Meeting 2020
Honolulu, Hawaii

Teaching and Tutoring

Physics and Astrophysics Teaching Assistant 2021-2022
Caltech Division of Physics, Mathematics, and Astronomy.
Physics 1A: Introductory Physics (Fall 2021).
Astronomy 102: Physics of the Interstellar Medium (Winter 2022).
Astronomy 3: Discovering the Universe (Spring 2023).

Stanford Center for Teaching and Learning Math and Physics Tutor 2018-2020
Lead Math and Physics Tutor 2019-2020
Stanford Office of the Vice Provost for Teaching and Learning

Outreach

Caltech Astronomy Outreach 2020-
Speaker at public talks including stargazing nights and *Astronomy on Tap*. Host for *Astronomía en el Bar* events held completely in Spanish.

Stanford Astronomical Society, Co-President 2017-2020
Member 2016-2020
Participated in and led quarterly stargazing and informational sessions for the public. Led regular outreach events and directed expansion of events to underserved Bay Area elementary and middle schools. Helped manage a $10,000+ budget for telescopes, astrophotography, outreach activities, external collaborations, emergency fund, etc.

Professional Membership

Caltech Astronomy Graduate Admissions Committee, Student Representative 2022-2023
American Astronomical Society, Graduate Member 2020-
American Astronomical Society, Undergraduate Member 2019-2020
Stanford Physics Department Committee on Undergraduate Studies 2019-2020

Technical Skills

Python (Numpy, Scipy, Jupyter Notebook), Mathematica, Java, C++, R, LaTeX, Git, Unix/Linux, IRAF/PyRAF, SExtractor, TOPCAT, SAO DS9.
Languages: English (Native), Spanish (Native), French (Conversational).