

# The Sky in your Hands



*The planetarium show user's guide*



**IYA 2009**

**“THE SKY IN YOUR HANDS”  
Planetarium show user’s guide**

**ASTRONOMICAL ACTIVITIES  
FOR PEOPLE WITH SPECIAL  
NEEDS WORKING GROUP**

**ORIGINAL TITLE:** *MANUAL DE USO PLANETARIO “El Cielo en tus Manos”*

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**COVER PICTURE:** CACSA



February 2011



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## 1 INTRODUCTION: *THE AIA-IYA2009*

On October 27th 2006 the International Astronomical Union (IAU) announced the decision by UNESCO to declare 2009 as the International Year of Astronomy (IYA2009). This resolution was ratified later by the UN on December 19th 2007. The reason for this celebration was to commemorate the first time that Galileo had pointed a telescope to the sky.

The International Year of Astronomy has been a global celebration of Astronomy and its contributions to society, culture and human development. Its main goal was to inspire citizens worldwide to think about their place in the Universe through a way of discoveries. Activities of different kinds were held worldwide to increase interest about Astronomy in particular, and Science in general-- from its influence in everyday life to how scientific knowledge helps in building a more free, equalitarian, better world.

The IYA activities were carried out at three different levels: local, regional and international. At the international level they were coordinated by the international IYA Secretariat, with national nodes in more than 100 participant countries.

The IYA 2009 offered a unique opportunity to communicate the thrill of discovery to the general public, as well as the joy of sharing the knowledge about the Universe, in order to appreciate our place in it and the relevance of the scientific culture.

Therefore, some of the main IYA 2009 goals were to increase the scientific



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knowledge of society, to promote the universal knowledge about basic science, to support the growth of astronomical communities in developing countries, to support and improve the teaching of science, to show a modern image of science and scientists, to foster new networks joining amateur astronomers, scientists and communication professionals, to improve the gender parity in the scientific community and to support the conservation and protection of the dark skies natural and cultural heritage.

Especially during the celebration of the IYA 2009, we wanted to make Astronomy available to all kinds of public, including those with special needs. Therefore, the Spanish IYA2009 National Node created the National Project “Astronomical Activities for People with Special Needs”. The National Project ‘s working group was composed of :

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Mariana Lanzara	Astronomical Observatory - University of Valencia (Spain)
Silvia Martínez Núñez	University of Alicante (Spain)
Pere Blay Serrano	University of Valencia (Spain)
José Carlos Guirado Puerta	University of Valencia (Spain)
Sara Gil Casanova	Astronomical Observatory - University of Valencia (Spain)

The planetarium show for blind people “El Cielo en tus Manos (The Sky in Your Hands)” was one of the projects that were carried out. Based on similar activities carried out by Sebastián Musso (“Cartografía Celeste Auditiva”) and Buenos Aires’ Planetarium (“*Planetario para Ciegos: el Cielo para todos*”), both in Argentina, we tried to bring Astronomy’s beauty to a visually-impaired public. In particular, the planetarium show “The Sky in Your Hands” has been developed by Mariana Lanzara and José Carlos Guirado Puerta, under the coordination of Amelia Ortiz-Gil. The Hemisfèric

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planetarium and the Spanish national organization for the blind (ONCE) collaborated in the implementation and evaluation of the show.

The project has been partially funded by the Spanish Foundation of Science and Technology (FECyT) and the University of Valencia.

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## 2. THE PLANETARIUM SHOW "THE SKY IN YOUR HANDS"

The planetarium show "The Sky in your Hands" is a show designed for people with visual impairments. It makes use of sounds with the support of tactile elements, which can be easily adapted to different types of planetariums.

The goal of this project is to create an image of the Universe for the visually impaired and blind public as close as possible to the real world. It also seeks to foster other skills related to the understanding of science and to pursue equality through a shared knowledge of the world.

The planetarium show is 25 to 30 minutes long and it has three differentiated elements: a visual projection, a special soundtrack and a tactile support. The first is simply a star field projection that can be static or dynamic, according to the type of planetarium used. The second one consists of a soundtrack with sound effects and a narration explaining a few selected Astronomy facts related to the projected images. As a complement, each person in the public holds a tactile semi-sphere. With it, members of the audience are able not only to follow the story in a personal and effective way, but also to reinforce their perception of the concepts introduced in the activity.

### 2.1 The script of the show



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The script of the show has been specifically adapted to the characteristics of the sound system of the auditorium (the Hemisfèric at the Arts and Sciences City of Valencia), carefully taking into account the loudspeakers location. In this show, the audience makes a trip through different constellations, their legends and special sky objects while they are projected on the dome.

The script is narrated by two different speakers. The first tells the astronomical storyline, which is about a trip to different constellations. The second one points out specific directions to enable the blind person to use the tactile semi-sphere correctly. This second narration was intended to be listened through headphones only (PSE, following the Hemisfèric acronym), so that it is distinguished clearly from the main narration, which is heard from the theatre loudspeakers.

When the show starts, the narrator offers some brief instructions to the public on the use of the tactile half-sphere, such as where is the starting position and the meaning of the different elements on it. However, sometimes it is advisable to include a slower, previous live introduction showing the use of the half-sphere, in order to answer the questions that could arise from the public about it.

After these brief indications the astronomical show begins. By way of introduction, the narrator invites the spectator to contemplate the night sky. Then, some constellations toward the south on the winter sky of the Earth’s northern hemisphere (Orion, Taurus and the Pleiades) are projected and their history and singular elements briefly explained. Following the Pleiades a brief intermission begins, which is necessary to allow the projected sky to rotate in azimuth to point towards the north and to begin with the next sequence of constellations (the users of the half-spheres also need this time to rotate them to a new position). Now the show takes the audience to some constellations of the sky toward the north: the Little Bear and the Great Bear, Leo and Gemini. During the whole trip, the PSE always guides the public through the half-sphere, helping them to identify the objects that are explained by the main narrator.

## **2.2 The soundtrack**

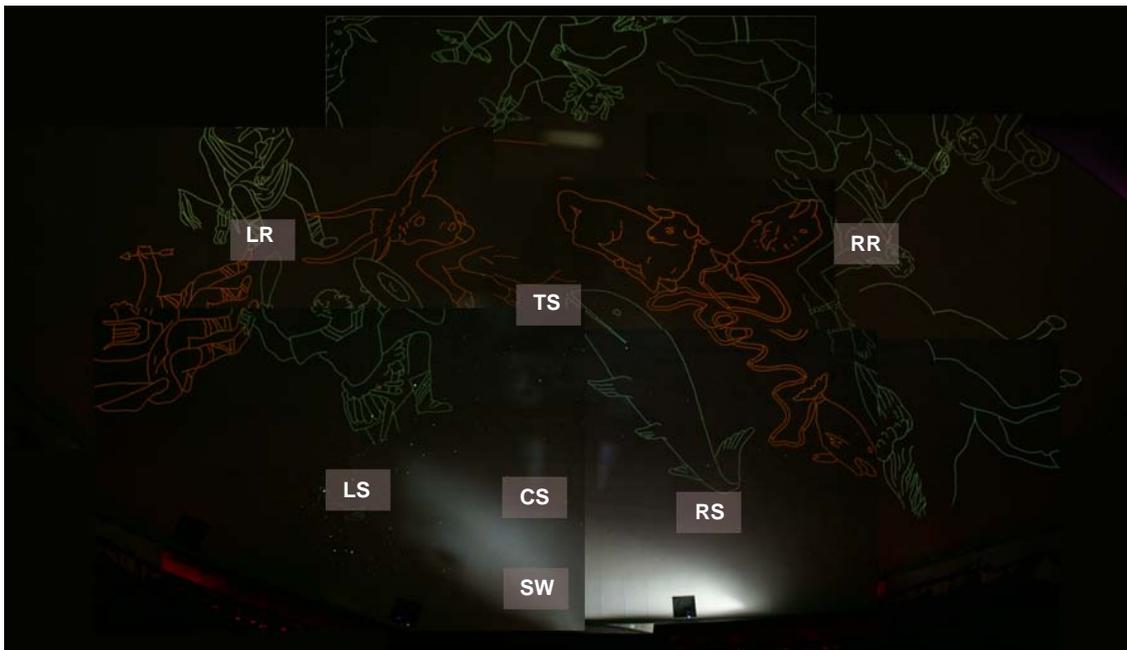


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The main goal of this show is to allow the sightless person to recreate the celestial vault shape and the star positions in it by means of the sense of touch and also sounds. To get that “spatial location feeling” of the stars in the sky, we chose a multichannel soundtrack. The featured celestial objects were chosen because they are projected close to one of the loudspeakers in the Hemisfèrci theatre. The speaker positions in the Hemisfèric dome are pointed out by squares in Figure 1. For projections in other theatres it is advisable to study the location of the loudspeakers to project the constellations nearby and feed the associated sounds to the corresponding loudspeakers.



(Fig. 1)

The distribution of the different musical themes and the particular sound effects associated with the featured objects was as follows:



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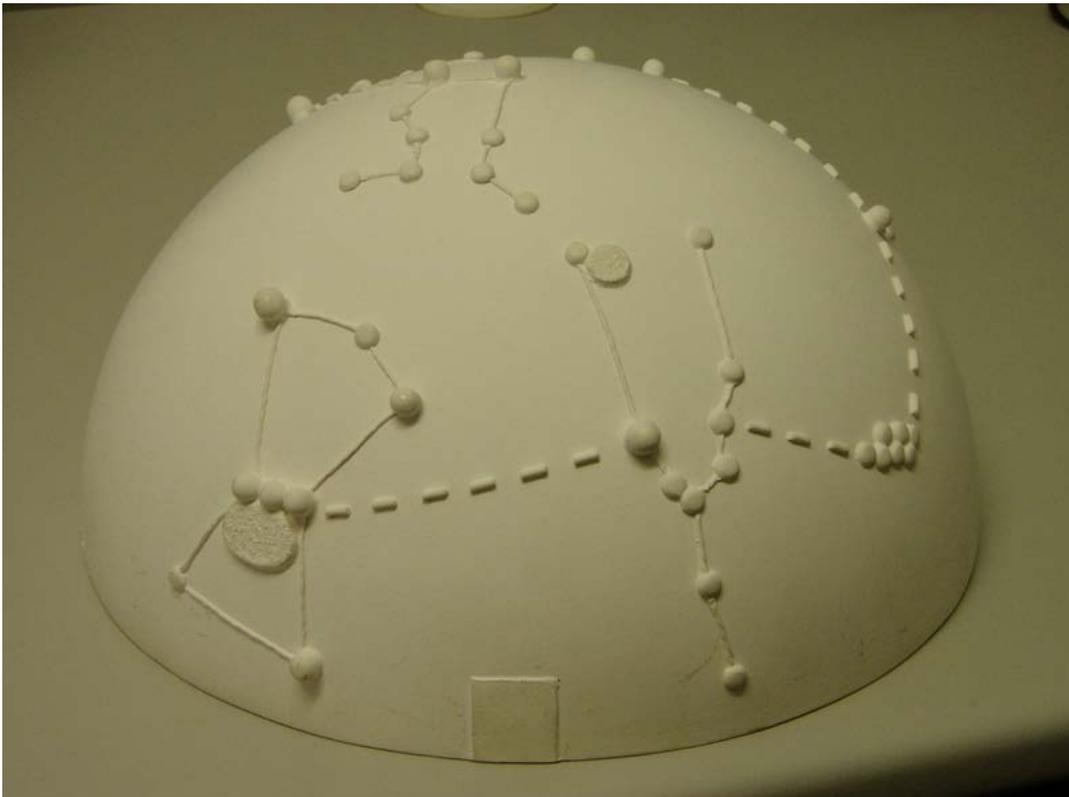
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AUDIO	TRACK	LOUDSPEAKER	LOUDSPEAKER ACRONYM
Narration 1 (Main)	1	Central Screen	CS
Narration 2 (PSE)	-	PSE	-
Orion	2	Left Screen	LS
Taurus	3	Top Screen	TS
Pleiades	3	Top Screen	TS
Little Bear	3	Top Screen	TS
Great Bear	3	Top Screen	TS
Leo	1	Central Screen	CS
Gemini	4	Right Screen	RS

The spectator listens to the astronomical narration and the musical compositions through the speakers of the theatre. The constellations (and their associated sound effects) are heard from different speakers, according to their projected position in the dome. In this way we communicate the “spatial location” information. The PSE narration, however, as it is only about how to handle the half-sphere, is only listened to through the public’s individual headphones during the show.

### 2.3 Tactile support

The tactile support of the show consists of a fiberglass half-sphere that represents the celestial vault and the celestial objects featuring in the show’s script. (Fig 2).



(Fig. 2)

On the half-sphere there are various types of elements of different shapes and sizes. Each one represents either an object or a path so that the visually impaired person can follow the story. Constellations are represented by groups of pellets and small disks all linked by solid lines (Fig. 3 and 6). Pellets that represent important stars are referred to in the script and they have one or several characteristic sounds associated in the soundtrack (Fig. 4). The difference among the sizes of the various pellets stands for the difference in magnitude, brightness and size among the different stars. The small disks are

stars that are not especially important and they may not have a special sound effect associated (Fig. 5). Dashed lines are the paths that take the user from one constellation to the next (Fig. 7). Finally, rough areas represent nebulas, which are also described in the script (Fig. 8)



(Fig. 3)



(Fig. 4)



(Fig. 5)



(Fig. 6)



(Fig. 7)



(Fig. 8)

Guided by this half-sphere the spectator will be able to follow the entire show. The PSE narrator will be the one giving the instructions to the visually impaired, telling them what object they have to move to, or at which element they have to stop, and so on.

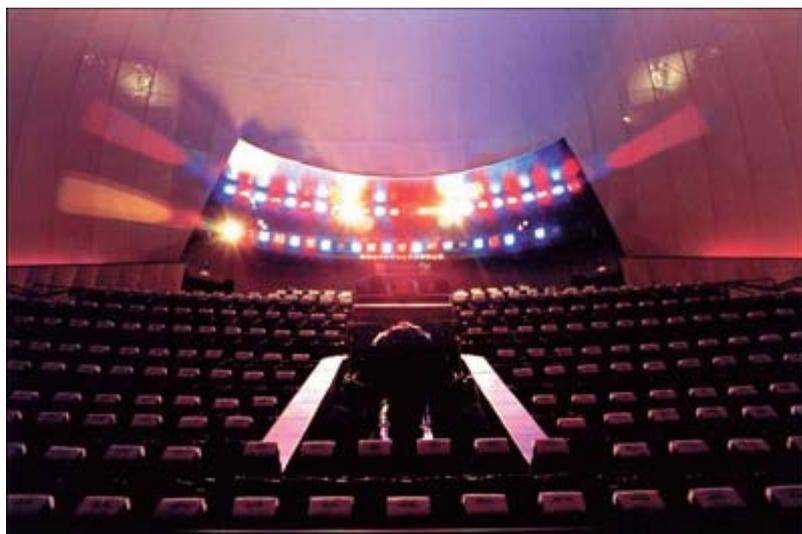
#### **2.4 Characteristics of the theatre**

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The show première took place at the Hemisfèric of the City of Arts and Sciences in Valencia (Spain) (Fig. 9). Some characteristics of this theatre relevant to the show are the following:

- Half-spherical screen: 24 m of diameter.
- Capacity: 306 seats + 4 for physical disabled persons (tier with 30° slope)
- Planetarium digital full dome
- Personalized stereophonic narration (PSE) through individual headphones

The half-spherical screen and the digital planetarium are used to show the images of the constellations and objects described in the script. The projection of the images is useful for the accompanying public and the partially sighted people. The audio, on the other hand, is distributed around the whole room taking advantage of the 6 channels of the theatre sound system.



(Fig. 9)

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### 3. SHOWING “THE SKY IN YOUR HANDS”

The planetarium show “The sky in your hands” was conceived for a public of 100 blind persons since that is, at the moment, the number of tactile half-spheres available. The show can be exhibited in digital planetariums with the option of sound distribution through as many as 6 different channels, or conventional ones that only have stereo sound system, even in an inflatable one or a simple room without dome or projection system. Digital planetariums with several speakers are the ones that will fully exploit the possibilities of this activity. But still if you don't have that kind of theatre, “The Sky in your Hands” is an excellent popularization tool, even without the encircling sound effect. The semi-spheres, in this case, become the most important element.

In any case, before the show starts, it is convenient to give a brief description about the spheres and how to put them at the starting position. Once the public is ready, with a basic knowledge about the show peculiarities regarding the soundtrack and with the half-spheres on their knees at the starting position (Fig 10) the show can begin.



(Fig 10)

Following the spirit of the IYA2009, we wish to make all the products of this planetarium show publicly available to other theatres, institutions and everyone that wishes to use it in outreach activities. These products are:

- The soundtrack with the story line, music and special sound effects
- Script with annotations
- Tactile half-spheres (you can borrow ours) or the digital 3D model to be printed by the user that can be downloaded from the website

“The Sky in your Hands” is free but when exhibiting the show we kindly ask the theatres to project briefly on the dome the logos of the institutions that created and collaborated on this project: Astronomical Observatory of the University of Valencia, University of Valencia, International Year of Astronomy IYA 2009, Arts and Sciences City and Spanish National Organization for the Blind (ONCE).



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#### 3.2 Credits

##### Main contributors:

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*José Carlos Guirado Puerta* (Planetarium author, responsible for the soundtrack)

Consultants : *Miquel Gómez i Collado* (script design), *Aurelia Teresa Gallego Calvente* (script and tactile support design)

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