Accelerating Science

We are all 14 billion years old!

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Accelerating Science

We are all 14 000 000 000 years old!

An exciting cultural and educational experience about the Universe, particles and the value of fundamental science

THE AUDIENCE of the exhibition

The major focus is on visitors from age 12 upwards, although the exhibition will also be attractive to children from the age of 8. Younger people maybe be accompanied by adults but tend to want to decide what is interesting for themselves. The young visitors are used to accessing information via modern media and playing with sophisticated visual content. All interactivity are visually exciting and reasonably challenging.

A. Overview

The experience seeks to inspire a sense of wonder and curiosity about the origins of the Universe and particle physics, and to build an appreciation of the value of pure scientific research.

Every part of the story is communicated in two languages – the host country's primary language and English.

The exhibition is divided into an entrance tunnel and five zones. Each space is distinctly different and uses a range of media including dramatic imagery, sound, lighting, video, effects and interactive media.

The entrance tunnel, takes the visitor on a trip back from today to the moment just after the Big Bang.

From there the visitor enters the Big Bang theatre (a dramatic history of the Universe), before moving to a zone dedicated to the origins and extraordinary properties of particles. The visitor then moves on to discover some of the many outstanding mysteries of the Universe, before entering a zone dedicated to CERN and the Large Hadron Collider. They discover how Accelerators and Detectors are used by physicists to research particles and investigate some of the mysteries explored in the previous zone.

The exhibition concludes by showing the importance of fundamental research, building an appreciation of its importance and relevance to many of the technologies that we all take for granted.

1. Entrance and time tunnel:

"You, the people you love and everything around you are made from particles that originated at the very beginning of the Universe."

This extraordinary idea brings together the universal and the personal in a very powerful way. It is reinforced by the mirror at the entrance in which every visitor sees themselves and by a tiny red dot representing a fundamental particle in all of us. The dot recurs throughout the exhibition.

The visitor enters a darkened tunnel where a combination of dramatic images on semi-translucent panels and information on monitors trace the history of the Universe from the present day back to the moment just after the Big Bang.

2. History of the Universe ….The Big Bang

'The first stars are like factories, up to 1,000 times heavier than our sun. When their fuel is exhausted, they collapse and explode into giant supernovae, producing heavy elements – the building blocks of life.'

The climax of the cosmology phase of the journey is an experiential theatre. Around the entire wall surface of this zone is a huge graphic treatment which traces the story of the Universe from Big Bang to the present, giving additional details such as the origins of particles.

In the centre of the zone, visitors lean over a safety rail to peer into the void beneath as if suspended over space. A dynamic, timed audio visual show, projected into this space, tells the story – from the moment of Big Bang to the present day. It is a mirror image of what they have just walked through, and a visual spectacle which whets the appetite to explore the rest of the exhibition.

Visitors walk through a transition pod which elegantly illustrates the fact that as space expands energy density decreases – the dynamic behind our expanding universe.

3. Particles matter

'At CERN we investigate these tiny building blocks –
the fundamental particles that make up your world and the entire Universe'

This zone explains the nature of particles, introduces the particle 'families' found in the standard model, and inspires visitors to ask big questions about particles.

Around the walls the graphic treatment explores two big questions:

- How big are particles?
- What are particles?

A facebook-type treatment explains the relationships between particles and carrier forces.

A 'powers of 10' video brings to life the astonishingly small scale of fundamental particles.

Interactive exhibits include the opportunity to discover the relationship between energy and mass by enabling the visitor to 'create' each of the fundamental particles in the standard model.

Visitors walk through an 'infinity tunnel' to reach the next zone which is dedicated to the mysteries of the Universe.

4. Mysteries of the Universe

'All visible matter accounts for just 4% of the Universe. So where's the rest of it?'

The graphic outline of a human figure against the wall represents the 4% we know about the Universe. Formulas scribbled across the walls suggest attempts to solve the many mysteries. A series of big questions on the walls are explored in greater depth via audio visual treatments inside three giant domes. The visitor steps inside a dome to hear scientists talk about the mysteries and possible answers - where particles get their mass from (the Higgs field), dark matter, anti-matter and quark-gluon plasma.

From here the visitor walks through a transition tunnel. Short LED phrases stream up the walls at high speed, suggesting an moving elevator shaft underground. They communicate some of the unique properties of the Large Hadron Collider – 'fastest on earth…emptiest space in the solar system…colder than outer space…'

5. Exploring matter

'When two beams of protons collide inside the Large Hadron Collider they generate temperatures 1,000 million times hotter than the heart of the sun but in a miniscule space.'

This zone is dedicated to an explanation of the Large Hadron Collider (LHC). At the centre of the space is a three-dimensional model featuring a topographical map of the countryside above the LHC with a transparent side, enabling the visitor to look at what happens below ground.

There is a graphic image of the tunnel on the wall, out of which a transparent tube fires LEDs into a three-dimensional model of a detector. The visitor interacts with the model to see how particles can pass through layers of the detector during collisions. Screen animations capture the moment of actual 'events'.

A video screen shows highlights of the LHC engineering story and an interactive screen offers the opportunity to explore fascinating facts about the LHC – its amazing scale, speed and accuracy and the extraordinary amount of data that must be analysed.

Around the walls, dramatic photography, graphics and copy explain how detectors and accelerators work, what happens when particles collide and how the data is analysed.

The visitor walks through a transition tunnel that features a cut-through model of the LHC, and into the final zone.

6. Our world is built on fundamental research

'Many of the challenges we face – whether it's curing diseases, growing food to feed the hungry, providing clean drinking water, preserving planet earth or discovering the origins of the Universe – depend on science for the answers.'

The final zone seeks to inspire visitors with the value of fundamental research. Copy around the walls explains the relationship between the visitor and fundamental scientific research, the collaborative international role of CERN and the value of scientific curiosity.

In the centre of the space are two curved light boxes. They form dramatic image grids, illustrating the amazing range of technologies that enrich our lives in every field – from television to radar to GPS to medical applications to the internet. The visitor is asked to imagine what the World would be like if great scientists hadn't asked fundamental questions. By pressing a button next to the name of a scientist or group of scientists at a moment in history the visitor makes all of the applications that resulted from that question disappear.

B.Conditions of use

CERN's new traveling exhibition is available on request, within the limits of a calendar kept by CERN. The exhibition will be administered, shipped, installed and dismantled by CERN but the cost of these operations are at the charge of the receiving organiser (see costs).

The 400m2 exhibition requires a large hall with a minimum ceiling height of 3.50 metres. Complementary events such as popularising or specialised talks, debate sessions, and scientific demonstrations, can also be organised during the duration of the exhibition. These events are the responsibility of the organisers and must be clearly identified as such.

A strong presence from the local scientific (physics) community is recommended during the event.

CERN reserves the right to refuse a request without the need to give a reason.

1. LOGISTICS

The exhibition shall be installed and dismantled by the installation and dismantling team supervised by the CERN Exhibition Manager. This will ensure that the exhibition is installed, dismantled and packed correctly. It will also minimise damage and will also allow on-site repairs and the replacement of damaged parts during installation and/or dismantling.

The exhibition has been designed to move easily and directly from venue to venue but under the condition that the installation and dismantling team are used. The exhibition is delivered by road on two 13.00 metre, curtain sided lorries. A fork lift truck will be required to load and unload the lorry.

If the event area is not on the ground floor a large goods lift should be available to move the exhibition material to the exhibition floor. A storage area of approximately 100 m^2 is required to store the exhibition packaging for the duration of the exhibition.

Site visit:
A site visit is recommended for each venue to help finalise and determine all the details and logistics for the event.

Potential users of the exhibition are also encouraged to visit the exhibition in one of its future venues.

Installation and dismantling

- Between Monday and Friday.
- Weekend work shall be avoided where possible, this includes travel to and from venue.

Packaging

The exhibition material will be transported in a set of customised flight cases, crates for protection and storage. All the cases will either be on wheels or easily transportable with a pallet trailer. The largest crate is 200 cm x 200 cm x 150 cm

Storage
An area of approximately 100 m^2 is required to store the exhibition packaging for the duration of the exhibition.

Requirements
Floor area

- Minimum area required 400 m^2.

Additional recommendations

- No columns or pillars within the exhibition area
- Minimum ceiling height, 3.50 m
- Minimum hall width required for stand installation, 9.00 m
- Floor loading, 500kg/m2
- Low level of ambient lighting
- Exhibition hall ideally on ground floor,

or

- Large goods lift for access to the exhibition area

Electricity

- 380 V, 63 amp, 3 phase electrical mains supply

2. EXHIBITION OVERVIEW AND USE OF MEDIA

Exhibition environment:
Is designed to fit into any host venue whilst retaining a consistent experience.

The structure uses a contemporary exhibition system framework to bring flexibility and ease of use to the skeletal framework.

The visitor experience happens in a series of connected, decahedron (10 sided) enclosed zones which may be configured in different configurations. Example configurations are shown, (see "Possible layouts").

The complete exhibition is composed of an entrance tunnel and 5 distinct enclosed zones. Each zone relates a specific part of the story. Transfer pods join together the 5 zones. (see "Possible layouts").

The exterior walls feature decorative imagery, the exhibition branding and the title of the traveling exhibition.

Transfer pods:
These short tunnel sections are used to transfer the visitor from one zone to the next, giving them time to reflect on what they have just experienced and whetting their appetite for the next stage of the experience.

Exhibition content:
Inside, the story unfolds through a combination of experiences using lighting, sound, graphics, video, models, exhibits, interactive presentations and hands-on experiments.

Some texts will be presented digitally on LCD monitors in local language/s and/or English; these can be pre-programmed and switched with ease.

Big, bold questions and facts communicate first level information and where appropriate more detailed second level information is provided for the visitor who wishes to explore further and learn more.

LED scrolling text in the local language on Newscaster units, followed by English language, provides orientation signage at each stage of the story so the visitors always know where they are.

3. SAFETY

The exhibition has been designed to respect the present International safety and security regulations that are practiced with the Science centres and Science Museums that are affiliated to the ECSITE network.

In addition all electrical, audio and video material is relayed back to a central technical area. The technical area shall be kept locked at all times and shall be only accessible to the venues staff.

Emergency Fire exits are clearly marked in each of the zones.

4. THE VENUE

The host venue shall be expected to supply the following services during the duration of the exhibition:

- A minimum of 1 person in charge of regular surveillance of the exhibition
- Staff to act as an explainers/guides/monitors during the entire duration of the exhibition. A minimum of 1 person shall always be present within the exhibition.
- Daily cleaning
- A technician to switch on and off the exhibition each day.
- Storage for all of the exhibitions packing cases and crates.

These above services shall help ensure the safety, daily management and overall presentation of the exhibition.

A contract shall be established with each venue which clearly underlines the responsibilities and duties of both the venue and the provider (CERN) of the exhibition

5. COST AND CONTRACT

The fee requested for the exhibition is not a rental cost but is the sum required to cover the logistical costs related to preparation, transport, installation and dismantling.

The cost per venue is at present being finalized and will be available after completion of the first installation in Geneva.

- The fee will cover all logistical costs for:
  - Transport
  - Installation and dismantling
  - Travel and accommodation of the installation and dismantling team.
  - All additional costs incurred by translation
  - All preparation for presenting the exhibition in the language/s of the host venue.
  - Supervision of the installation and dismantling operations by CERN's Exhibition Manager
- There are no additional costs related to the duration of the exhibition.
- The cost is based on:
  - Delivery from Geneva to each venue
  - Weekday work and travel
  - Weekend work and travel will increase the installation/dismantling costs
- A Contract will be signed between CERN and the Center hosting the exhibition

6. LIST OF MATERIAL

The exhibition will be accompanied with a complete list of material:

- Number of flight cases (l x w x h); weight
- Total weight; total volume
- Number of audiovisuals (list)
- Number of interactive exhibits (list)
- Documentation (list)

C. Additional events during the exhibition

1. SCIENCE AFTERNOONS – exhibition for youngsters

It is also proposed to organize Science afternoons during the duration of the exhibition. The University of Geneva will train the venues staff to perform and operate these afternoons.

Science afternoons offer youngsters aged 8 to 12 the chance to experience, discuss and debate a scientific topic with specialists. Each session is organized in a coherent and well-structured way. The children take part in all the activities, which are linked to one another by a brief scenario. This scenario provides the whole scientific experience with a playful aspect**.**

Science afternoons were first created in 2001 by the University of Geneva as a project for youngsters. The project's aim is to show children during a whole afternoon, that Science is a dynamic and captivating field. With the help of scientists and of a professional actor who will explain the content of each session, the children experience Science throughout various methodical experiments.

2. LECTURES, FILMS, WEB SITE

Lectures and the presentation of more detailed and specific films can also be organised during the duration of the exhibition. It is planned that these shall be done in coordination with the local scientific community (University, Laboratory, Institute).

The exhibition also has its own dedicated Website, which will be continually updated during the lifetime of the exhibition.
http://acceleratingscience.web.cern.ch/acceleratingscience/

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