

From the school to the space: outreach experience in Astronomy at IFCA.

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Abstract

For the last 5 years, the Instituto de Física de Cantabria (CSIC-UC) has developed a titanic effort in disseminating the Astronomy in spite of a scarce funding. The activities supported by a tenacious group of enthusiastic astronomers have been mainly focused (but not only) in the youngest students, visiting their schools or receiving them in the institute. The Athena mission outreach group, managed by the Athena Community Office, has also added its own resources to support the scholar activities to take advantage of the synergy when resources are limited.

1 Introduction

The Instituto de Física de Cantabria (IFCA) [1] is a small institute with a staff of about 80 people dedicated to different lines of research in Physics (Galaxies and AGNs, Cosmology and observational instrumentation, Particle Physics, Non-linear Physics, Advanced computing and Climate and data mining). Under the administrative tree, there is a Vice-directorate of Outreach, that in spite of the difficulty of assigning funds or human resources to its activities in a small centre like this one, it shows the commitment of the institute management to the science dissemination. With the help of the Sociedad Española de Astronomía (SEA)[2] and the other outreach unit at the institute (Athena Community Office (ACO)'s [3] outreach unit) and the sound compromise of the researchers, IFCA's dissemination activities have been numerous along the last 5 years, becoming a solid reference for the educational centers in the region.

2 Motivation

Among all the activities performed by the scientists during the development of their profession, unfortunately outreach is not one that could be considered as highly recognized or

appreciated by the evaluation panels. When done, it always takes part of the personal time of the researchers usually buried under loads of administrative tasks. It cannot be considered an easy job to do, since being able to explain latest scientific developments to a non-professional audience requires an extraordinary effort to talk about complex things with a simple language. And it does not make scientists rich, either! Then, why are there enthusiastic disseminators that still keep the commitment with science dissemination?

As Carl Sagan said “We live in a society absolutely dependent on science and technology and yet have cleverly arranged things so that almost no one understands science and technology. That’s a clear prescription for disaster”. We believe that is also our responsibility, not only to give society the latest developments but also to educate citizens in science to help them to make funded decisions in their everyday life. And, from our point of view, science dissemination at schools, from the very first years is the most powerful tool.

We consider that not only education in science is essential, but education in equality in science is fundamental. That is why the second pillar of our outreach activities is the compromise with the visualization of the female role in science to contribute to a more egalitarian and fair society. For this purpose it is vital to incorporate women to the scientific careers and to create the conditions for them to stay. From our positions we can at least highlight female scientists work and try to change stereotypes.

3 Activities

The objectives outlined in previous section have been shaped in four different outreach activities at IFCA during the term 2017-2018:

- *Expanding Science: researchers at schools*: bring science closer to children and teenagers in their own environment
- *Visits to IFCA*: introduce scientist’ activities in their work places
- *European Researcher Night*: bring science to the streets to involve local society
- *11 February*: highlight female scientists role and change stereotypes

3.1 Expanding science: researchers at schools

With the financial help of the SEA to cover the travel expenses of the staff, schools along the region receive astronomers in their classes, having the opportunity to listen to a talk about a selected subject in Astronomy (Solar System, Exoplanets, Scales of the Universe, Life in the Universe, Black Holes, Big Bang, Dark matter) and after that to chat with them and raise their questions. The audiences are scholars from Preschool to Secondary levels (3 to 17 years old). In addition to the talks about Astronomy, scientists make with them different types of workshops according to their ages, being the Virtual Reality views one of the most successful.

According to the school teachers these are very motivating experiences in class and students are willing to dedicate research time to the Astronomy subject before and after



Figure 1: S. Martínez-Núñez (left) and X. Barcons (right) giving talks at primary and secondary schools in Cantabria.



Figure 2: M.T. Ceballos in school workshops with VR glasses.

the astronomer's visit. Very frequently the groups reflect the activity in their webs, blogs or periodic paper publications. Last term, this activity reached more than 80 talks in 35 different scholar centers and more than 2000 students.

3.2 Visits to IFCA

For the first time in the scholar term 2017-2018 and as a pilot experience, IFCA opened its doors during the whole term (one visit per month) to the secondary classes willing to know how scientific work is done in a research center. They had the opportunity to be in contact with different research groups and visit the IFCA facilities, where special emphasis is put on the multidisciplinary scientific collaboration.

They are also offered different workshops that include a demonstration of the space curvature in a gravitational table, kahoot[4] games for smartphones or VR movies with VR glasses.

3.3 European Researchers Night

Every year IFCA joins the European Researcher's Night (ERN)[5] to bring science to the streets of Santander and get a close contact with the local general public. The astronomy group is always very active and organizes several activities related to Solar System, Cosmology (cosmic microwave background and gravity) and X-ray astronomy, this last one led by the outreach group of the Athena Community Office. This group is dedicated to the dissemination of the Athena [3] project and its news and activities not only among the scientific community but also for the general public. They are also members of IFCA, since the ACO is based at the institute and they actively participate in all the outreach events. Many activities are focused on the children (like the multiwavelength drawings of emblematic astronomical objects) or the photo-call with the satellite but there are also opportunities for the adult people which can have a look to the X-ray sky in 360 deg or with the VR glasses.



Figure 3: Summary of activities organized by the ACO for the ERN2017.

3.4 International Day of Women and Girls in Science

Another initiative in which IFCA is involved every year is the celebration of the *International Day of Women and Girls in Science*[6], declared by the UN “in order to achieve full and equal access to and participation in science for women and girls, and further achieve gender equality and the empowerment of women and girls”. Considering this endeavor fundamental in the every day life of our institute, the staff took part in 2017 in four different activities:

- talks in educational centers to highlight science (past and present) done by female scientists
- outreach videos: IFCA female staff participated in a collaboration with Javier Santaolalla (“Date un Vlog”) to produce a video[7] about pulsars and in the elaboration of another one about two of the scientific projects in the institute where these female scientist participate (CMS[8] and Athena[9]).
- female scientists mosaic: in a joint effort and both for the Athena project and SEA, we created two mosaics with the face photos of female scientists in each community. In addition, the Athena outreach group elaborated a video-clip with Athena community female scientists sharing motivating sentences about science [10].
- Science for Her: some of the female scientists at IFCA participated in a mentorship initiative to foster scientific vocation in young girls by sharing with them part of their workday[11].

4 Conclusions

It is indisputable that giving back to society its inversion in Science is a duty of the scientists. However the evaluation panels that judge the scientists performance in their careers do not assign a great value to this dedication, leaving the outreach work to the will of the researchers. All the activities presented here have been done with the dedicated effort of a group of selfless people that truly believe in the importance of outreach, with a little funding and a great commitment. A lot can be done under these conditions, but in spite of being a rewarding experience it is clear that public outreach in science has to be organizationally supported with adequate material and human resources to fulfill its mission of educating society in science.

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References

- [1] IFCA website
- [2] SEA website
- [3] Athena website
- [4] Kahoot
- [5] ERN website
- [6] 11 February website
- [7] Qué son las estrellas de neutrones (Date un Vlog)
- [8] Mujeres IFCA-CMS
- [9] Mujeres IFCA-Athena
- [10] 11 February - ACO clips
- [11] Stem Talent Girl