

Andrea Guzmán Mesa

Curriculum Vitae

Research Interests

- Exoplanet Atmospheres
- Planetary Evolution
- Radiative Transfer Models
- Machine Learning

Education

2018–present **Doctoral student**, *University of Bern*, Switzerland.

Supervisors Prof. Dr. Kevin Heng, Prof. Dr. Christoph Mordasini

Description My research lies in the intersection between exoplanet atmospheres, planet interiors and machine learning and aims at understanding how we can couple our knowledge about the interior and the atmosphere of exoplanets.

2016–2018 **Erasmus Mundus Joint Masters Degree in Astronomy and Astrophysics.**

- 1st Semester: Leopold-Franzens-Universität Innsbruck, Austria
- 2nd Semester: Università degli Studi di Roma Tor Vergata, Rome, Italy
- 3rd & 4th Semester: Georg-August-Universität Göttingen, Germany

Thesis *Probing the exoplanet's HD189733b atmosphere using CARMENES' Rossiter-McLaughlin observations.*

Supervisors Prof. Dr. Ansgar Reiners, Dr. Mahmoudreza Oshagh.

Description It is known that the amplitude of the Rossiter-McLaughlin effect depends on the effective size of the planet, and in the case of an atmospheric contribution it depends on the observed wavelength. The aim of this work is to use the chromatic-Rossiter McLaughlin effect to retrieve the transmission spectrum of HD 189733b using HARPS data and expand the wavelength coverage with CARMENES data.

2010–2015 **Bachelor of Science in Mathematics**, *Universidad Sergio Arboleda*, Bogotá, Colombia.

Thesis *Analysis and Simulation of Earth-to-Moon trajectories.*

Supervisor Dr. Jorge Alberto Sóliz.

Description This work presents the results of a simulated trajectory from Earth to Moon using the Patched Conic Method integrated with the Rungekutta 78 Method in FORTRAN.

Grants & Scholarships

2020 Open Round, Universität Bern (5000 CHF)

2020 SSAA & MERAC (Mobilising European Research in Astrophysics and Cosmology) Funding and Travel Award (€5000)

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- 2019 Young Academics Support, University of Bern (1700 CHF)
- 2019 SSAA Young Scientist Travel Support, Swiss Society for Astronomy and Astrophysics (1000 CHF)
- 2019 Student grant to attend the 3rd Advanced School on Exoplanetary Science: Demographics of Exoplanetary Systems, Italy (€350)
- 2018 Student grant to attend the 30th General Assembly of the IAU, Vienna, Austria (€920)
- 2016-2018 Erasmus Mundus Consortium Student Scholarship for partner-country students (€49000)
- July 2017 Student grant to attend the Europlanet Summer School in Lithuania (€900)
- June 2017 Student grant to attend the Exoplanet Summer Program at UCSC, California, USA (€1500)
- May 2017 Student grant to attend the 2nd Advanced School on Exoplanetary Science: Astrophysics of Exoplanetary Atmospheres in Italy (€320)
- Nov 2015 Student grant to attend the International School for Young Astronomers IAU-ISYA (€700)
- Jan 2013 Student grant to attend the Observational Astronomy School for Latin-American Students ESAOBELA, México (€500)
- 2013-2015 Universidad Sergio Arboleda's Merit Scholarship (€2000)
- 2013-2015 Fundaciones Michelsen's Scholarship (€2000)
- 2010-2012 Fundación Coca-Cola Colombia para la Educación y la Oportunidad's Scholarship (€5000)

--- Honors & Awards

- June 2018 Best Master's thesis poster prize, Astromundus Retreat
- 2010 Special Invitee at the NASA Juno Spacecraft's Launch, Cape Canaveral, FL, USA

--- Research Experience

- 2017 **On the characterization of a signal coming from HD147374b using CARMENES data**, *Institute of Astrophysics, Georg-August-Universität Göttingen*, Germany, 2 months.
Supervisor: Prof. Dr. Ansgar Reiners, Dr. Mathias Zechmeister.
- 2017 **Filter Calibration of the BRIDE constellation satellite**, *Leopold-Franzens-Universität Innsbruck*, Austria, 3 months.
Supervisor: Prof. Dr. Konstanze Zwintz.

--- First Author Publications

- [1] **Guzmán Mesa** et al. 2020. Information Content of JWST-NIRSpec Transmission Spectra of Warm Neptunes

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Other Publications

- [1] M. Oshagh, F. F. Bauer, M. Lafarga, K. Molaverdikhani, P. J. Amado, L. Nortmann, A. Reiners, A. **Guzmán Mesa**, E. Pallé, E. Nagel, and et al. The widest broadband transmission spectrum (0.38–1.71 μ m) of HD 189733b from ground-based chromatic Rossiter–McLaughlin observations. *Astronomy & Astrophysics*, 643:A64, Nov 2020.
- [2] M. Oshagh, A. H. M. J. Triaud, A. Burdanov, P. Figueira, A. Reiners, N. C. Santos, J. Faria, G. Boue, R. F. Díaz, S. Dreizler, S. Boldt, L. Delrez, E. Ducrot, M. Gillon, A. **Guzmán Mesa**, E. Jehin, S. Khalafinejad, S. Kohl, L. Serrano, and S. Udry. Activity induced variation in spin-orbit angles as derived from Rossiter-McLaughlin measurements. *A&A*, 619:A150, November 2018.
- [3] *Submitted*, S. Grimm, M. Malik, D. Kitzmann, A. **Guzmán Mesa**, C. Fisher, H. Jens Hoeijmakers, M. Malik, S. Tsai, J. Mendonça, M. Oreshenko, and K. Heng. HELIOS-K 2.0 Opacity Calculator and Open-source Opacity Database for Exoplanetary Atmospheres. *A&A*, 2020.

Workshops and Summer Schools

- Sep 2019 **“A Crash Course in Machine Learning with Applications in Natural and Life Sciences”**, Heidelberg, Germany.
- Jul 2019 **Sagan Exoplanet Summer Workshop: Astrobiology for Astronomers**, NASA Exoplanet Science Institute, Pasadena, California.
- Jun 2019 **1st Exoclims Simulation Platform (ESP) Summer School**, Center for Space and Habitability, Universität Bern, Guarda Val, Switzerland.
- May 2019 **3rd Advanced School on Exoplanetary Science: Demographics of Exoplanetary Systems**, Max Planck Institute for Astronomy, Vietri Sul Mare, Italy.
- August 2017 **Ondrejov-Tautenburg Summer School on Exoplanets**, Astronomical Institute of ASCR, Czech Republic.
- July 2017 **Europlanet International Research Summer School “Space missions: ground-based observations and science communication”**, Molėtai Astronomical Observatory, Lithuania.
- June 2017 **Exoplanet Summer Program**, University of California Santa Cruz (UCSC), California, USA.
- May 2017 **2nd Advanced School on Exoplanetary Science: Astrophysics of Exoplanetary atmospheres**, Max Planck Institute for Astronomy, Vietri Sul Mare, Italy.
- Nov 2015 **37th International School for Young Astronomers**, IAU & National Autonomous University of Honduras, Tegucigalpa, Tegucigalpa, Honduras.
- 2015 **Astronomy Twinning Program (AstroTwinColo)**, University of Antioquia & Leiden Observatory, Medellín, Colombia.
- 2014 **6th Colombian Astronomy School: Birth and early evolution of Stars**, Observatorio Astronómico Universidad Nacional de Colombia, Bogotá, Colombia.
- Jan 2013 **Observational Astronomy School for Latin-American Students ESAOBELA**, National Institute of Astrophysics, Optics and Electronics and Institute of Astronomy of the National Autonomous University of Mexico UNAM, Puebla, Mexico.

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Talks, Posters and Meetings

Talks

- Nov 2020 **Exploring the chemical diversity of sub-Neptune planets**, *SPIMAX Colloquium*, University of Oxford, UK.
- Oct 2020 **What is the information content of JWST transmission spectra?**, *SSAA General Assembly*, Switzerland.
- Oct 2019 **Exoplanetas en la Era de Machine Learning**, *VI Congreso Colombiano de Astronomía y Astrofísica COCOA*, Medellín, Colombia.

Posters

- Aug 2020 **What is the information content of JWST Transimission spectra?**, *Exoplanets III*, Heidelberg, Germany.
Virtual conference
- Sep 2019 **ESP open-source Opacity Database**, *JURA - JUnior Researchers' Assembly II*, Vitznau, Switzerland.
- Jul 2019 **ESP open-source Opacity Database**, *Sagan Exoplanet Summer Workshop*, NASA Exoplanet Science Institute-Caltech, Pasadena, California.
- Jun 2018 **Uncovering the true nature of Exoplanet Atmospheres**, *Astromundus Retreat*, University of Innsbruck, Innsbruck, Austria.

Meetings & Conferences

- Sep 2020 **12th Canadian Science Policy Conference**, *Canada*, Virtual Conference.
- Sep 2020 **Exoplanets III**, *Heidelberg*, Germany, Virtual Conference.
- Oct 2019 **VI Congreso Colombiano de Astronomía y Astrofísica COCOA**, *Medellín*, Colombia.
- Sep 2019 **European Planetary Science Congress EPSC**, *Geneva*, Switzerland.
- Sep 2019 **JURA - JUnior Researchers' Assembly II**, *Vitznau*, Switzerland.
- Aug 2019 **Extreme Solar Systems IV**, *Reykjavik*, Iceland.
- 2018 **30th General Assembly of the IAU**, *Vienna, Austria*, Participant and volunteer.
- 2017 **51st ESLAB Symposium: "Extreme Habitable Worlds"**, *ESTEC European Space Agency*, Noordwijk, Netherlands, Participant.
- 2017 **Rock and Stars II conference**, *Max Planck for Solar System Research*, Göttingen, Germany, Participant.
- 2014 **United Nations/Mexico Symposium on Basic Space Technology: "Making Space Technology Accessible and Affordable"**, *UNOOSA*, Ensenada, Mexico, Speaker.
- 2013 **6th International Meeting in Astronomy and Aeronautics**, *Rio de Janeiro, Brazil*, Speaker.

Professional Experience

- 2019–present **Teaching Assistant**, *Institute of Physics*, Universität Bern, TA for the course of Basics of Physics for Medicine and Dentistry students..

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- 2019 **Library Assistant**, *Bibliothek Exakte Wissenschaften*, Universität Bern, In charge of helping with the organization of the library..
- 2015–2016 **Astronomy mediator**, *Planetarium of Bogotá*, Bogotá, Colombia, In charge of planning and implementing astronomy activities for children and adults.
- 2010–2014 **Astronomy mediator**, *Observatorio Astronómico Universidad Sergio Arboleda*, Responsible for operating the telescopes and planetarium for academic and outreach talks.
- 2013 **Astronomy mediator**, *Buinaima (Science Education Non-profit)*, Bogotá, Colombia, Responsible for planning, designing and implementing astronomy activities for high school students.
- 2012 **Astronomy tutor for Science Clubs**, *Maloka Science Museum*, Bogotá, Colombia, Responsible for planning, designing and implementing astronomy activities for science clubs.
- 2012 **Museum Guide**, *Maloka Science Museum*, Bogotá, Colombia, Guide visitors through science exhibits.

Professional affiliations and memberships

- 2019–present Member of the **SSAA** Swiss Society for Astrophysics and Astronomy
- 2019–present Member of the **OWSD** Organization for Women in Science for the Developing World
- 2018–present Member of **PlanetS** NCCR (National Center of Competence in Research)
- 2017–2018 Member of the CARMENES (**C**alar **A**lto high-**R**esolution search for **M** dwarfs with **E**xo-earths with **N**ear-infrared and optical **E**chelle **S**pectographs) consortium

Languages

Spanish	Mother tongue	
English	Fluent	TOEFL iBT: 94
French	Intermediate	B1
Italian	Fluent	B1
Portuguese	Fluent	B1
German	Basic	A1

Courses

- Nov 2020 **Scientific Integrity**, *Universität Bern*.
- Oct 2020 **Public Speaking for Scientists**, *Universität Bern*.
- Sept 2020 **AAAS-TWAS Course on Science Diplomacy**, *The World Academy of Sciences TWAS*, American Association for the Advancement of Science AAAS.
- April 2020 **Project Management for Research**, *NCCR PlanetS*, Cubisma.

Computer skills

- OS Operating systems: Linux, Windows, MacOS.

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PL Programming Languages: Python.
WP Word Processing Software: L^AT_EX, Office.
AT Astrophysical Tools: TOPCAT, Period04, emcee, Systemic, Radvel

Media Appearances

- March 2020 **Colombian Scientists among the stars**, *Adrián Atehortúa*, [Bacánika Magazine](#).
March 2020 **What Is This Colombian's Exoplanet Work? It's Out Of This World!**, *Forbes Science*, Andrew Wight, [Forbes Science Guzmán](#).
March 2020 **Hay un planeta donde llueve Hierro**, *Instituto Distrital de las Artes IDARTES*, [Idartes Guzmán](#).

Outreach

- Sept 2020 **Qué esconde la atmósfera de Venus?**, *Ciencia Viral - Periódico EL TIEMPO*, Colombia.
July 2020 **Talk "In Search of New Worlds"**, *Astronomy on Tap Bonn*, Bonn, Germany.
April 2020 **Exoplanetas en una cáscara de nuez**, *Observatorio Astronómico Nacional - Tonantzintla*, Puebla, México.
March 2020 **Hablemos del Universo: WASP-76b, El planeta con lluvia de Hierro**, *Planetarium of Bogotá*, Bogotá, Colombia.
May 2019 **Organizer/Volunteer of the Pint of Science**, *Bern*, Switzerland.
May 2019 **Talk "Exoplanets in a Nutshell"**, *Fantasy Basel*, Basel, Switzerland.
Feb 2019 **Talk "Exoplanets in a Nutshell"**, *Astronomy on Tap Bern*, In celebration of the International Women and girls in Science Day, Bern, Switzerland.
Oct 2018 **Talk "Atmósferas Exoplanetarias"**, *Astronomy Colloquium*, Universidad Sergio Arboleda, Bogotá, Colombia.
Co-founder of CHIA:, *Colombianas Haciendo Investigación en Astrociencias / Female Colombians doing research in Astroscience.*

References

Prof. Dr. Kevin Heng University of Bern ✉ kevin.heng@csh.unibe.ch ☎ +41 31 631 5918	Prof. Dr. Ansgar Reiners University of Göttingen ✉ Ansgar.Reiners@phys.uni-goettingen.de ☎ +49 551 391 3825	Dr. Francine Marleau University of Innsbruck ✉ francine.marleau@uibk.ac.at ☎ +43 512 507 52019
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