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STROM-Inclusive Astronomy

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Abstract

STROM-Inclusive Astronomy is an itinerant astronomy exhibition that invites us to enter into the wonders of our Universe though a multi-sensorial and inclusive journey. Using tactile material, sounds, audiovisual experiences and artistic pieces, STROM teaches basic concepts of astronomy and brings us to the frontiers of astrophysical research.

1 Introduction

Astronomy is, in essence, an inclusive science. It teaches us that only a small portion of the electromagnetic spectrum (the language of the Universe) corresponds to wavelengths that humans can see. As far as the Universe is concerned, we are all blind in one way or another.

Translating information that we cannot see into understandable models is essential to astronomy. But what if, instead of visible models, astronomy chooses other senses, such as hearing or touch, to understand its nature?

That's exactly the choice of STROM-Inclusive Astronomy exhibition, a multi-sensory and inclusive journey that presents from basic concepts of astronomy to the frontiers of astrophysical research through tactile, sound and audiovisual experiences.

STROM-Inclusive Astronomy has been produced by Donostia International Physics Center (DIPC) for the 2023 Passion for Knowledge Festival, organized by DIPC in Donostia/San Sebastian. It was possible thanks to the collaboration with different institutions and professionals who have been working for years to bring astronomy closer to people with functional diversity, specially visually and hearing impaired communities.

In the section 2 we summarize the steps that led to the inauguration of the first STROM-Inclusive Astronomy exhibition in Tabakalera International Centre for Contemporary Culture, Donostia/San Sebastián. We will then discuss in section 3 the future of STROM-Inclusive Astronomy as itinerant exhibition available for no-profit institutions worldwide.

2 The first steps of STROM-Inclusive Astronomy

The idea of STROM-Inclusive Astronomy was conceived as a first attempt by DIPC to produce a truly inclusive science experience for the general public in the frame of the Passion for Knowledge Festival (P4K), organized in the city of Donostia/San Sebastián in 2023.

The concept was based on the extensive work carried out over the years by members of the Equity and Inclusion Working Group of the International Astronomical Union (IAU, Bayo, Amelia; Ortiz Gil, Amelia; Argudo Fernández, María del Carmen; Perez Montero, Enrique), astronomers and outreach officers of international astronomical organizations and astronomy educators worldwide, committed to give access to astronomical knowledge to people with functional diversity.

A diverse group of international experts was formed to outline the general ideas of the exhibition. Some contributed with materials already tested and validated by visually impaired communities, others provided scientific validation for the English and Euskera translations, and Dr. Enrique Perez Montero, astronomer at the IAA, provided invaluable feedback to make the whole experience as inclusive as possible.

The contributions received for STROM-Inclusive Astronomy include a tactile model of planetary formation, developed by the Millennium Nucleus of Planetary Formation (NPF); a tactile model of the Solar System developed by the Planetarium of Medellín together with the Giant Magellan Telescope (GMTO); the sounds of the Sun, produced by the Astrophysics Studies Institute of the Universidad Diego Portales (UDP); 3D galaxies models, developed by AstroBVI project funded with the support of the Consejería de Universidad, Investigación e Innovación de la Junta de Andalucía and the International Astronomical Union; and a tactile stellarium, produced by the Medialab at Tabakalera.

The selection of these unique pieces, as well as the content included in the exhibition, were curated by DIPC Ikerbasque astronomer Dr. Silvia Bonoli and DIPC outreach officer Valentina Rodriguez, with the valuable museographic design and production experience of Morgancrea. A new prototype of the formation of a black hole was produced specially for STROM - Inclusive Astronomy, as well as a video describing the distribution of matter and dark matter in the universe developed by the group of Dr. Raul Angulo (DIPC). The artist conception of the particle experiment NEXT by the artist Patricia Cancelo was also included in the exhibition, accompanied by a video and audio description of the project, led by Prof. Juan José Gómez Cadenas (DIPC).

This rich collection of materials was combined to deliver a unique experience in the beautiful location of Tabakalera, in Donostia/San Sebastián. The result was a one-of-a-kind exhibition, fully committed to accessibility in terms of eliminating barriers for the participation of people with functional diversity. The exhibition included podotactile strips installed on the floor, Braille information complementing the panels printed in accessible text sizes, QRs linked to audio guides designed specifically for the visually impaired, audiovisuals with sign language, subtitles and magnetic loop for hearing aids, all in space free of physical barriers.

The inauguration day will be remembered as the day in which the doors opened for the first time to receive the astrophysicist Prof. Josselyn Bell-Burnell and the physicist Prof.

Pedro Miguel Etxenike, president of DIPC (see 1) From that moment on, the magic began.

Soon after the inauguration, a message arrived from the local representative of ONCE (Spanish National Organization of the Visually Impaired) in the Basque Country, Nicolás Verdejo Aroca: "We wanted to sincerely thank you for having treated visual impairment and blindness with so much care, so much love, so much everything... Your work has allowed people with visual impairment and blindness to be a little closer to the heavens".

The exhibition remained open to the whole public for one month, receiving more than 12.000 visits. Given the unprecedented success for a city such as Donostia/San Sebastián, the exhibition remained open for an extra month for guided tours to educational centers and inclusive institutions, for a total of 57 guided visits.

The response from the public was overwhelming.

3 The future of STROM-`Inclusive Astronomy`

The message is clear. Including senses other than the sight not only benefits people with functional diversity, but it also enriches the experience of everyone. Universal access to astronomy is still far away, but we hope that STROM-`Inclusive Astronomy` will encourage others to commit to more inclusive astronomy education.

The response so far has been very positive. The first institution to confirm that will host STROM-`Inclusive Astronomy` as a temporary exhibition is Planetario de Pamplona, Navarra. Their plan is to inaugurate before the end of 2024 and to use the exhibition for their regular academic program next year. Planetario de Pamplona is developing didactic guides for STROM-`Inclusive Astronomy` , in collaboration with Aranzadi Foundation, and this new material will be donated for the future itinerancy of the exhibition.

Other institutions have expressed interest in hosting STROM-`Inclusive Astronomy` in the upcoming years.

The technical dossier of STROM-`Inclusive Astronomy` can be found here: Dossier

Acknowledgments

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The scientific collaborators who contributed to STROM-`Inclusive Astronomy` were: Raul Angulo, María Argudo, Giovanni Aricò, Naiara Barrado, Amelia Bayo, Itziar Gárate, Juan José Gómez Cadenas, Erika Labbé, Francesc Monrabal, Lurdes Ondaro, Ángela Pérez and Enrique Pérez Montero.

The museographic design and production of STROM-`Inclusive Astronomy` was done by Morgancrea.

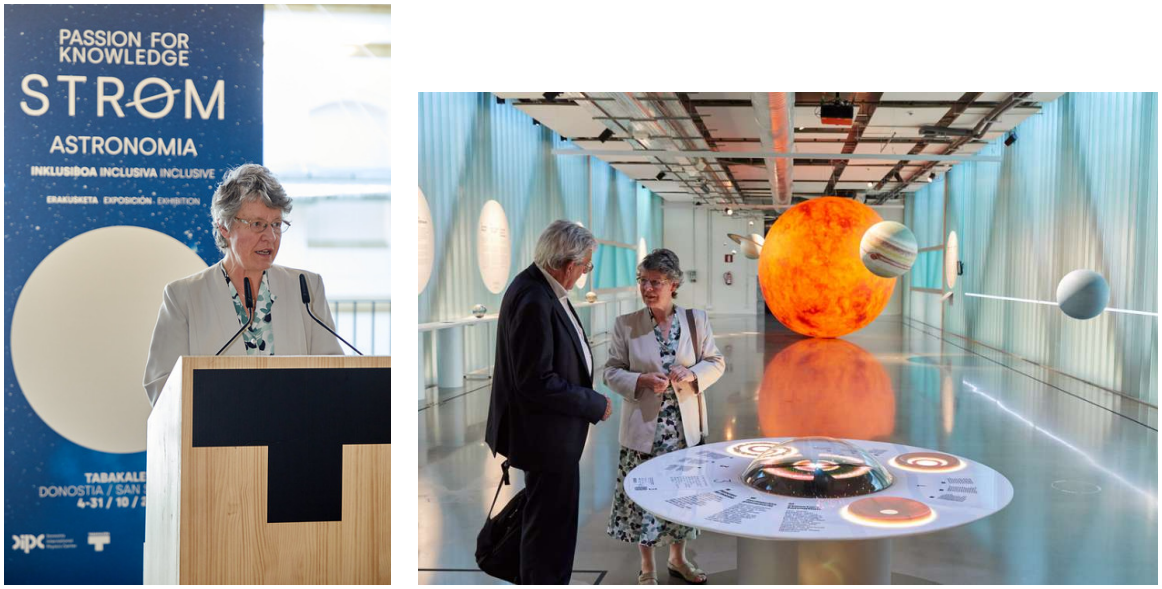

Figure 1: STROM-`Inclusive Astronomy` inauguration. Left: Prof. Jocelin Bell-Burner giving the initial speech. Right: Prof. Jocelin Bell-Burner and the president of the DIPC, Prof. Pedro Miguel Echenique, talking next to the planet formation table.

Figure 2: A few images from STROM-`Inclusive Astronomy` installed in Tabakalera. Top left: tactile stellarium. Top right: Constellations in perspective. Bottom left: animation on the formation of a black holes. Bottom right: planet formation table.

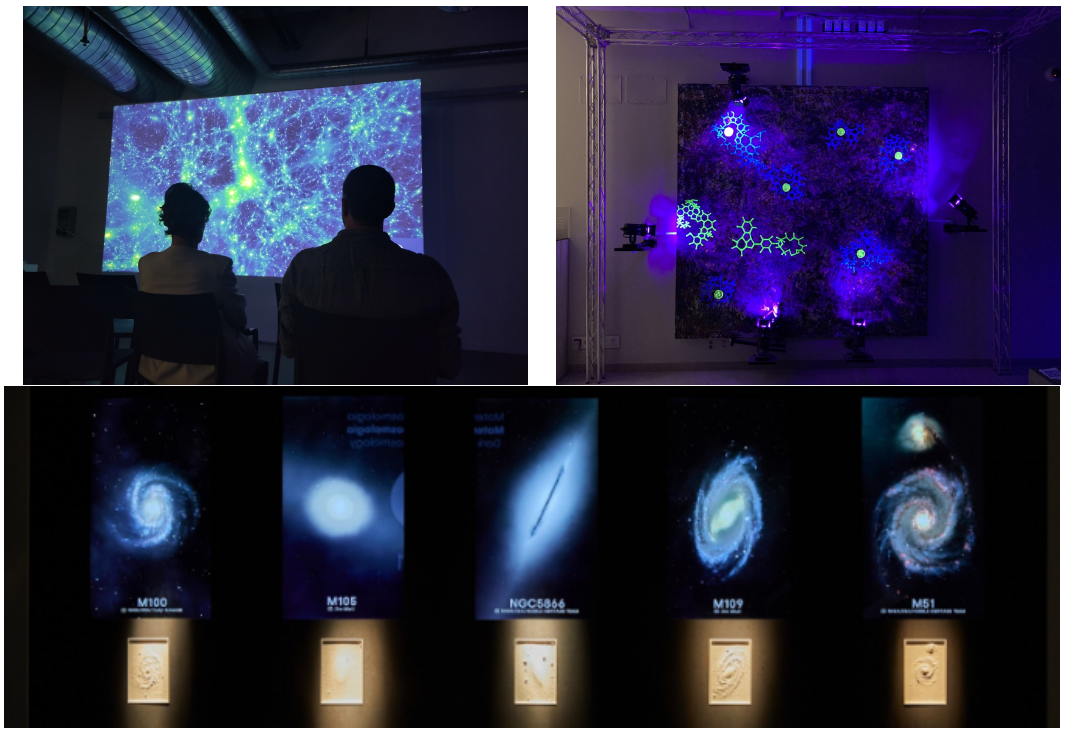

Figure 3: A few more images from STROM-`Inclusive Astronomy` installed in Tabakalera. Top left: simulation of the large scale structure of the Universe, which is accompanied by a sign-language translation. Top right: artistic representation of the experiment `NEXT` by the artist Patricia Cancelo. Bottom: Images of nearby galaxies and their 3D tactile model.