JENNY MARGOT RAMOS LAZARO

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EDUCATION

Undergraduate education: Universidad Nacional Mayor de San Marcos, Peru.
Department: Department of Physical Sciences.
Academic ranking: I ranked 5 out of 199 students.
Degree: Bachelor in Fluid Mechanics Engineering (Degree conferred in 2018).
Professional title: Fluid Mechanics Engineer-by Thesis defense (Diploma in process).
Thesis defense date: November, 2021. Grade: 18 out of 20. (Grade with honors).

GRADUATED COURSES (AUDITED)

National University of Cordova September-December 2020, Argentina.
Integrated Spectroscopy of Galactic and Extragalactic Star Systems (remote participation)
Course from The Doctorate Program in Astronomy. Prof. Andrea Ahumada

Chalmers University of Technology March-May 2023, Sweden.
The Interstellar Medium and Star Formation (remote participation)
Course from The Master's programme in Physics . Prof. Jonathan Tan

RESEARCH INTERESTS

Extragalactic Astrophysics, Star Formation, Planet Formation, Stellar Physics, and Astrochemistry.

RESEARCH EXPERIENCE IN ASTROPHYSICS AND SPACE SCIENCE

1. **ISYA 2023- National Institute of Astrophysics, Optics and Electronics. Mexico.**
   Research: The Chemical Composition of the Orion Nebula. July 17- August 4 2023
   We studied if two regions of Orion Nebula (HH 529 and Nebula) present different chemical conditions. We used data of the VLT from Méndez-Delgado et al (2021) to estimate the electronic density, electronic temperature, and total abundances of ions from O, N, Ne, S, and Ar. We found that N abundances are lower in HH 529, which could be generated by the outflow activity of the HH 529 Herbig-Haro object. **Supervisor:** Prof. Monica Rodriguez, INOE, Mexico.

2. **LEAPS 2022- Leiden University, The Netherlands.** June-August 2022

   Research: Modelling emission from sulphur molecules in a planet-forming disk.
   Research Program: The Leiden/ESA Astrophysics Program for Summer Students. **(LEAPS)**
   I researched which sulfur molecules might be the most detectable in the planet-forming disk HD 100546 to improve the effectiveness of future ALMA observation proposals. I performed three simulation scenarios based on the initial sulfide abundance to simulate the emissions of SO, SO_2, OCS and H_2CS from HD 100546. The results show that the simulated SO column densities are very close to the observation values.
   Supervisor: Dr. Alice Booth, Leiden Observatory, Leiden University, The Netherlands.

3. **CASSUM 2021- Chalmers University of Technology, Sweden.** May 2021-Present

   Research: The evolution of carbon-chain chemistry from prestellar to protostellar cores in Taurus Molecular Cloud. This research started during the CASSUM 2021 Research Program from Chalmers (Sweden). I study C_2H, c-C_3H_2 , and CH_3OH in 15 protostars using data from the Submillimeter Telescope at the Arizona Radio Observatory. I estimated the excitation temperatures, column densities, and abundances. I compared them with the evolutionary parameters and with the protostars from Perseus. I also estimated the kinetic temperature using the RADEX model.**Supervisor:** Dr. Yao-Lun Yang, Star and Planet Formation Laboratory, RIKEN, Japan.

4. **Integrated spectra of Magellanic Clouds' star clusters.** December 2020-Present

   The research project started when I was an vocational student in a course in star clusters from the Doctorate program in Astronomy of the National University of Córdoba, Argentina. We derived astrophysical parameters of the star clusters from Magellanic Clouds, using flux-calibrated integrated spectroscopy in the optical range (3800 Å -7000 Å). We presented part of our results at the Annual Meeting of the Argentine Astronomical Association 2021.
   Supervisor: Prof. Andrea Veronica Ahumada, National University of Córdoba, Argentina.

5. **CosmoAmautas Science. OAD- International Astronomical Union.** May-October 2020

   Research: Fundamental differences in the radio properties of Type 2 Quasars.
   I cross-matched the BOOTES-FIELD catalog, the WISE AGN catalog, and the SDSS Quasars catalog to find a sample of 1378 type 2 (red) Quasars (z <3). I reconstructed the SED of each Quasar and calculated the rest-frame 6 μm luminosity. I found a radio detection fraction of 30 % with LOFAR data. I also compared my sample with the sample from (Klindt et al., 2019), and I found no significant differences between the luminosities of the red and blue quasars.
   Supervisor: Dr. Gabriela Calistro, European Southern Observatory, Germany.

6. **UNMSM- Undergraduate thesis in solar magnetohydrodynamics.** Aug 2019-Nov 2021

   Thesis: Fluid dynamic simulation of particle flow in a plasma during a solar flare.
   The objective was to study the origin of the energy release phase of a solar flare (SF) using 2D magnetohydrodynamic simulations. I characterized the morphological evolution of SF using the AIA/SDO and GOES data. I also simulated the profiles of pressure, velocity, temperature, and density during the SF energy release phase. The results replicated 2D magnetic reconnection.

7. **National Institute of Astrophysics, Optics and Electronics. Mexico.** June 2018

   Research Project: Calculation of the mass of the molecular cloud MC76.
   I did this research during the "3 rd Summer Radio-Astrophysics Workshop TNT-2018." I used three methodologies based on viral equilibrium, local thermodynamic equilibrium, and a conversion factor to calculate the mass of MC76. **Supervisors:** Prof. Ricardo Retes and Prof. Abraham Luna. National Institute of Astrophysics, Optics and Electronics, Mexico.

8. **Jicamarca Radio Observatory. Peru.** January-March 2018.

   Research project: Processing and online visualization of the BLTR wind profiler at the Huancayo Observatory. I worked as a research intern at JRO's Research and Development Area + Innovation. I developed an algorithm in Python in the data processing library: Signal Chain-JRO to eliminate outliers of the BLTR radar. I also created a web application to publish (in real-time) the corrected BLTR radar data. **Supervisor:** Engr. Espinoza, Co-S: Dr. Scipion.

9. **Simulation of a space mission (type return of sample) in the Martian analog desert Pampas de La Joya - Arequipa, Peru.** 2017-2018.
   I participated in this multidisciplinary research project with undergraduate students, members of the Scientific Society of Astrobiology of Peru, and professionals from other Peruvian institutions and universities. I was part of the research team to design a low-impulse rocket motor.

10. **Scientific Society of Astrobiology of Peru** October-November 2016

    Research project: Sustainable habitat model through the use of thermal energy on Mars
    We designed a long-term sustainable habitat model for Martian environments. The model had a complete and self-sufficient mechanical-architectural system of hybrid construction. We also proposed the construction of a mini thermal power station for the generation of energy. We presented this project at the closing of the "II Annual Training in Astrobiology 2016" of the Scientific Society of Astrobiology of Peru.

PUBLICATIONS

1. **RAMOS Lazaro Jenny** and Yang Yao-Lun.(2023). The evolution of carbon-chain chemistry from prestellar to protostellar cores in Taurus Molecular Cloud. Currently in preparation with plans for submission to The Astrophysical Journal.

2. **RAMOS Lazaro Jenny** and Yang Yao-Lun. (2023). The evolution of carbon-chain chemistry from prestellar to protostellar cores in Taurus Molecular Cloud. Resolving the Rise and Fall of Star Formation in Galaxies (IAU S373). **Proceedings of the International Astronomical Union**, Volume 373, pp. 63-66. [Link]

3. Ahumada, A. V, Vega, L. R, Simondi, F. O., Asa'd, R., **RAMOS Lázaro, J. M.** (2022). Kron 27: another genuine globular cluster in the small Magellanic Cloud?. **Bulletin of the Argentine Astronomy Association** , Vol. 63, pp. 112-114. [Link]

4. Calistro, G.(ESO, Germany); Bardalez, D. ; Alvarado, D.; Gonzales, L.; Kleffman, D; Meza. E.; Quispe, A.; **RAMOS Lázaro, Jenny Margot**; Ricra, J.; Rodríguez, B.;Torre, E. (2022). The CosmoAmautas project for equitable scientific education in Peru. **Nature Astronomy Journal** 6, 170–172. [Link]

5. Calistro, G.(ESO, Germany); Bardalez, D.; Alvarado, D.; Calcina E; Casas S; Gonzales, L.; Quispe, A.; **RAMOS Lázaro JM**; Ricra J; Rodríguez, B.; Torre, E. (2021). **BOOK**: CosmoAmautas: Astrophysics in the high school classroom. arXiv:2109.11945. [Link]

    - I wrote chapter 5 "Galaxies and black holes" (pp.71-84) and collaborated in editing chapter 6 "Cosmology" (pp.85-95).

6. **RAMOS Lázaro Jenny** et al., (2020). Processing and online visualization of the BLTR wind profiler at the Huancayo Observatory. Section 1. Geospatial Sciences and Astronomy. Compendium of researchs in geophysics: research works carried out by students during the years 2018-2019. Pp.117-121. Geophysical Institute of Peru. [Link]

OBSERVING EXPERIENCE

1. **Telescope:** Submillimeter Telescope from Arizona Radio Observatory, USA.
   Title: Determining the origin of carbon-chain molecules in Taurus embedded protostars.
   Time: 20 hours. Observation days: March 27, 30 and 31, 2022.
   CO-Investigator: **Jenny Margot Ramos Lazaro.**
   Principal-Investigator: Dr.Yao-Lun Yang.

FUNDING, CONTEST AND AWARDS

1. **Grant from the 43rd International School for Young Astronomers**
   ISYA 17 July- 4 August 2023, Mexico
   The International Astronomical Union and the National Institute of Astrophysics, Optics and Electronics covered my travel, accommodation and living expenses to participate in the 43rd ISYA 2023. I was accepted among more than 190 applicants worldwide.

2. **Grant from International Astronomical Union.** August 2022, Republic of Korea
   I was awarded with a registration fee waiver of 529 euros to participate as a speaker (e-Talk) at the IAUGA 2022 XXXIst General Assembly of the International Astronomical Union in Korea. Initially, I was awarded a grant of 1318 euros from the IAU to participate in person. But I decided to participate virtually, so I finally received the IAU grant for the registration fee.

3. **Grant from Committee on Space Research (COSPAR).** July 2022, Greece
   I was awarded with a registration fee waiver of 650 euros to participate as a Speaker (Talk) in COSPAR 2022 - 44th Scientific Assembly. Athens, Greece. 16-24 July 2022.

4. **Grant from CASSUM-Chalmers University of Technology** June 2022, Sweden
   I received funding from CASSUM to travel and participate in the conference: "From Stars to Galaxies II- Connecting our understanding of star and galaxy formation" in Sweden. My travel, accommodation, and registration fee were fully funded by CASSUM. Participation: Poster.

5. **Studentship from LEAPS- Leiden Observatory.** June-August 2022, Netherlands
   The Leiden/ESA Astrophysics Program for Summer Students 2022. My travel, accommodations, health insurance, and stipend were fully funded by the host institution. Leiden Observatory at the Department of Science, Leiden University, The Netherlands. I was accepted to the program among more than 500 applicants worldwide.

6. **Grant from EducationUSA** April 2022-March 2023, Peru
   Opportunity Funds 2022/2023 Program-EducationUSA, Perú. The opportunity Funds program is funded by the **United States Department of State's Bureau of Educational and Cultural Affairs**. I was one of the 12 students awarded with the Grant, in the national call.

7. **Research Fellowship from Chalmers Astrophysics Space Science Summer (CASSUM). Chalmers University of Thecnology** . May-July 2021, Sweden
   I was selected among more than 120 applicants from all over the world. Research program from Chalmers University of Technology, Sweden.

8. **7th Byurakan International Summer School for Young Astronomers.** 2020, Armenia
   I was accepted into the school after applying to the highly competitive global call. According to the analysis of Division C of the International Astronomical Union, BISS is among the top 3 astronomical schools in the world. Byurakan Astrophysical Observatory, September 2020.

9. **1st Workshop of the National Space Weather Laboratory** September 2020, Mexico
   I attended this workshop because I applied to the call and was selected as a participant. In this school, there were many applicants from Central and South America. I was one of the four students selected to participate in the Magnetohydrodynamics workshop.

10. **GROWTH astronomy school:The dynamic universe at all wavelengths** Aug.2020,USA
    I got a place in this school after applying to the highly competitive global call. The school was organized by the Global Relay of Observatories Watching Transients Happen. Virtual meeting.

11. **CosmoAmautas- International Astronomical Union** May 2020-September 2021, Peru
    CosmoAmautas is a project Financed by the International Astronomical Union. I applied to the National call (Peru) and was one of the six students selected to participate in CosmoAmautas. I was part of the areas of research (CosmoAmautas Science) and scientific dissemination.

12. **Finalist in IAU 100 Name ExoWorlds-Peru Contest.** November 2019, Peru
    I was a national finalist in the International Astronomical Union 100 Name Exo Worlds-Peru contest for the planetary system HD 156411. I made the proposal: Chicopaec and Quismique. I proposed the names of two mythological figures of the pre-Hispanic culture "Moche," a civilization that existed in Peru from about 100 to 700 AD.

13. **Grant from 3rd Radio-Astrophysics Workshop Summer TNT** June 2018, Mexico
    My travel, accommodation, and food expenses were fully financed by the host institution. National Institute of Astrophysics, Optics, and Electronics (INOE), Mexico. I obtained the grant after participating in the Latin American call, which had more than 80 applicants.

14. **First place in the research paper competition of the University Residence. National University of San Marcos**. December 2017, Peru
    Prize awarded by University Residence and Researchers from "Virrectorado" for Research of the Universidad Nacional Mayor de San Marcos, Peru.

15. **Scientific Society of Astrobiology of Peru** 2016, Peru
    I applied to the highly competitive national call and was accepted to the Annual Training of

Astrobiology of Peru. Then I passed the training and was admitted as a new member of the Scientific Society of Astrobiology of Peru.

16. **University Housing Scholarship** 2014-2017, Peru
Scholarship awarded by the OGBU of the Universidad Nacional Mayor de San Marcos, Peru.

17. **NASA Contest: Cassini Scientist for a Day.** 2014, Peru
Contest from National Aeronautics and Space Administration (NASA, USA) and "Ecovida y Universo" (Peru). I got first place nationally with the article "Dione: The White Enigma." I was awarded in the auditorium of the Congress of the Republic of Peru: José Faustino Sánchez Carrión.

TALKS

a) **Contributed Talks**

1. **XXXIst General Assembly International Astronomical Union** 2-11 August 2022 Korea.
e-Talk: The evolution of carbon-chain chemistry from prestellar to protostellar cores in Taurus Molecular Cloud. IAUGA 2022. Symposium 373: Resolving the Rise and Fall of Star Formation in Galaxies. Type of Participation: e-Talk. Link: Event website, Presentation.

2. **COSPAR 2022-44th Scientific Assembly.** July 22, 2022 Greece.
Talk: The evolution of carbon-chain chemistry from prestellar to protostellar cores in Taurus Molecular Cloud. F3.5 Simple and Complex Molecules in Star-forming Regions. Type of Participation: Virtual. Links: Event website/Abstract/Program.

3. **From Stars to Galaxies II.** June 20, 2022 Sweden.
Poster: The evolution of carbon-chain chemistry from prestellar to protostellar cores in Taurus Molecular Cloud. From Stars to Galaxies II-Connecting our understanding of star and galaxy formation. Links: Event website/Abstract/Poster.

4. **Origins Workshop - ISM, Star and Cluster Formation.** January 10, 2022 USA.
Talk: Characterizing the carbon-chain chemistry toward Taurus embedded protostars. Links: Event website/Abstract.

5. **XIX Meeting of Physics.** September 25, 2020 Peru.
Calculation of the mass of the Molecular Cloud MC76. XIX Meeting of Physics, National University of Engineering, Peru. September 24-26, 2020. Links: Abstract/Abstract Book.

6. **International Scientific Meeting 2019-Summer.** January 3, 2019 Peru.
Talk: Star Formation and Interstellar Medium as triggers for life in the Universe. Space Sciences: Astrobiology. Ricardo Palma Private University.

7. **International Scientific Meeting 2018-Winter.** August 1, 2018 Peru.
Talk: Hydrological Evolution of Mars: Morphology and Martian channels. Space Sciences: Astrobiology. Ricardo Palma Private University.

8. **XVIII Meeting of Physics.** August 17, 2018 Peru.
Analysis of the influence of El Niño-Southern Oscillation and the El Niño index Coastal over rainfall in the Crisneja basin, La Libertad -Peru. National University of Engineering, Peru. August 15-17, 2018 .

9. **International Scientific Meeting 2018- Summer.** January 4, 2018 Peru.
Talk: Design of a Hybrid Rocket engine for sample return type spatial simulation in the Martian analog desert Pampas de La Joya - Arequipa, Peru. Session: Space Sciences and Astrobiology. Ricardo Palma Private University.

10. **National Meeting of Researchers of the Scientific Society of Astrobiology of Peru.** SCAP November 18, 2017 Peru.
Talk: Design of a hybrid rocket engine. University of Engineering and Technology -UTEC.

11. **International Scientific Meeting 2017-Winter.** August 1, 2017 Peru. Talk: Groundwater on Mars: analysis of its origin and behavior using numerical modeling. Session: Astronomy. Ricardo Palma Private University.

b) **Invited Talks**

1. **Astrobiology Lectures, Vol-5.Scientific Society of Astrobiology of Peru.** Oct 19, 2019 Peru. Talk: Celestial Mechanics: Kepler's Laws of Planetary Motion. Department of Physical Sciences and Mathematics, National University of Trujillo.
2. **Astrobiology Lectures, Vol-3.Scientific Society of Astrobiology of Peru.** July 20, 2019 Peru. Talk: Detection of Matter and Dark Energy in the Universe. Department of Physical Sciences and Mathematics - National University of Trujillo.
3. **International Day of Astronomy-Trujillo.** April 13, 2019 Peru. Talk: Physics of Black Holes. National university of Trujillo.
4. **Astrobiology Lectures, Vol -1. Scientific Society of Astrobiology of Peru.** March 2, 2019 Peru. Talk: Galactic Evolution: Formation and evolution of galaxies. Department of Physical Sciences and Mathematics, National University of Trujillo.
5. **Cycle of talks WiTMeetup -August, organized by "Woman in Tecnology Perú (Wit-Perú)."** August 28, 2017 Peru. Talk: Technologies for a Space Simulation to Mars.

RESEARCH SOCIETIES, RESEARCH GROUPS AND JOURNAL CLUBS

1. **X-Formation Group, University of Virginia**. June 2021-September 2021, USA Organizer: Prof. Ilse Cleeves. X-Formation meets weekly to discuss the formation of X=stars, planets, molecules, etc. It is a casual format where everyone gets a chance to provide a short research update discuss an interesting article, tools, etc.
2. **National Radio Astronomy Observatory (NRAO)-CASSUM. Summer Group, Star Formation.** May-August 2021, USA.
3. **University of Virginia Astronomy Journal club**. May-July 2021, USA. University of Virginia
4. **CosmoAmautas 2020-2021**. May 2020- September 2021, Peru Scientific Education Project promoted by the Office of Astronomy for Development of the International Astronomical Union.
5. **Cosmology Journal Club** 2020, Peru. Department of Physical Sciences of the National University of Trujillo.
6. **Particle Physics Journal Club** 2019, Peru. Department of Physical Sciences of the National University of Trujillo.
7. **Scientific Society of Astrobiology of Peru** 2016-Present, Peru. Spanish name: Sociedad Científica de Astrobiología del Perú.
8. **Fluid Mechanics Engineering Research Center (CIDIMF)** 2015-2017, Peru. Universidad Nacional Mayor de San Marcos.
9. **Center for research and development of energies of tomorrow Micha Yawaypita.** Universidad Nacional Mayor de San Marcos. Peru 2020-Present, Peru.

TEACHING EXPERIENCE, MENTORING AND RESEARCH LEADERSHIP

1. **April 2021-May 2021**. I was an instructor in CosmoAmautas 2021. I gave workshops on Astronomy and Space Sciences to secondary school teachers from rural areas of Peru. I was an instructor of a group of teachers in the workshops on Earth, the Sun and Moon, Solar System, stars, and exoplanets. Additionally, I supported another Instructor on the subject of cosmology.
2. **October 2019**. I gave a workshop on black holes and star formation. I taught how to carry out a scientific experiment on the subject, which the attendees (middle school students) replicated.

I gave this workshop during the event: Project Fair of the Scientific Society of Astrobiology and the night of the telescopes. Huamachuco (Highlands), La Libertad, Peru.

3. **May 23-24, 2019**. I was Mentor/Instructor of a group of undergraduate students, who designed the power system for a possible (hypothetical) Peruvian mission to Mars during Bootcamp: Peruvian Mission to Mars. Group: Energy. Institute of Radio Astronomy, Pontifical Catholic University of Peru (PUCP).

4. **November, 2018**. I was an evaluator jury of the " Exhibition of research works of the Annual Training in Astrobiology, 2018." Scientific Society of Astrobiology of Peru. I evaluated the final research projects of the possible new members (undergraduate students) of the Scientific Society of Astrobiology of Peru, Trujillo headquarters, Peru.

5. **2016-2017**. I was Academic Director of the Fluid Mechanics Engineering Research Center (CIDIMF), Department of Physical Sciences, Universidad Nacional Mayor de San Marcos.

SCHOOLS-WORKSHOPS ON ASTROPHYSICS

1. **43rd International School for Young Astronomers** July 17- August 7, 2023 Mexico. National Institute of Astrophysics, Optics and Electronics (INOE). Link: Event website.

2. **CICO-VICO-CASSUM Science Workshop.Hybrid meeting.** May and 26, 2023 Sweden.

3. **MC-SIM (Molecular Cloud Simulation) Workshop** April 27-28, 2023 Sweden. Chalmers University of Technology. Hybrid Meeting.

4. **1 st Gaia Latin American School – UdeA. Hybrid Meeting.** Feb. 7-11, 2022 Colombia. I learned theory and practical examples on: astrometry, photometry, and spectroscopy with Gaia; artificial intelligence; neural networks; and unsupervised methods. University of Antioquia.

5. **The SOFIA School 2022: Understanding mid and far-IR data.** Feb. 2-4, 2022 USA I learned theory and practical examples with SOFIA data about mid-far IR/measuring flux; dust: morphology, spectroscopy, and polarimetry; and gas in the ISM. Link: Event website.

6. **VICO-CICO Fall 2021 Workshop- Virtual Meeting.** December 9-10 2021 USA.

7. **10th IRAM 30-meter School on Millimeter Astronomy.** November 2021 Spain. The school provided me with specialized training in millimeter astronomy theory and techniques of data calibration. The school focused on the use of NOEMA. Institut de Radioastronomie Millimétrique. Granada, Spain. Virtual Meeting. November 15-19, 22 and, 23, 2021.

8. **I Workshop Computational Tools for Physics: Astrophysics and Gadget- XX Meeting of Physics.** August 17-21 2021 Peru.
In the school, I learned about astrophysical plasmas, and the use of SWIFT, a hydrodynamics and gravity code for astrophysics and cosmology. National University of Engineering (UNI).

9. **CICO-VICO-CASSUM Science Workshop.** May 27 and 28, 2021 USA.

10. **1st Workshop of the National Space Weather Laboratory: Data analysis and instrumentation.Virtual meeting.** Sep. 7-11, 2020 Mexico.
Area: Workshop Magnetohydrodynamic numerical simulations (MHD) in solar and space physics. In the workshop, I learned about space weather. I also received formation on magnetohydrodynamics and computational codes in MHD. National Laboratory for Space Weather.

11. **7th Byurakan International Summer School for Young Astronomers.** 2020 Armenia
I received lectures and practical tutorial sessions on astronomical surveys, digitization of astronomical data, astronomical catalogues, astrostatistics and Astroinformatics, Virtual Observatory tools. Byurakan Astrophysical Observatory, Armenia. Virtual meeting. September 7-11, 2020.

12. **GROWTH astronomy school:The dynamic universe at all wavelengths** 2020 USA
The school provided me with specialized training in observational techniques and tools for track-

ing transient events in X-ray, UV, optical, infrared, and radio wavelengths. Theoretical sessions were accompanied by hands-on activities on real data sets. Global Relay of Observatories Watching Transients Happen (GROWTH). August 17-21, 2020. Link: Event website.

13. **AtomDB Workshop and Advanced Spectroscopy School.** August 3-5, 2020 USA.
The Harvard & Smithsonian Center for Astrophysics. Link: Event website.

14. **VI Ecuadorian School of Astronomy and Astrophysics.** July 27-31, 2020 Ecuador.
The workshop included lectures on high-energy astrophysics, exoplanets, galaxies, galactic centers, relativistic equations of stars, and shock waves in the universe. Astronomical Observatory of Quito of the National Polytechnic School, Ecuador. Virtual meeting.

15. **2020 Sagan Exoplanet Summer Virtual Workshop.** July 20-24, 2020 USA.
Extreme Precision Radial Velocity.
The workshop included lecture presentations, hands-on sessions working with radial velocity data, a virtual poster session. NASA exoplanet science institute. CALTECH, Pasadena.CA.

16. **II Joint ICTP-Trieste/ICTP-SAIFR School on Particle Physics.**June 22-July 3, 2020.
International center for theorical Physics. Virtual meeting.

17. **Project Closure School: Development of the Cosmic Rays observatory in Huancayo and Astroparticles in the LAGO Project (Latin American Giant Observatory).**
I received formation on the phenomenology of cosmic rays and their detection. I also learned computational tools for cosmic ray simulation. Peruvian Space Agency. May 16-18, 2019 Peru.

18. **Third Astronomy Workshop in the Andes.** November 12-16, 2018 Peru.
Science Faculty, National University of Engineering.

19. **Workshop: Checking the accelerated expansion of the Universe.** Oct. 13, 2018 Peru.
Department of Physical Sciences and Mathematics, National University.

20. **3rd Summer Radio-Astrophysics Workshop TNT.** June 17-30, 2018 Mexico
National Institute of Astrophysics, Optics and Electronics (INOE).Link: Event website.

21. **"II Annual Astrobiology Training 2016" dictated by the Scientific Society of Astrobiology of Peru (SCAP).** October 1 - November 12, 2016 Peru.
I receive training in astrobiology, martian habitability, terraforming, and space exploration.

COURSES IN ASTROPHYSICS

1. **The Insterstellar Medium and Star Formation** March-June 2023, Sweden.
Chalmers University of Technology Remote Participation
Course from The Master's programme in Physics of Chalmers University of Thecnology (Sweden)
Remote participation. Profesor: Jonathan Tan..

2. **Astrochemistry: From the Big Bang to Life** March-August 2023.
Global Online Lecture Series, The course was organized by Prof. Robin Garrod (UVA, USA), Prof. Wolf Geppert (Stockholm University, Sweden), Prof. Martin McCoustra (Heriot-Watt University, Scotland), and Prof. Martin McCoustra (FSU and MPI, Germany). Course website.

3. **Particle Physics: an Introduction** March-present.
University of Geneva Online Course-Coursera.

4. **Understanding Einstein: The Special Theory of Relativity** March 2023-present.
Standford University Online Course-Coursera.

5. **Exploring Quantum Physics** March 2023-present.
The University of Maryland Online Course-Coursera.

6. **Astrophysics: Cosmology** March 2023-present.
The Australian National University Online- edX.

7. **Integrated Spectroscopy of Galactic and Extragalactic Star Systems**
National University of Córdoba September-December 2020. Argentina.

   Course from the Doctorate Program in Astronomy at the Department of Mathematics, Astronomy, and Physics of the National University of Córdoba. I attended the graduate course (Doctorate/Ph.D.) as an external (vocational) student. During this course, I learned the theory of stellar populations (SP).I also learned to determine the fundamental parameters of the SP by fitting spectra templates and synthesis of stellar populations. Profesor: Prof.Andrea Ahumada.

8. **Introduction to Astronomy** May 2020, Ecuador.
Astronomical Observatory of Quito of the National Polytechnic School. Remote participation.

9. **Summer mini-course in General Relativity and Cosmology.** February 2020, Peru
Faculty of Physical Sciences of the National University of Trujillo
The topics covered in this mini-course were: Einstein's equations, perturbations of Einstein's equations, an introduction to cosmology, cosmological perturbations, and general relativity equation. I completed and passed the mini-course.

10. **Basic Astronomy: Planets, Exoplanets, Telescopes, Galactic Physics and Observational Techniques.** September-October 2019 Peru.
Astronomical Observatory of the National University of Trujillo. Trujillo-Peru.

11. **Practical Astronomy Course: Stars and constellations.** May, 2019 Peru.
Permanent seminar of Astronomy and Space Sciences (SPACE), Department of Physical Sciences, Universidad Nacional Mayor de San Marcos.

12. **Analyzing the Universe- online course.** November 2018-February 2019.
Rutgers, The State University of New Jersey.

13. **Astronomical Techniques in Planetary Sciences.** November, 2018 Peru.
Third Astronomy Workshop in The Andes. National University of Engineering. Lima-Peru.

14. **Milky Way Structure and Evolution.** November, 2018 Peru.
Third Astronomy Workshop in The Andes. National University of Engineering.

15. **Data Driven Astronomy - online course.** University of Sydney. Aug 2018-Sep 2018.

16. **Plasma Physics: Introduction – online course.** July 2018-November 2018
École polytechnique fédérale de Lausanne.

17. **Introduction to Loop Quantum Gravity - online course.** June 2018
National University of Córdoba.

18. **Introduction to Gravitational Waves - online course.** May 2018-June 2018.
National University of Córdoba.

19. **AstroTech: The Science and Technology behind Astronomical Discovery - online course.** University of Edinburgh. April 2018.

LANGUAGES

English (Fluent), German (Basic), French (Basic) and Spanish (Native).

COMPUTER SKILLS

- **Programming languages:** Python, IDL, Fortran, C ++, Matlab, R and JavaScript.
- **Packages/Softwares in Astrophysics and Particle Physics:** Astropy, Sunpy, IRAF, Topcat, DS9, FLUKA, GEANT4, CORSIKA (Cosmic Ray Simulations for Kascade), GILDA-CLASS, Wolfram Mathematica, and CASA.

- **Radiative transfer code:** RADEX.
- **Experience working with astronomical data from:** ALMA, GAIA, Wise AGN Catalog, SDSS Quasar Catalog, LOFAR, Bootes Field (GALEX, NDWFS,SDWFS, Subaru Telescope, New firm and SPIRE). Infrared Astronomical Satellite, Astronomical Observatory of Córdoba-Argentina, Atmospheric Imaging Assembly/Solar Dynamic Observatory, NOAA-solar flare database, RHESSI,GOES-15 X-ray, Submillimeter Telescope, Arizona Radio Observatory.
- **Database management:** SQL and ADQL.
- **Hydrodynamics and gravity code for astrophysics and cosmology:** SWIFT.
- **Knowledge of numerical methods:** Numerical methods for solving partial difference equations. Finite difference method, Finite volume method, and Boundary element methods.
- Linux, **Machine learning**, neural networks.
- **Virtual machine:** Virtualbox and Docker.
- **Markup language:** Latex (Overleaf) and HTML.

OUTREACH ACTIVITIES

a) Scientific Education Project: CosmoAmautas May 2020-September 2021.
I was a member of the CosmoAmautas project in the area of scientific research and teacher training. The project has four astronomy education programs: school visits, school astronomy clubs, teacher training, and university research projects. CosmoAmautas is promoted by the Office of Astronomy for Development- International Astronomical Union (IAU).

b) Scientific Society of Astrobiology of Peru 2017-March 2020.
As a member of the Scientific Society of Astrobiology of Peru (SCAP). I participated in various science outreach activities in the community, among which stand out:

1. **2017.** Fair Peru with Science 2017. Concytec-Peru. Lima, Peru.
2. **2017-2019.** I gave many talks on astrophysics and astronomy to the general public.
3. **June 2019.** I participated in the Great Peaceful March to inaugurate the art exhibition "Break your silence." Some numerous institutions and citizens mobilized to say no to violence and say yes to peace. Trujillo, Peru.
4. **July 2019.** I participated in a popular science event to celebrate the 50^{th} anniversary of the arrival of man on the moon. Trujillo-Peru.
5. **October 2019.** SCAP Project fair and night of telescopes: we traveled to Huamachuco (a city in the highlands of Peru) to give science workshops to middle school students from the city.
6. **November 2019.** II Peruvian Space Week. Trujillo, Peru.
7. **March 2020.** I participated in an interview for the Asociación Trujillana de Astronomía (ATA) – Program: "Astrobiology and the search for life in the universe." Trujillo-Peru.

SELECTED UNDERGRADUATE COURSES

1. **Courses in Physics (17)**
   Physics I, Physics II, Statics, Dynamics, Thermodynamics I, Physics III, Fluid Dynamics, Potential Flow, Turbulent Flow, Viscous Flow, Compressible Flow, limiting Layer, Unsteady Flow, Heat And Mass Transfer, Aerodynamics I, Meteorology, and Physical Similarity.
2. **Courses in Mathematics (10)**
   Basic Mathematics I, Differential Calculus, Basic Mathematics II, Integral Calculus, Vector and tensor analysis, Statistics, Ordinary Differential Equations, Complex Variable, Partial Differential Equations, and Probabilities.
3. **Courses in numerical methods (4)**
   Programming Language, Informatics and Systems, Numerical Methods I and II.