

Francisco J. Mercado, Ph.D.
CURRICULUM VITAE

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| RESEARCH INTERESTS | Galaxy formation and evolution, low-mass galaxies, kinematics and dynamics, chemical evolution, abundances, cosmological simulations, computational astrophysics, machine learning | |
| EMPLOYMENT | NSF MPS Ascending Postdoctoral Fellow at Pomona College Visiting Assistant Professor at Pomona College | 2023-Present Spring 2024 |
| APPOINTMENTS | Visitor in Theoretical Astrophysics at Caltech National Osterbrock Leadership Fellow Flatiron Institute CCA Summer Fellow University of California, Irvine Competitive Edge Scholar University of California, Irvine SURF Scholar Cal-Bridge Scholar at Cal Poly Pomona CAMPARE Scholar at Harvard Center for Astrophysics | 2023-Present 2021-2022 Summer 2021 Summer 2017 Summer 2016 2015-2016 Summer 2015 |
| EDUCATION | University of California, Irvine Ph.D. Physics Advisor: James S. Bullock University of California, Irvine M.S. Physics Advisor: James S. Bullock Cal Poly Pomona B.S. Physics Advisor: Jorge Moreno | Awarded 2023 Awarded 2019 Awarded 2017 |
| FUNDING | National Science Foundation – <i>23rd Annual Symposium of the NSF Astronomy and Astrophysics Postdoctoral Fellows</i> (\$50,000, Award# 2437597, PI: J. Moreno, co-PI: F. Mercado) Pomona College – <i>Summer Undergraduate Research Program</i> (\$14,000 for two Research Assistants) National Science Foundation – <i>Probing small galactic scales in large volumes with the Rubin Observatory</i> (\$300,000, Award# 2316748, PI: F. Mercado) Heising-Simons Foundation – <i>Using Galaxy Scaling Relations to Test Galaxy Formation & Dark Matter Models</i> (\$140,000, Declined) University of California Chancellor’s Fellowship – <i>Using Galaxy Scaling Relations to Test Galaxy Formation & Dark Matter Models</i> (\$120,000, Declined) | |
| AWARDS & SCHOLARSHIPS | UC Irvine Latino Excellence and Achievement Award (\$1,000) UC Irvine Physical Sciences Diversity Fellowship (\$9,000) UC Irvine Diversity Recruitment Fellowship (\$4,500) Presidents Student Research Travel Scholarship (\$800) TELACU Scholarship (\$4,000) | Spring 2021 Spring 2021 Fall 2017 Winter 2016 2013-2017 |

PUBLICATIONS LEAD AUTHOR/MAJOR CONTRIBUTOR

1. Effects of galactic environment on size and dark matter content in low-mass galaxies
F. J. Mercado, J. Moreno, R. Feldmann, J. A. Benavides (2024); [Submitted to ApJ](#)
2. Hooks & Bends in the Radial Acceleration Relation: Discriminatory Tests for Dark Matter and MOND
F. J. Mercado, J. S. Bullock, J. Moreno, M. Boylan-Kolchin, A. Wetzel, C. Faucher-Giguère, J. Samuel (2024); [MNRAS, Volume 530, Issue 2, pp.13491362](#)
3. Comparing implementations of self interacting dark matter in the GIZMO and AREPO codes
H. Meskhidse, **F. J. Mercado**, O. Sameie, V. Robles, J. S. Bullock, M. Kaplinghat, J. O. Weatherall (2022); [MNRAS, Volume 513, Issue 2, pp.2600-2608](#) * Served as co-advisor on this project
4. Amplified J-factors in the galactic center for velocity-dependent dark matter annihilation in FIRE simulations
D. McKeown, J. Bullock, **F. J. Mercado**, Z. Hafen, M. Boylan-Kolchin, A. Wetzel, L. Necib, P. F. Hopkins, S. Yu (2021); [MNRAS, Volume 513, Issue 1, pp.55-70](#)
5. A Relationship Between Stellar Metallicity Gradients & Galaxy Age in Dwarf Galaxies
F. J. Mercado, J. Bullock, M. Boylan-Kolchin, J. Moreno, A. Wetzel, K. El-Badry, A.S. Graus, A. Fitts, P. F. Hopkins, C. Faucher-Giguère, A. B. Gurvich (2020); [MNRAS, Volume 501, Issue 4, pp.5121-5134](#)

CONTRIBUTING CO-AUTHOR

1. Stellar Metallicities and Gradients in the Faint M31 Satellites Andromeda XVI and Andromeda XXVIII
S. W. Fu, D. R. Weisz, E. Starkenburg, N. Martin, M. L. M. Collins, A. Savino, M. Boylan-Kolchin, P. Côté, E. Dolphin, N. Longeard, M. L. Mateo, **F. J. Mercado**, N. R. Sanford, E. D. Skillman (2024); [Accepted to ApJ, eprint arXiv:2407.04698](#)
2. Size-mass relations for simulated low-mass galaxies: mock imaging versus intrinsic properties
C. Klein, J. S. Bullock, J. Moreno, **F. J. Mercado**, P. F. Hopkins, R. K. Cochrane, J. A. Benavides (2024); [MNRAS, Volume 532, Issue 1, pp.538-548](#)
3. Confronting the Diversity Problem: The Limits of Galaxy Rotation Curves as a tool to Understand Dark Matter Profiles
I. S. Sands, P. F. Hopkins, A. Shen, M. Boylan-Kolchin, J. S. Bullock, C. Faucher-Giguère, **F. J. Mercado**, J. Moreno, L. Necib, X. Ou, S. Wellons, A. Wetzel (2024); [eprint arXiv:2404.16247](#)
4. Stellar Metallicities and Gradients in the Isolated, Quenched Low-mass Galaxy Tucana
S. W. Fu, D. L. Weisz, E. Starkenburg, N. Martin, **F. J. Mercado**, A. Savino, M. Boylan-Kolchin, P. Côté, A. E. Dolphin, N. Longeard, M. L. Mateo, J. Samuel, N. R. Sanford (2024); [ApJ, Volume 965, Issue 1, id.36, 23 pp.](#)
5. Galaxies lacking dark matter produced by close encounters in a cosmological simulation
J. Moreno, S. Danieli, J. S. Bullock, R. Feldmann, P.F.Hopkins, O. Catmabacak, A. Gurvich, A. Lazar, C. Klein, C. B. Hummels, Z. Hafen, **F. J. Mercado**, S. Yu, F.Jiang, C. Wheeler, A. Wetzel, D. Angles-Alcázar, M. Boylan-Kolchin, E. Quataert, C.A. Faucher-Giguère, D. Keres (2022); [Nature Astronomy, Volume 6, p. 496-502](#)
6. The time-scales probed by star formation rate indicators for realistic, bursty star formation histories from the FIRE simulations
J. Florez Velaázquez, A. Gurvich, C. Faucher-Giguère, J. Bullock, T. Starkenburg, J. Moreno, A. Lazar, **F. J. Mercado**, J. Stern, M. Sparre, C. Hayward, A. Wetzel, K. El-Badry (2020); [MNRAS Volume 501, Issue 4, pp.4812-4824](#)

MENTORSHIPRESEARCH ADVISING/CO-ADVISING:

| | |
|--|--------------|
| Benjamin Hanf (Senior Thesis) Pomona College Undergrad | AY 2024-2025 |
| Brian Giraud Calderon Pomona College Undergrad | Summer 2024 |
| Isa Hahn Pomona College Undergrad | Summer 2023 |
| Pei Qin Pomona College Undergrad | Summer 2022 |
| Necdet Canim Pomona College Undergrad | Summer 2022 |
| Helen Meskhidse UC Irvine Grad | 2021 |
| Evangelina Chicas Cal State Long Beach Undergrad | Summer 2020 |
| Imani Ware San Francisco State University Undergrad | Summer 2020 |
| Daniel McKewon UC Irvine Grad | Summer 2020 |

PROFESSIONAL/ACADEMIC MENTORSHIP:

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|---|-------------|
| UC Irvine PACE Mentorship Program Peer Mentor 4 grads | 2018 - 2023 |
| UC Irvine Competitive Edge Peer Mentor 2 grads | Summer 2022 |
| Cal-Bridge Graduate Mentor 2 undergrads | 2019 - 2022 |
| TELACU Graduate Mentor 2 undergrads | 2019 - 2022 |

TEACHING

* = instructor of record – TA if otherwise

POMONA COLLEGE:

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|---|-------------|
| * Introduction to Galaxies & Cosmology (ASTR 002) | Spring 2024 |
| Regular Discussion Guest – Extragalactic Astronomy (ASTR 125) | Spring 2024 |
| Guest Lecture – Astro Collective (ASTR 001) | Oct 2023 |

SOUTHERN CALIFORNIA UNIVERSITY OF HEALTH SCIENCES:

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|--------------------------------------|------------------------|
| * Basic Physics I | Spring 2023, Block I |
| * Basic Physics II | Spring 2023, Block II |
| * Basic Physics I Online Laboratory | Spring 2023, Block II |
| * Basic Physics II Online Laboratory | Spring 2023, Block III |

UC IRVINE:

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| * Basic Physics I | Summer 2022 |
| * Basic Physics II | Summer 2021 & 2022 |
| * Intro to Mathematical Methods for Physics | Summer 2021 |
| Statistical Mechanics | Fall 2018 |
| Life in the Universe | Spring/Fall 2018 |
| Introduction to Mathematical Physics | Fall 2017 |

CAL POLY POMONA:

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| Electrostatics | Fall 2015/Winter 2016 |
| Introductory Physics | Spring 2015 |

ELSEWHERE:

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| Learning Shack Math and Physics Tutor | 2018 - 2022 |
| * Ardent Academy AP Physics C Instructor | Winter 2020 |

TRAINING & CERTIFICATIONS

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| UCI/CSULB PRE-Professor Program | Spring 2021 |
| UCI OIE Inclusive Excellence Certificate | Fall 2020 |
| UCI DTEI Certificate in Course Design | Spring 2020 |
| CIRTL Associate Level | Spring 2020 |

PROFESSIONAL SERVICE

SCIENTIFIC ORGANIZING COMMITTEES:

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| 23rd Annual NSF AAPF Postdoc Symposium (Chair; National Harbor, MD) | Jan 2025 |
| Galaxy Formation & Evolution in Southern California (Member; Pasadena, CA) | Sep 2024 |
| Galaxy Formation & Evolution in Southern California (Chair; Irvine, CA) | Aug 2019 |

REVIEWER:

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| The Astrophysical Journal | 2023 - Present |
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STUDENT ORGANIZATIONS:

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| UC Irvine PACE Mentorship Program Co-Chair & Administrator | 2022 - 2023 |
| UC Irvine Physics Graduate Caucus Diversity Chair | 2020 - 2022 |
| UC Irvine DECADE Physics Graduate Representative | 2018 -2022 |

OUTREACH:

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| UC Irvine Telescope Outreach Program Co-Organizer | 2018 - 2019 |
| UC Irvine WATzUP Group Leader | 2017 - 2019 |

PAST & UPCOMING PRESENTATIONS

INVITED:

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| First Joint NSBP/NSHP Conference (Houston, TX) | Nov 2024 |
| Cal Poly Pomona Physics & Astronomy Seminar (Pomona, CA) | Oct 2024 |
| Cal State LA Colloquium (Los Angeles, CA) | March 2024 |
| Carnegie Observatories Colloquium (Pasadena, CA) | Feb 2024 |
| TAPIR Seminar at Caltech (Pasadena, CA) | Jan 2024 |
| CSU San Bernardino Physics & Astronomy Colloquium (San Bernardino, CA) | Nov 2023 |
| UC Riverside Astronomy Seminar (Riverside, CA) | Oct 2023 |
| Pomona College Physics & Astronomy Colloquium (Claremont, CA) | Sep 2023 |
| Northwestern University Science Happy Hour (Evanston, IL) | Apr 2021 |
| Ohio Sate ArXiv Discussion (Columbus, OH) | Feb 2021 |
| Cal Poly Pomona SIAM Research Symposium (Pomona, CA) | Apr 2017 |
| BUILD Star Party Speaker (Upland, CA) | May 2017 |
| Cal Poly Pomona SIAM Research Symposium (Pomona, CA) | Apr 2016 |

CONTRIBUTED & OTHER PRESENTATIONS:

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| NDiSTEM SACNAS Conference (Phoenix, AZ) | Nov 2024 |
| NSF MPS Ascend Postdoctoral Fellow Conference (Nashville, TN) | Oct 2024 |
| Galaxy Formation & Evolution in Southern California (Pasadena, CA) | Aug 2024 |
| Dwarf Galaxies, Star Clusters & Stellar Streams in the LSST Era (Chicago, IL) | Jul 2024 |
| 22nd NSF Astronomy & Astrophysics Postdoc Symposium (New Orleans, LA) | Jan 2024 |
| 4th Regional Extragalactic Astronomy Meeting (Córdoba, Argentina) | Dec 2023 |
| Galaxy Formation & Evolution in Southern California (Riverside, CA) | Aug 2024 |
| 240th AAS Meeting (Pasadena, CA) | Jan 2022 |
| Flatiron Center for Computational Astrophysics Symposium (New York City, NY) | Aug 2021 |
| Galaxy Formation & Evolution in Southern California (Irvine, CA) | Aug 2019 |
| Galaxy Formation & Evolution in Southern California (Pasadena, CA) | Aug 2018 |
| Galaxy Formation & Evolution in Southern California (Pasadena, CA) | Aug 2017 |
| UC Irvine Summer Research Symposium (Irvine, CA) | May 2017 |
| 229th AAS Meeting (Grapevine, TX) | Jan 2017 |
| Cal-Bridge/Campare Symposium, Cal Poly Pomona (Pomona, CA) | Sep 2016 |
| UC Irvine Summer Research Symposium (Irvine, CA) | Aug 2016 |
| Galaxy Formation & Evolution in Southern California (Pasadena, CA) | Aug 2016 |
| 227th AAS Meeting (Kissimmee, FL) | Jan 2016 |
| Hernquist Group Meeting, Harvard CfA (Cambridge, MA) | Jul 2015 |
| Vogelsberger Group Meeting, MIT (Cambridge, MA) | Jul 2015 |