

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 in the long term consists in understanding how the atmosphere and interior evolution of a diversity of exoplanets are coupled, with the goal of building atmospheric-evolutionary grids of models (i. e, Bern Exoplanet tracks). These models will be used to interpret observations of exoplanets and increase our understanding of physical and chemical trends.

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, Roma, 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.

Research Experience

Gessellschaftstrasse 6, Bern – 3012 – Switzerland

☎ +393274449276 • ☎ +41 44 631 37 74

✉ andrea.guzmanmesa@space.unibe.ch

- 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 BRITe constellation satellite**, *Leopold-Franzens-Universität Innsbruck*, Austria, 3 months.
Supervisor: Prof. Dr. Konstanze Zwintz.

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 **Ondřejov-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.

Talks, Posters and Meetings

Talks

- Oct 2019 **Exoplanetas en la Era de Machine Learning**, *VI Congreso Colombiano de Astronomía y Astrofísica COCOA*, Medellín, Colombia.

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Posters

- 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

- 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.

Honors and Awards

- 2019 Young Academics Support, University of Bern (1700 CHF)
- 2019 SSAA Young Scientist Travel Support, Swiss Society for Astronomy and Astrophysics (1000 CHF)
- May 2019 Student grant to attend the 3rd Advanced School on Exoplanetary Science: Demographics of Exoplanetary Systems in Italy (€350)
- August 2018 Student grant to attend the 30th General Assembly of the IAU in Vienna, Austria (€920)
- June 2018 Best Master's thesis poster prize, Astromundus Retreat
- 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)

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- 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 (€500)
- 2013-2015 Merit Scholarship, Universidad Sergio Arboleda
- 2013-2015 Michelsen's Foundation Scholarship
- 2010-2012 Colombia Foundation Scholarship
- 2013 Honorary Member of the Colombian Astronomy Network RAC
- 2010 Special guest at the NASA Juno Spacecraft's Launch, Cape Canaveral, FL, USA

Professional Experience

- 2019–present **Teaching Assistant**, *Institute of Physics*, Universität Bern, TA for the course of Basics of Physics for Medicine and Dentistry students..
- 2019 **Library Assistant**, *Bibliothek Exakte Wissenschaften*, Universität Bern, In charge of helping with the organization of the library..
- 2015–2016 **Astronomy teacher**, *Planetarium of Bogotá*, Bogotá, Colombia, In charge of planning and implementing astronomy activities for children and adults.
- 2010–2014 **Astronomy teacher**, *Observatorio Astronómico Universidad Sergio Arboleda*, Responsible for operating the telescopes and planetarium for academic and outreach talks.
- 2013 **Astronomy teacher**, *Buinaima (Science Education Non-profit)*, Bogotá, Colombia, Responsible for planning, designing and implementing astronomy activities for high school students.
- 2012 **Astrophysics 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–present 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
 Italian Fluent

TOEFL iBT: 94
 B1

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Portuguese	Fluent	B1
German	Basic	A1
French	Intermediate	B1

Computer skills

- OS Operating systems: Linux, Windows, MacOS.
- PL Programming Languages: Python.
- WP Word Processing Software: L^AT_EX, Office.
- AT Astrophysical Tools: TOPCAT, Period04, emcee, Systemic, Radvel

Outreach

- 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.

Authoring and administrative activity for the PlanetS Facebook page.

References

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

First Author Publications

- [1] Guzmán Mesa et al. 2019 Information Content of JWST-NIRSpec Transmission Spectra of TESS Hot Neptunes et al. 2019, Submitted

Publications

- [1] 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. , 619:A150, November 2018.
- [2] *In prep*, S. Grimm, A. **Guzmán Mesa**, C. Fisher, D. Kitzmann, H. Jens Hoeijmakers, M. Malik, S. Tsai, J. Mendonça, M. Oreshenko, and K. Heng. An Open-source Opacity Database for Exoplanetary Atmospheres. , 2019.

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