David Ricardo Coria Hernandez

University of Kansas * Physics & Astronomy * drcoria@ku.edu

Education

University of Kansas, Lawrence, KS

PhD in Physics — Fall 2020 – Present

Advisor: Ian Crossfield

Kansas State University, Manhattan, KS

Cum Laude, Bachelor of Science in Mathematics — May 2020

Cum Laude, Bachelor of Science in Physics — May 2020

Projects & Publications

Graduate Research Assistant, Physics & Astronomy, University of Kansas — **Present**

D. Coria, I. Crossfield, J. Lothringer et al.; *The Missing Link: Testing Galactic Chemical Evolution Models with the First Multi-Isotopic Abundances in Dwarf Stars*, 2023 ApJ 954 121 doi: 10.3847/1538-4357/acea5f

- I measure $^{12}C/^{13}C$ and $^{16}O/^{18}O$ ratios in a sample of well-studied solar twin stars, revealing that these isotopic ratios can be successfully derived from mid-infrared M band spectra. My measurements agree with several GCE models and archival $^{12}C/^{13}C$ ratios within the uncertainties. This isotopic abundance analysis can be extended to K/M dwarf stars where GCE models lack crucial constraints.

N. Hejazi, I. Crossfield, T. Norlander, M. Mansfield, **D. Coria** et al.; Detailed Elemental Abundances of a Super-Neptune Host Star Using High-Resolution, Near-Infrared Spectroscopy 2023, ApJ, 949, 79, doi: 10.3847/1538-4357/accb97

- We derive elemental abundances (C, O, Na, Mg, Al, Si, K, Ca, Ti, V, Cr, Mn, Fe) for exoplanet-host WASP-107 using a Gemini/IGRINS spectrum, TurboSpectrum, and MARCS models. We find near-solar abundances. These precise stellar abundances enable us to make a comparison with companion planet WASP-107b which is targeted by four JWST Cycle 1 programs in transit and eclipse.

I. Crossfield, M. Malik, M. Hill, S. Kane, B. Foley, A. Polanski, **D. Coria**, et al.; GJ 1252b: A Hot Terrestrial Super-Earth with no Atmosphere, ApJL, 937, L17, 2022. doi:10.3847/2041-8213/ac886b

- We compare secondary eclipse observations of this exoplanet to simulated planetary spectra and conclude that GJ1252b has no significant atmosphere. Our derived brightness temperature (~1410 K) is consistent with a bare rock surface. We also find that even a substantial atmosphere (~100 bar) would have been evaporated at time scales far shorter than the system's estimated age.

Research Practicum, University of New South Wales, Sydney, Australia

D. Coria, C. Bergmann, C. Tinney; *Veloce Quick Look App* — Summer 2019

- Developed an app intended for real-time data reduction and spectral extraction of echelle images produced by the Veloce spectrograph (as soon as data is recorded); use simplified processes rather than the complete process from the Veloce Reduction Pipeline

Invited/Contributed Presentations

Invited Talk: Cool Stars 22 June 2024
Splinter Session: Learning from the Coldest Worlds in the era of JWST

Exoplanetary Origins: Unraveling Planetary Formation and Accretion Histories with CNO Isotopologues

Accepted Talk: AAS 243 January 2024

Tracing Giant Exoplanet Formation Using Complementary Host Star CNO Abundances

Contributed Talk: Mid-America Regional Astrophysics Conference November 2023

Tracing Giant Exoplanet Formation Using Complementary Host Star CNO Abundances

Planetarium Show: Rocks & Rockets August 2023

Intro to Celestial Navigation

Contributed Talk: Towards Other Earths III July 2023

CNO Isotope Ratios Across Exoplanet Systems: Implications for Planet Formation and Atmospheric Composition

iPoster: AAS 241 January 2023

The Missing Link: Testing Galactic Chemical Evolution Models with the First Multi-Isotopic Abundances in Solar Twin Stars

Special Session: AAS 241 January 2023

It's Giving... Back: Advocating for Minority-Oriented Academic Success Programs as an Alum

iPoster: Cool Stars 21 July 2022

The Missing Link: Testing Galactic Chemical Evolution Models with the First Multi-Isotopic Abundances in Solar Twin Stars

Contributed Talk: IR 2022 February 2022

The Missing Link: Connecting Exoplanets and Galactic Chemical Evolution via Stellar Abundances: Isotopic Carbon and Oxygen Abundances in Solar Twin Stars

Invited Talk: McNair Heartland Research Conference September 2021

Alumnx Panel

Invited Talk: Exoplanet Explorers Science Series April 2021

The Missing Link: Connecting Exoplanets & Galactic Chemical Evolution via Stellar Abundances

Contributed Poster: Cool Stars 20.5 10.5281/zenodo.4563216 February 2021

Measuring CO Isotopic Abundance Ratios in Solar Twin Stars

Contributed Talk: Ronald E. McNair Heartland Research Conference September 2019

Simplified echellogram data reduction and spectral extraction via the Veloce Quick Look App

Service/Outreach

NASA SCoPE Project w/ NASA's Universe of Learning 2024
Project Title: Las Estrellas y sus Compañeros: Developing Bilingual Activities & Resources for NASA's Universe of Learning

KU Physics & Astronomy Locally Organized Assembly Co-Organizer 2023-2024
Rocks & Rockets: KU Co-Organizer August 2023
Traveling KU Planetarium: Co-Organizer and Presenter 2021 -Present
NASA ExoExplorers: DEI Special Session at AAS January 2023
Advocacy for Kansas-based TRIO/McNair programs Spring 2022
KU Graduate Student Organization: Graduate Colloquium Organizer Fall 2021 - Present
KU Telescope Nights: Co-Organizer 2021 – Present

Teaching/Tutoring

Graduate Teaching Assistant: Contemporary Astronomy Lab Fall 2023

- KU ASTR 196: An introduction to astronomical observations and modern data analysis methods. Students will carry out independent investigations as well as standard exercises.

Graduate Teaching Assistant: Research Astronomy @ Lawrence High School Spring 2023

- I taught students how to read and manipulate data from the Virgo Filament Survey using tools like Excel and TopCat. We worked through the entire research process: from literature reviews, developing research questions, data processing and analysis, poster development and practicing effective science communication. Each group created a research poster and presented it at their own research symposium.

Private Tutor: McNair Scholars Program 2021-Present

- I have tutored current KU McNair Scholars in both math and physics. This includes courses like College Algebra, Trigonometry, Calculus I, II, and III, Physics I and II.

Observing Experience

Keck I & II 10m Telescopes, W. M. Keck Observatory, HI

- 2 nights on NIRSPEC; 2 nights HIRES

4m Anglo-Australian Telescope, Siding Spring Observatory, NSW, Australia

- 3 nights on Veloce

3m NASA Infrared Telescope Facility, HI

- 2 nights on iSHELL

8.1m Gemini South Observatory, Cerro Pachon, Chile

- IGRINS time awarded for "Elemental Abundances of the Coolest HWO Targets"

Awards and Honors

NASA SCoPE Seed Grant Recipient Spring 2024
Barbara J. Anthony-Twarog Academic Support Award Spring 2024
NASA Exoplanet Explorers Program: Inaugural Cohort Member 2021
University of Kansas Graduate Fellow Fall 2020 – Spring 2021
Hagan Scholarship Foundation Recipient Fall 2016 – Spring 2020
McNair Scholars Program: Research Assistant Fall 2018 – Spring 2020
Developing Scholars Program: Research Assistant Fall 2016 – Spring 2019
Kansas State University Honor Roll Fall 2016 – Spring 2020
Kansas State University Putnam (Distinguished University) Scholar Fall 2016 – Spring 2020