

RECA: Mentoring, internship and educational programs as tools to overcome inequalities for Astronomy students in Colombia.

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Abstract

The Network of Colombian Astronomy Students (Red de Estudiantes Colombianos Astronomía, RECA – in Spanish) is a civil association that seeks to create and maintain strong links among Astronomy students in Colombia. One of the RECA's main goals is to build a strong collaborative community of early-career Astronomers and professional Astronomers to enhance the scientific development of the country. Since 2020, RECA has successfully implemented two programs targeting last year undergraduate and master students looking to take their next step in their professional career. These are the mentoring and summer internship programs. With these two programs together with an educational project for schools, RECA intends to foster in the students the essential capacities to carry out scientific research, contribute to their academic training and encourage vocations. An overview of these activities implemented by RECA is presented, as well as the preliminary impact of these activities.

1 Introduction

RECA¹ began in the framework of the III Colombian Congress of Astronomy and Astrophysics (Congreso Colombiano de Astronomía y Astrofísica, COCOA – in Spanish) held in 2012, from the need of physics and astronomy students to create spaces to generate extracurricular environments for dissemination, discussion, and interaction, with the purpose of creating an astrophysical community that would provide academic opportunities and social connections for students. The network is part of the Colombian astronomers community (Comunidad de astrónomos de Colombia, AstroCO² – in Spanish) since 2021, which is also a member of the Colombian Academy of Exact, Physical and Natural Sciences (Academia Colombiana de Ciencias Exactas, Físicas y Naturales, ACCEFYN – in Spanish). Nowadays, RECA is a civil association that seeks to create and strengthen the links between astronomy students in Colombia and Colombian professional astronomers; promoting spaces that allow the exchange of ideas and significant experiences among its members, where collaboration prevails for the realization of diverse academic projects generating a professional and social impact.

The network is currently composed of 171 members, of which 111 are from more than 18 Colombian institutions and 60 are from different institutions in 22 foreign countries, with a percentage of 38.60% women, 60.82% men, and 0.58% non-binary.

RECA's operational functionality is based on a horizontal structure composed of nodes defined on the main projects developed by the network: organizational, mentoring, internship, education, census, communications, and institutional relations nodes. RECA works to have a very welcoming environment, especially for early-career researchers.

2 Mentoring

The Mentoring program[1] was conceived in response to the barriers experienced by Colombian students in getting access to postgraduate studies, especially due to the lack of information and guidance during undergraduate studies. The primary goal is to connect early-career students with astronomers who have developed a professional career. This program is focused on providing information on the different options to continue their career, guiding students during the application process to postgraduate programs in astronomy, and/or advising them to succeed in their following professional steps.

2.1 First edition

The first edition of the RECA Mentoring program was held in the 2020-2021 academic year and involved 24 students from 13 Colombian institutions, and 24 Mentors from 22 institutions of which 18 were international. The program consisted of 1:1 virtual mentorships in which students received personal advice in the process of applying to postgraduate studies. In

¹<https://www.astroreca.org/>

²<https://accefyn.com/microsites/nodos/astroco/>

addition, weekly panels (8 in total) were carried out on CV preparation, exam preparation (e.g., the Graduate Record Examination, and the Test Of English as a Foreign Language), scholarships and funding opportunities, and time management, among other soft skills topics. All the panels are accessible to the community through the website and YouTube channel of RECA.

As a result of this first edition, 12 applications were made to international universities of which 10 were successful. However, not all students were able to finish the application process to universities or start their postgraduate studies due to financial hardship (need for scholarship) and the lack of research experience in astrophysics.

2.2 Second edition

The second edition of the RECA Mentoring program was carried out in 2021-2022 with a considerable increase in the number of applications to the program, from 24 in the past edition to 46 in this edition, from 14 universities in 7 different cities in Colombia. Meanwhile, the number of Mentors remained similar to the first edition, with 20 Mentors for this edition, from 18 institutions in 8 different countries.

Because of the increase in the number of students and the small decrease in the number of Mentors, an advisory mode was included for the first time in the program. This advisory mode consisted in 23 students who were not yet at the stage of applying for postgraduate studies but wanted to learn more about the process a couple of semesters in advance. These students had full advice from the RECA Mentoring node members and access to the panels but were not involved in the 1:1 mentoring. The remaining 23 students had a 1:1 mentoring. As part of the activities developed in this edition, there were the panels as in the first edition. This time, thanks to a grant of 5000€, from the Office of Astronomy for Development of the International Astronomical Union (IAU-OAD) in 2022 to improve the program, it was possible to recruit experts for the panels and improve the quality of the videos.

As feedback from this edition, the students expressed their satisfaction with the program and highlighted learning about writing motivational letters as well as helping to organize and prepare their applications to postgraduate studies.

2.3 Third edition

The third edition of the mentoring program started in September 2022 and follows the same scheme that the second version. In this case, 47 early-career students applied for advising and 20 later-career applied for 1:1 mentoring. The students are from 20 universities in 13 different cities in Colombia. For the first time, a decentralization of applications has been observed, with students coming from regions of the country where access to education is more challenging (e.g. applications from students coming from the Amazon region, a region that is considered difficult to access due to communication problems, limited education, and poor health). In addition, for the first time, 2 Colombian students from international institutions were allowed to participate.

Regarding the Mentors, for this edition, the program currently has 17 Mentors, from 17

institutions in 9 different countries. This third edition is still ongoing and is expected to finish before July 2023.

3 RECA Internship

Currently, there are many research internship programs around the world aimed at undergraduate students, but many of them are highly competitive and citizenship-limited. With the idea of enriching the curriculum of Colombian students to make them more competitive when applying to international programs, the RECA internship program was created to promote scientific research and create networks to establish collaborations. The summer internship consists of a 10-week training program in scientific research in Astronomy, aimed at students from Colombian institutions who are in their final years of undergraduate studies under the supervision of scientists inside and outside Colombia.

3.1 First edition

The first edition of the internship program took place in the summer of 2021. Over 60 applications were received from Colombian students in astronomy, physics, chemistry, and engineering, of which 13 were selected (6 men and 7 women). Besides, there were 13 selected research projects proposed by researchers from 10 different countries. The projects covered a variety of current topics in Astronomy and the results were presented at the 1st RECA Internship Symposium³, held virtually, and published in *Astrobitos*⁴.

The work was carried out over a period of 10 weeks in which each student worked one-to-one with each researcher and also had the opportunity to participate in remote observations using the Nordic Optical Telescope (NOT) and the Mercator Telescope, located at the Roque de los Muchachos Observatory, in Canary Islands (Spain).

Some of the research projects done during this internship have been published in high-impact journals in Astronomy, have been presented as undergraduate theses, and have been the beginning of collaborations between Colombian and foreign researchers.

3.2 Second edition

The second edition of the program was held in the summer of 2022. In particular, this edition was supported by funding from different organizations such as The LSST Corporation⁵, The Flatiron Institute, Platzi, and the IAU-OAD⁶. This funding was used entirely to pay research stipends to the students because, in the first edition, some students commented that it was financially difficult to balance work and internship. In this edition, there were more than 40 applications from students from 13 different Universities and 9 research projects proposed by

³<https://www.astroreca.org/internship-simposio-2021>

⁴Spanish version of *Astrobitos*: <https://astrobitos.org/>

⁵<https://www.lsstcorporation.org/node/270>

⁶<https://www.astro4dev.org/category/a-virtual-community-mentorship-program-for-development-in-colombia/>

Supervisors from 5 countries. On this occasion, 9 participants were selected (4 men and 5 women).

In addition to the research projects, the students had the opportunity to participate in different activities organized by the RECA Internship Committee such as a Python Bootcamp, lectures given by experts on current topics in astrophysics, and remote observations. This time the observations were performed with the VLT Telescope at the Paranal Observatory and the IAC80 Telescope at the Teide Observatory. As in the last edition, the results were presented at the 2nd RECA Internship Symposium⁷ and will be published in *Astrobitos*.

4 RECA Education

The RECA educational node was created in 2021 with the aim of bringing Astronomy to schools in all socio-economical contexts (rural and urban) around Colombia to promote links between professional Astronomers and schools and encourage scientific inquiry from an early age. Among the activities that the education node organizes with teachers in schools, RECA has the project “Astronomy goes to your School”. This consists of creating spaces for schools to have the opportunity to interview an Astronomer or attend a talk related to diverse topics of Astronomy and Women Scientists.

During 2021, 14 talks were given in different public and private schools in cities such as Bogota, Medellin, Cali, and Bucaramanga. The main problem we encountered was communication with teachers and the use of virtual platforms such as Zoom or Meet. In the case of 2022, 30 talks were held throughout different regions of Colombia, including 5 schools in rural areas. These talks were a great challenge for the RECA team and the teachers because there was no internet access in the schools, so the sections were recorded on weekends. Nevertheless, there was an overall 14% increase of talks finalized compared to 2021, and a 22% of talks given in schools from rural areas. However, there were still a number of issues and delays in the final encounter between the astronomer and the school because of the lack of connectivity.

Additionally, we have implemented the “Accompanying schools” program that is focused on school clubs. In the major cities of Colombia where the schools have more resources to implement programs outside the general curriculum, some teachers have initiated astronomy clubs. However, they often do not know how to access resources for workshops or activities and therefore the RECA Education Node offers help in this matter. For example, we have worked closely with the Abraham Maslow School in Bogota, which has an observatory with two 12” and 16” and a meteorological station. We have made motivational talks for students in primary and secondary school to make use of these resources at their school. Moreover, we have helped the teacher in charge of the astronomy curriculum in implementing ideas and resources in the classroom. Finally, the 2023 version is in preparation and we hope to reach more schools and cities in the country.

⁷<https://www.astroreca.org/internship-simposio-2022>

Acknowledgments

RECA acknowledges the support and funding from the IAU-OAD astronomy for development grant 2022, the LSST Corporation Enabling Science Award 2021-51, and the Simons Foundation. RECA also acknowledges the collaboration and partnership with ACCEFYN, Astroco, Platzi, ScienceLab, astrobotos, Alpha-Cen, SEA. RECA acknowledges the Mentors and Supervisors who have contributed with their work to make the RECA programs possible. RECA thanks to Instituto de Astrofísica de Canarias for allowing the use of the facilities of the Roque de los Muchachos Observatory and the Teide Observatory, as well as the European Southern Observatory for the use of the Very Large Telescope at the Paranal Observatory. N.O. acknowledges funding from the Ministry of Universities of Spain, the Recovery, Transformation and Resilience Plan (PRTR), and the UAM through the Grant CA3/RSUE/2021-00559 and the Grant PID2021-124050NB-C31 funded by MCIN/AEI/10.13039/501100011033 and by the European Union NextGenerationEU/PRTR. S.R.R. acknowledges financial support from the International Max Planck Research School for Astronomy and Cosmic Physics at the University of Heidelberg (IMPRS-HD). J.P.U.T. acknowledges support from the National Agency for Research and Development (ANID)/Scholarship Program/Doctorado Nacional/2021-21210732. The work of A.A.P.M. was supported by the U.S. Department of Energy under contract number DE-AC02-76SF00515.

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