Edwin Fernando **Cruz Aguirre**

Postdoctoral Research Scholar · Department of Physics & Astronomy
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Education

PhD, Astrophysical and Planetary Science
Boulder, CO
University of Colorado, Boulder
Received May 2023

- Advisor: Dr. Kevin France
- Thesis: *Characterizing Far Ultraviolet Radiation Environments Around Dwarf Stars*

MS, Astrophysical and Planetary Science
Boulder, CO
University of Colorado, Boulder
Received Dec. 2020

- Advisor: Dr. Kevin France

BS, Physics
Troy, NY
Rensselaer Polytechnic Institute
Received May 2018

- Minor in Astrophysics
- Minor in Astrobiology

Experience

Postdoctoral Research Scholar
Iowa City, IA
Department of Physics & Astronomy, University of Iowa
Jul. 2023 - Current

- Designing UV optical systems for laboratory calibration and suborbital platforms
- Fabricating and characterizing novel X-ray and UV gratings
- Training for design, development, and execution of future NASA space missions

NASA Astrophysics Mission Design School
La Cañada, CA
Jet Propusion Laboratory
Feb. 2023 - Apr. 2023

- Collaborated on the development of the Mission to Analyze the UltraViolet universE (MAUVE) probe concept
- Co-Objective Lead for differentiating Type Ia supernovae progenitors
- Lead for the MAUVE propulsion system

Science Ambassadors
Troy, NY
Rensselaer Center for Initiatives in Pre-College Education
Sep. 2016 - May 2018

- Developed and gave presentations to inspire and encourage children to pursue a career in STEM
- Attended a conference for the development of scientific presentations
- Co-developed and taught weekly science curricula at an after school community center
- Served as Secretary for the 2017-2018 academic year

Research and Instrumentation

UVIa: the Ultraviolet Type Ia Supernova CubeSat
Iowa City, IA

University of Iowa
Oct. 2023 - Current

- Developed the optical design of a three channel imaging telescope
- Will serve as the Instrument Scientist for UVIa

FIREBall-2 Balloon Telescope
Iowa City, IA

University of Iowa
Aug. 2023 - Current

- Communications system team for the 2023 balloon flight at Fort Sumner

Lyα Reconstructions of Classical T Tauri Stars
Iowa City, IA

University of Iowa
June. 2023 - Current

- Developed models for reconstructing CTTS Lyα profiles
- Model results are comparable to reconstructions from Lyα driven H_2 fluorescence
- Developed multiprocessing technique for best fit confidence interval determination

Terrestrial Exoplanet Atmospheres around F-type Stars
Boulder, CO

Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder
Feb. 2022 - Jan. 2023

Advisor: Dr. Kevin France

- Developed the first SED of a mid-F type star using sounding rocket and archival data
- Modeled the impact of XUV emission on atmospheres of terrestrial exoplanets orbiting mid-F type stars
- Simulated Lyα transit spectroscopy of terrestrial atmospheres with current and future space telescopes

Recovering Stellar Lyα and O I Emission
Boulder, CO

Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder
May 2019 - Dec. 2022

Advisor: Dr. Kevin France

- Created airglow templates for the Cosmic Origin Spectrograph (COS) on board the *Hubble Space Telescope*
- Developed a GUI for the removal of airglow from COS spectra
- Recovered the stellar Lyα and O I emission from a sample of 171 dwarf stars in the COS data archive

SISTINE Sounding Rocket
Boulder, CO

Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder
Aug. 2018 - Jan. 2022

Advisor: Dr. Kevin France

- Characterized the far ultraviolet radiation environment around dwarf stars
- Assisted in the assembly, calibration, and launch of SISTINE-1
- Lead the assembly, calibration, and launch of SISTINE-2
- Assisted in the assembly and calibration of SISTINE-3

Hot Jupiter Atmospheric Modeling
Charlottesville, VA

University of Virginia
Jun. - Aug. 2017

Advisor: Dr. Phil Arras

- Developed python code to simulate Hot Jupiter thermospheres
- Utilized a non-isothermal approach to temperature profile retrieval

Publications

- ***"The Radiation Environments of Middle-aged F-type Stars"***
  F. Cruz Aguirre, K. France, N. Nell, N. Kruczek, B. Fleming, P. C. Hinton, S. Ulrich, and P. R. Behr, ApJ, Oct. 2023
- ***"Disentangling Stellar and Airglow Emission Lines from Hubble Space Telescope (HST) Cosmic Origins Spectrograph (COS) Spectra"***
  F. Cruz Aguirre, A. Youngblood, K. France, and V. Bourrier, ApJ, Apr. 2023
- ***"The assembly, calibration, and predicted performance of the SISTINE-2 sounding rocket payload"***
  F. Cruz Aguirre, N. Nell, N. Kruczek, P. C. Hinton, M. Bridges, K. France, and B. Fleming, Proc. SPIE, 11821, Aug. 2021
- ***"The High-energy Spectrum of the Young Planet Host V1298 Tau"***
  G. M. Duvvuri, P. W. Cauley, **F. Cruz Aguirre**, R. Kilgard, K. France, Z. K. Berta-Thompson, and J. S. Pineda, AJ, Nov. 2023
- ***"FIREBall-2 UV Balloon Telescope In-Flight Calibration System"***
  J. S. Li, N. I. Kerkeser, A. R. Khan, S. Agarwal, O. Jones, E. Hamden, T. Brendel, H. Chung, V. Picouet, D. Schiminovich, D. M. Miles, K. Hoadley, I. Cevallos-Aleman, M. Sitaram, Z. Lin, H. Bradley, D. C. Martin, M. Crabill, **F. Cruz Aguirre**, C.-A. Chevrier, P. Balard, P. Blanchard, N. Bray, G. Davis, X. Deng, F. Harmand, C. Hourtolle, G. Kyne, N. Melso, B. Milliard, J. Montel, S. Nikzad, A. Peus, J. Richard, J. Termini, J.-N. Valdivia, D. Valls-Gabaud, D. Vibert, and M. Werneken, submitted, 2024
- ***"MAUVE: An Ultraviolet Astrophysics Probe Mission Concept"***
  M. Balakrishnan, R. Bowens, **F. Cruz Aguirre**, E. Gilbert, K. Hughes, R. Jayaraman, E. Kuhn, E. Louden, D. R. Louie, K. McBride, C. McGrath, J. Payne, T. Presser, J. Reding, E. Rickman, R. Scrandis, T. Symons, and L. Wiser, in prep. 2024

Presentations

Direct Lyα Reconstructions of Classical T Tauri Stars — *New Orleans, LA*
243RD Meeting of the American Astronomical Society, Talk — *Jan. 2024*

Mission to Analyze the UltraViolet universE (MAUVE): Exploring Exoplanets and Explosions — *La Cañada, CA*
NASA Astrophysics Mission Design School — *Apr. 2023*

Far Ultraviolet Radiation Environments of FGKM Stars — *Seattle, WA*
241ST Meeting of the American Astronomical Society, Talk — *Jan. 2023*

The SISTINE and FLUID Sounding Rocket Payloads: Ultraviolet Technology Development for Large IR/O/UV Missions — *Baltimore MD*
NASA UV/Vis and CubeSat/Pioneers APRA Annual PI Program Review, Talk — *Nov. 2022*

Recovering Stellar Lyα and O I Emission from HST-COS Spectra: Separating Stellar and Geocoronal Signals — *Toulouse, France*
Cool Stars 21, Poster — *Jul. 2022*

Preliminary Results of the SISTINE-2 Sounding Rocket Observation of our Stellar Neighbor Procyon A — *Pasadena, CA*
240TH Meeting of the American Astronomical Society, Talk — *Jun. 2022*

Recovering Stellar Lyα and O I Emission from HST-COS Spectra: Separating Stellar and Geocoronal Signals — *Las Vegas, NV*
AASTCS 9: Exoplanets IV, Poster — *May 2022*

The Assembly, Calibration, and Predicted Performance of the SISTINE-2 Sounding Rocket Payload — *San Diego, CA*
SPIE Optics and Photonics, Virtual Talk — *Aug. 2021*

Exoplanet Atmosphere Temperature Using Sodium Absorption During Transit — *Hartford, CT*
Leadership Alliance National Symposium, Talk — *Jul. 2017*

Awards

2023	**Astrophysics Graduate Fellowship**, University of Colorado, Boulder	*Boulder, CO*
2018	**Magna Cum Laude**, Rensselaer Polytechnic Institute	*Troy, NY*
2015-18	**Dean's Honor List**, Rensselaer Polytechnic Institute	*Troy, NY*
2014-15	**Dean's List**, Rensselaer Polytechnic Institute	*Troy, NY*
2014	**Eagle Scout**, Boy Scouts of America	*Danbury, CT*

Service and Outreach

10/23 -	**Hawk-Eyes on Science and Hawk-Eyes in Space**, University of Iowa	*Iowa City, IA*
9/22 - 6/23	**Partnerships for Informal Science Education in the Community**, University of Colorado, Boulder	*Boulder, CO*
8/22 - 5/23	**Exams Committee**, University of Colorado, Boulder	*Boulder, CO*
8/19	**Accepted Student Orientation**, University of Colorado, Boulder	*Boulder, CO*
3/19	**Prospective Student Visit**, University of Colorado, Boulder	*Boulder, CO*
12/18	**CU on the Weekend**, University of Colorado, Boulder	*Boulder, CO*
8/18 - 8/19	**Colloquium Committee**, University of Colorado, Boulder	*Boulder, CO*

Skills

Programming Languages	Python, LaTeX, IDL, C++, Mathematica, MATLAB
Software and Libraries	OpticStudio, PyQt, QtDesigner, VirtualBox, Hyper-V, VNC, BEAMER, stistools, CIAO, minicom, SAOImageDS9, OpenCV
Operating Systems	Windows, Mac, Linux (Ubuntu, Debian, Mint, Fedora, openSUSE), Raspberry Pi
Laboratory Training	Cleanroom, Vacuum Hardware, Interferometry, Spin Coating, Ellipsometry, E-Beam Lithography, Space-grade Epoxy Mixing, ESD, Hazardous Waste