

An ear turned to “The Cosmos”: 50 projects to discover the universe

Carmen del Puerto

Museo de la Ciencia y el Cosmos,
Vía Láctea, s/n, 38200 Santa Cruz, La Laguna, Tenerife, Spain
email: cpv@iac.es

Abstract. In 1609, as Galileo pointed the sky with a telescope, he observed Jupiter’s satellites and changed our vision of the universe. Four hundred years later, we celebrate this event all over the world, and also in the Canaries. 2009, the International Year of Astronomy, is a very special year for the Science and Cosmos Museum (Museo de la Ciencia y el Cosmos). This was the first museum in Spain supported by a public entity, The Local Government of Tenerife (Cabildo de Tenerife), through its Autonomous Council of Museums (Organismo Autónomo de Museos y Centros), and a research centre, the Instituto de Astrofísica de Canarias. Fifteen years later, this museum, which receives 50,000 visitors a year, celebrates the International Year of Astronomy with fifty projects described in this paper.

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1. Introduction

The astronomical focus that characterises this museum –without forgetting other sciences that it also covers– starts with the museum’s creation in 1993 and begins with its name, “*Science and Cosmos Museum*”. The museum’s logo is inspired on the coordinates of the *Tenerife Mountains* on the surface of the Moon, which are also painted on the museum’s radio-telescope dish that has a diameter of 18m. The aerial is placed on the museum’s Plaza (square) and it’s the best identifying icon of the museum, due to its visual impact from a long distance. The *Tenerife Mountains* were so called in memory of Piazzi Smyth, the first astronomer who observed the universe from the mountaintops of Tenerife, in 1856, proving the astronomical advantages of high mountains to watch the sky. The Museum pays a deserved tribute to him and to other pioneers of astronomy in the Canaries during the IYA 2009.

The *Science and Cosmos Museum*, under the supervision of Ignacio García de la Rosa from the IAC, was opened on May 11, 1993 by the Russian astronaut Sergei Krikalev after his stay of more than 300 days on the Mir space station. Later, the Museum received a visit from S.A.R. the Prince of Asturias, who many times has expressed his interest for Astronomy. The building that accommodates the *Science and Cosmos Museum* was given a cosmic sense. It is situated close to the Headquarters of the IAC in La Laguna. With the support of the Town Hall of La Laguna, the museum could count in a close future with “astronomical” entry ways and a playpen with the physical principle of swings. Its terrace, equipped as an astronomical observatory, has the above-mentioned radio-telescope dish, a small telescope of 28 cm which is inside a dome of 3 m, and a sundial. In the past there was also an astronomical cromlech.



Figure 1. 2009 Año del Cosmos.

2. Main activities

Over 80% of the interactive activities offered by the *Science and Cosmos Museum* are related to astronomy. Its permanent “homemade” exhibition, which we are substantially renovating, and also making adjustments for the handicapped, includes modules that

invite one to go on a cosmic safari, learn about the Earth's rotation and translatory movements, Sun spots and magnetic areas of the Sun, and orbits within proximity of a black hole. We can also take a cosmic tour around the Solar System and visit a frozen comet, one of Jupiter's hot moons, experience seismic movements and volcanic eruptions, and visit Mars with its tornadoes. The Museum also has its own Astronomy exhibition room, with models of the Great Canarian Telescope (Gran Telescopio CANARIAS), and the observatories on Mount Teide and Roque de Los Muchachos. To understand the "astronomers' nightmare", there is a module that explains the negative effects of atmospheric turbulences that appear on images obtained with telescopes, and another warns against light contamination, which overrides the starlight. Fortunately, the 1998 "Sky's Law" (*La Ley del Cielo*) protects the Canaries Observatories from this potential problem; this is also explained in the Museum. There is also a module that shows the differences between observation with visible light and observation with an infra-red vision light, which always brings a smile from a visitor when it comes to looking at the human body.

3. Cosmic talks

At the Science and Cosmos Museum, we are conscious that, apart from using interactive experiments to bring people closer to all of sciences areas, it is also important to divulge important scientific advances, and investigations through maintaining a permanent communication with society. This is the aim of our talks, which, in 2009 are especially 'cosmic'. We also organise courses, which will include more astronomy themes; be it cinema, like the second course of Cinema and Science in The Museum, which, accompanied with an exhibition, will have the title "ASTRONOMIA, se rueda." (Astronomy-based movies), or astronomy in Egypt, courses for children and journalists and courses about Scientific language and the jargon of the stars. We give form to our compromise with *The Children of the Cosmos* (children born in 1993, like the Museum), who came to the Museum's fifteenth birthday. We would like them to always feel attached to the Museum.

In our Museum we also celebrated the first international congress about Astronomy Communication, in 2002. Today, in virtue of a collaboration contract with the Astrophysics Master Course of the University of La Laguna, and IAC (Astrophysics Institute of the Canaries), students from the course: *Communication of Scientific Results and Astronomy Didactics* do their practical training at the Museum.

Regular astronomical activities in this Museum include daily Planetarium sessions, astronomical camping nights, and birthday and holiday activities with the stars. With its *Cosmoneta*, a vehicle equipped with scientific experiments, and its portable planetarium, the Museum amplifies its radius of activity, being capable of realizing activities outside of its installations, even outside of the Canary Isles. In the scientific forum *AluCINE con el futuro* on Sundays, a high percentage of the films that are commented are related with space and astronomy.

Being the *Year of the Cosmos*, 2009 is the year of this Museum. We celebrated it with fifty projects that, in collaboration with the IAC, are added to the astronomical offer mentioned above. Of these projects, two stand out, and were selected as *emblematic projects* of national impact within IYA2009, and for which more details are found below.

This *star year* started early in Tenerife, may be because everything happens one hour early in the Canaries. The first initiative of the Museum was the spectacular *controlled falling* of a meteor (NITCE 08), in the early hours of 28th December, *day of the Innocent Saints* (Spanish April Fools Day), in the Plaza *Agustin de Betancourt*, which belongs to the Museum. As Director of the Museum, I was worried that our Plaza, recently reno-

vated, could suffer damage from the impact of the Meteor, which measures one meter in diameter, and if real, could cause a crater fifty meters wide. Fortunately, that didn't happen. A fictional *Canarian Space Agency* solved the "possible damage problem", by preparing a machine, the Anticollision I, which, by defying Earth's gravity, minimised the collision, avoiding any collateral damage. This science-fiction game, presented by a well known journalist who is very fond of astronomy, was accompanied by light effects, video, sound and a theatrical representation. We also used previously taped interviews and direct interviews. To be able to do all of this, we counted on advice from meteor specialists, astrophysicists, scientific journalists, employees from the Science and Cosmos Museum, and the OAMC (Canary Organization of Museums). The act finished with a party underneath the Orion Constellation. It was a fun, science-orientated way of welcoming the year 2009, thanks to collaboration from the IAC and The Canarian Agency of Investigation, Innovation and Society of Information (ACIISI) of the Canarian Government.

The Meteor project then inspired the *METErorITOS* exhibition. Meteors are not as dangerous as they are said to be, but they could destroy Earth (not the meteor that belongs to the Museums collection, a small one found in Sahara). This exhibition, of which an informative pamphlet was edited, is now travelling through different places on the island.

Other exhibitions have replaced the meteor exhibition in the Museum, or are waiting to do so, such as astro-photographic exhibitions like *Tenerife, a Balcony to the Universe*, or *The Universe, yours to discover*, *Teides Memories*, *Sundials of the Canary Islands*, or artistic exhibitions such as, *The Cosmos Flowers*, or *Cosmic Poetry*.

The interdisciplinarity in 2009 has been seen reflected in some literary or musical pieces, like concerts such as, *Bach to the Universe*, with the violinist Ara Milikian, accompanied with astronomical images, or the reading of *Canto C3smico* by the poet Ernesto Cardenal, among others. All these are financed by the Septenio programme, from the Canarian Government. We are projecting, under the name of *URANIA: In a place at the Universe*, a better interaction with literature, so that it includes more astronomical contents and references.

4. Children's planetarium

A very disastrous spaceship is moving through space to the rhythm of a song received from a blue planet in one of the spiral arms of our Galaxy. Observing with their sophisticated telescope the origin of the signal, are Jors and Jars, the crew members of this spacecraft and the major figures of our story. This is the summary of the children's planetarium programme in digital format entrusted to the Science and Cosmos museum by the museums and planetariums of Spain for its exhibition and simultaneous premiere in most of them. A new planetarium show using techniques from a children's programme called *Meteor, a rock from space*, also developed by the technicians of the Museums planetarium, with the financing of the Spanish Science and Technology Foundation (Fundaci3n Espa1ola de Ciencia y Tecnolog3a, FECYT). This programme, which was born from the one in preparation for the premiere called *Jors, Jars, Jurs y los Galigalitos*, was the first to include the use of traditional dolls so that, through a production process, they can be incorporated in the planetariums dome and can interact with the children. This audiovisual language to communicate science to the kids has a huge welcoming from the museums, other enterprises of this sector, and the community of educators.

The new children's planetarium programme, financed by the Septenio programma of the Canaries Government, is dedicated to the sky in relation with the ephemerides international event, and together with the FECYT, is one of the eleven emblematic projects

of national impact that we have mentioned. Another is *Astronomy in comic strips*, a collaboration with well-known graphic cartoon artists, showing this part of science in huge astronomical frames situated in public areas.

An interesting project is one called *From Orchilla to Finisterre (De Orchilla a Finisterre)*, which recreates the Experiment of Eratosthenes to measure the radius and the circumference of the earth through the shadow of a stick at distant points of latitude and with easy trigonometry calculates, as a wise Greek did in the 3rd century BCE between Alexandria and Aswan in Egypt. The Science and Cosmos Museum has performed it for several years, and this time in a special way on May 27, in collaboration with the museums of La Coruña and the financing of FECYT, using as reference two historical points of our geography: Finisterre, the end of the known world, and Orchilla on the island El Hierro, the lighthouse which is the occidental point of Spain and the reference (zero) Meridian of the ancient world.

5. Galaxies and flashes

The radio is a suitable tool for the divulgation of science and hasn't been employed well enough, and less in the Canaries. The science museums could do something with this tool and this is how the project: *Galaxies and flashes (Galaxias y centellas)* emerged, a weekly radio programme which, despite the fact that it doesn't only include astronomical topics, it will offer subjects related to astronomy. The first step to begin this project was to ask the Canary Agency of Investigation, Innovation, and Society of Information (Agencia Canaria de Investigación, Innovación y Sociedad de Información), who considered it a good proposal, and also count with the collaboration of the Canaries Autonomous Radio (Canarias Radio la Autónoma) whose director was enthusiastic with this idea. The initiative of the Science and Cosmos Museum was joined by the Elder Museum of Science and Technology from Las Palmas. A professional team with experience about radio and science outreach made possible the première on January 13, 2009, at the beginning of the International Year of Astronomy.

Soon we will count with our own newspaper for science divulgation: *The Lightning Conductor (El Pararrayos)*, the newspaper of the Science and Cosmos Museum, in which this year astronomical topics prevail. At this moment it exists only in videoworld format.

The Science and Cosmos Museum, preoccupied with gender discrimination and conscious that theatre plays can be a valid tool for science divulgation, has created, in honour of women's role in astronomy, a multimedia theatre play for museums and planetariums, called *The Lost Honour of Henrietta Leavitt*.

The Museum's offer for 2009 is completed with the celebration of a Carnival party, with astronomical fancy dress outfits, and a series of merchandising products, such as a calendar, a memory game (object from a humanitarian project, in favour of infancy), bookmarks (each with astronomical themes), the year of the cosmos T-shirts and printed editions of the children's story *Meteorito*. We also impart summer workshops under the theme *Open for Holidays in the Year of The Cosmos, Workshops for Cosmitos*, in *The Science Club* (for younger children), and *The Young Scientists Club* (for school age children).

2009 is a year of ephemerides, and we shouldn't just give tribute to Galileo. We must not forget Kepler, who published, four hundred years ago, his key book, and Darwin, who was born two hundred years ago. His well known book, *The Origin of Species*, invites us to think about biological evolution and compare the evolution of humanity with the evolution of the Universe. We must not forget that 40 years have passed since man set

foot on the Moon. It will be the Museums job to work on, and explain all the subjects mentioned above.

The Museum will also follow up on all astronomical events that will visit us this year (The Lulin Comet, eclipses, star showers, etc) by preparing public observation campaigns with help from astronomers, a collaboration that the Museum is always grateful for. We will also, as will the rest of the world, observe the Galilean Moons that circle Jupiter.

The Plaza belonging to the *Science and Cosmos Museum* has been recently renamed with the name of the illustrious universal engineer Agustín de Betancourt, in honour of the 250th anniversary of his birth in Puerto de la Cruz. The tribute to this engineer also has an astronomical slant, as an asteroid is named after him, and will be observed and followed with professional telescopes. Its name is *11446 Betankur* was discovered on October 9, 1978, by L.V. Zhuravleva, in the Astrophysics Observatory of Crimea, who wished to honour the Canarian that was well known in St. Petersburg.

As stated in the declaration statement of the General Assembly of United Nations, emphasising aims such as global cooperation for pacific intentions, like the search for our cosmic origins and our common heritage, astronomers have worked together for various millenniums, passing through numerous frontiers, such as; geographical, gender, age, cultural, and racial. From this, we conclude that astronomy is the best example of how science can contribute to international cooperation. The sky, even though it is divided by constellations, knows no frontiers.

Enjoy all this at the *Science and Cosmos Museum* when you come next to Tenerife !