

## Ciencia en Acción: a platform for Astronomy

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### Abstract

“Ciencia en Acción” (CEA) was born in 2000. It was in response to an initiative by CERN, ESA and ESO in order to promote the study of science in Europe. It was not until 2002 when the CEA organization proposed “Adopta una Estrella ” as a new set of procedures aimed at students of primary and secondary schools with the objective of promoting scientific vocations, in which the speciality of the central axis was astronomy. Students nominate a star or astronomical phenomenon and take on “ownership” and carry out a research about some interesting aspects concerning the chosen topic. For 14 years “Adopta una Estrella” has involved teachers and students from over 15 Spanish or Portuguese speaking countries, and now is one of the most dynamic international forums in order to exchange knowledge among peers in informal education. The selected projects from Spain and Portugal receive travel assistance to attend a final contest, but authors from American participate by means of an online connection. This kind of virtual communication is usually welcomed with enthusiasm by all attendees and is noted for being very exciting.

“Adopta una Estrella ” has been coordinated since its beginning alongside “Catch a Star ”, organized by the EAEE (European Association for Astronomy Education) in collaboration with ESO. The work of our students has achieved many distinctions within this European contest. Up to 2015, 42 awards have been obtained for specific projects as well as for schools or groups of students. “Adopta una Estrella ” has also the network support offered by the NASE (program of the International Astronomical Union IAU) which involves teachers in more than twenty countries in which it is implemented.

## 1 Ciencia en Acción Program

“Ciencia en Acción ” is one of the most important events devoted to the dissemination of science in Spain. It is an international competition for Spanish and Portuguese speaking countries. “Ciencia en Acción ” is a program initiated in the year 2000 and is organized by the Spanish National Research Council (CSIC), the Institute of Mathematical Sciences (ICMAT), the Royal Spanish Society of Physics, the Royal Spanish Society of Chemistry (RSEQ), the Spanish Society of Biochemistry and Molecular Biology (SEBBM), the Geological Society of Spain (SGE) and the National Distance Education University (UNED) and with the support



Figure 1: Winners Research in Astronomy

of other public and private institutions such as the Ministry of Economy and Competitiveness (MINECO) and the Spanish Foundation for Science and Technology (FECYT). Its aim is to promote the social communication of Science, educational innovation in scientific areas and the popularization of science and technology throughout our society.

The science teaching festival “Ciencia en Acción ” was organized in 2016 in Algeciras, Cadiz. About 1000 participants integrated in 160 projects from Spain, Portugal, Argentina, Colombia, Germany, Mexico, Morocco and Peru presented enthralling projects and scientific demonstrations and astronomy

This program offers a platform of dissemination and scientific formation in the society of the Spanish and Portuguese speaking countries, by means of a contest opened to the professionals of media and centres of social communication, teachers from all educational stages, university included, as well as students, children and young people of all ages.

The aims of the program are:

- Finding innovative ideas that make science more attractive for citizens.
- Underlining the international character of science.
- Contributing to extend contacts in science and in communicative matters in the European and Latin-American framework.
- Making pedagogical materials of high quality (texts, images, videos, etc.) that can be used to complement the curricular contents for the diverse educational levels.



Figure 2: *Adopta una Estrella* participants

- Promoting interest in science in an active way for educators so that it reaches students in the classrooms.
- Involving investigators in activities of scientific dissemination.
- Increasing citizens' level of scientific awareness.
- Showing the importance of science for the progress of society and peoples welfare.

The contest is structured in several categories. In all of them, it is necessary to be registered on the Internet page (<http://www.cienciaenaccion.org>) and to send the corresponding documentation. In the evaluation of the projects, the following criteria are taken into account: interest, usefulness, originality, and the quality of the presentation. The work must offer an attractive vision of science, to facilitate understanding on the part of students and non-specialized public, and have to offer possibilities of wide diffusion. Due to the importance of the event, the budget is very high, because all the teachers who come to these events receive a travel scholarship to travel from their places of origin. In addition, it is necessary to attend to the pupils who come to the competition with their teachers, to whom it is necessary to provide living expenses for the period that the competition lasts.

The awards of “Ciencia en Acción ”are currently distributed in different categories depending on the type of the project which is presented:

1. Demonstrations of Physics
2. Laboratory of Mathematics
3. Demonstrations of Chemistry
4. Laboratory of Biology
5. Laboratory of Geology
6. Science and Technology
7. Sustainability
8. Science, Engineering and Values
9. Physics in our society
10. Biomedicine and health
11. Performances
12. Instructional materials of Sciences : Interactive
13. Instructional materials of Sciences : Not interactive
14. Works of Scientific dissemination: Scientific method and Critical Thinking
15. Works of Scientific dissemination: Mass media
16. Scientific short films
17. Adopt a Star: Research in Astronomy
18. Adopt a Star: Research in Astrophysics
19. Adopt a Star: Speaking about Astronomy and Astrophysics

The years, in which international competitions of dissemination of Science, such as Science on Stage, European contest organized by EIRO forum, are organised, the projects that will represent Spain are selected from the winners of Ciencia en Acción. The number of submitted projects increases every year and also the average quality of the works. Moreover, it increases the quantity of participants coming from Latin-American countries: Argentina, Mexico, Chile, Uruguay, El Salvador, Colombia, Brazil, Peru and Venezuela, including major participation from Portugal.

Science on Stage Europe provides a European platform for science teachers to exchange teaching concepts and to share ideas. The ultimate goal is to improve science teaching by

encouraging creativity in science teachers. Through this we will stimulate more schoolchildren to consider a career in science or engineering by spreading good teaching concepts among Europe's science teachers.

**CIENCIA EN Acción: number of participants**

YEAR	PLACE	SUBMITTED	FINALIST
2000	San Sebastian	70	37
2001	Valencia	67	31
2002	La Corunya	64	37
2003	Terrassa	90	53
2004	Granada	135	57
2005	Tenerife	101	52
2006	Madrid	173	81
2007	Zaragoza	199	101
2008	Valladolid	181	81
2009	Granada	309	141
2010	Santiago de Compostela	377	112
2011	Lleida	295	148
2012	Madrid	286	115
2013	Bilbao	308	111
2014	Barcelona	383	145
2015	Viladecans	382	86
2016	Algeciras	440	159

Since its launch in 2000, Science on Stage has reached about 100,000 teachers and teacher trainers in 24 European countries and Canada. A network of National Steering Committees in these countries provides the interface to their national science teaching communities.

Science on Stage Europe is the umbrella organisation that supports the 25 member countries with the realisation of their activities and helps with coordination of the Science on Stage festivals. The broadening of the network, the acquisition of new members and various administrative tasks carried out by the Science on Stage Europe office in Berlin. "Ciencia en Acción" is Science on Stage-Spain and it is organised every year rather than biannually

"Ciencia en Acción" is not only a competition; really it is a program which includes a list of different activities:

- Courses for teachers. Every year several courses for primary school teachers and coordinated along with the education department in the corresponding region of Spain to encourage teachers to participate in the area.
- Production of printed materials and videos. In addition every year, activity sheets including science experiments are generated and these are published on the web. There is currently a collection of over 400 experiments and 200 videos that can be selected with a search engine, selected by subject and keywords.

- Network of teachers for fairs. There is a network of showmen formed by teachers who offer their services in scientific festivals, fairs experiments and cultural events which aims to disseminate science and encourage and attract youth towards issues of scientific and technological content as an interesting professional option.

All information of “Ciencia en Acción ”is on its website ([www.cienciaenAcción.org](http://www.cienciaenAcción.org)) or ordered directly by email [ciAcción@ma4.upc.edu](mailto:ciAcción@ma4.upc.edu)

## 2 International Carrer

- 2000 Physics on Stage 1 CERN Geneva - Switzerland
- 2001 Live en el Universo CERN Geneva - Switzerland
- 2002 Physics on Stage 2 ESA / ESTEC Noordwijk - The Netherlands
- 2002 Catch a Star 1 ESO Garching - Germany
- 2003 Physics on Stage 3 ESA-ESTEC Noordwijk - The Netherlands
- 2003 Catch a Star 2 ESO Garching - Germany
- 2004 Venus Transit ESO-EAAE Paris - France
- 2005 Catch a Star 3 ESO Garching - Germany
- 2005 Science on Stage CERN Geneva - Switzerland
- 2007 Catch a Star 4 ESO Garching - Germany
- 2007 Science on Stage 2 ESRF Grenoble - France
- 2008 Catch a Star 5 ESO Garching - Germany
- 2008 Science on Stage Deutschland, Berlin - Germany
- 2009 13th Science Picnic, Warsaw -Poland
- 2010 14th Science Picnic, Warsaw -Poland
- 2011 Science on Stage 3, Copenhagen - Denmark
- 2011 Catch a Star 6 ESO Garching - Germany
- 2012 16th Science Picnic, Warsaw-Poland
- 2012 Science on Stage Belgium, Wavre, Belgium
- 2013 Science on Stage 4, Frankfurt-Slublice, Germany-Poland

- 2013 Catch a Star 7 ESO Garching - Germany
- 2014 18th Science Picnic, Warsaw -Poland
- 2014 Science on Stage France, Le Creusot, France
- 2014 Science on Stage Belgium, Brussels, Belgium
- 2015 Catch a Star 5 ESO Garching - Germany
- 2015 Science on Stage 5, London, United Kingdom
- 2016 20th Science Picnic, Warsaw -Poland
- 2017 Science on Stage 6, Debrecen, Hungary

### 3 National Carrer

- 2000 Marimon Kutxaespacio de la Ciencia, San Sebastian
- 2001 Museo Principe Felipe de la Ciudad de Artes y Ciencias, Valencia
- 2002 Casa de la Ciencia, La Corunya
- 2003 Museo de la Ciencia y la Tecnica de Catalunya, Terrassa
- 2004 Parque de las Ciencias, Granada
- 2005 Museo de la Ciencia y del Cosmos, La Laguna
- 2006 Cosmocaixa, Madrid
- 2007 Plaza del Pilar (Fundacion Ciudad del Conocimiento), Zaragoza
- 2008 Museo de la Ciencia, Valladolid
- 2009 Parque de las Ciencias, Granada.
- 2010 IES Rosala de Castro (Tecnopole), Santiago de Compostela
- 2011 Parque Cientfico y Tecnologico Agroalimentario, Lleida
- 2012 Cosmocaixa, Madrid
- 2013 Bizkaia Aretoa (Fundacion Penascal), Bilbao
- 2014 CosmoCaixa, Barcelona
- 2015 Cubic, Viladecans
- 2016 Escuela Politecnica Superior, Algeciras
- 2017 Izarra Centre. Ermua - Eibar

## 4 Adopta una estrella

The main objective of “Ciencia en Acción” is to bring science and technology, in its various aspects, to the general public, as well as to find innovative ideas that make science more attractive for citizens and to show the importance of science for progress of society and the welfare of citizens. For participants the most significant aspect is the possibility of exchanging information and contents between them. The most motivating aspect in this meeting is the possibility of teaching and learning by all and for all.

Under the umbrella of “Adopta una Estrella” there are several categories. In Research in Astronomy and Research in Astrophysics the participants’ teams (three students and a teacher) must choose a celestial object and find extensive information about it such as inspectors investigating the chosen topic. The prize is a visit to a research centre or observatory depending on the contents of the project developed. The centres or observatories visited are under the coordination of the Spanish National Research Council (CSIC) and the Spanish Society of Astronomy (SEA) which are respectively the two mentors from each of the two categories mentioned.

In the category Speaking of Astronomy and Astrophysics the teams must submit a summary of all activities to spread the work about astronomy throughout the school year. The participants’ team can be a group coordinated by a teacher (this could be a whole class or a small group of students) and the first prize consists of a telescope from IMVO Company.

No doubt the main objective of “Adopta una Estrella ” is to arouse interest in science among students. All of us have experience in teaching astronomy knowing that this science has and manages to awaken a great interest in society and that young people cannot escape this attraction. The other sciences need to be promoted and motivation has to be generated, but in astronomy interest and motivation are already insured before starting. It is for this reason that it serves as a touchstone or catapult and launches other scientific contents that are usually not received as well as Astronomy is. This is the reason we must continue with “Adopta una Estrella ”.