

GRAVITY

Imaging the Universe after Einstein

The creative thinking of artists and scientists
tackling the big questions posed by the cosmos

An exhibition by MAXXI, the Italian Space Agency and the National Institute of Nuclear Physics

2 December 2017 – 29 April 2018

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Rome, December 2017. It travelled through space for 20 years, negotiating asteroid belts, passing by Venus and Jupiter, skimming the liquid methane seas of Titan and a “hexagonal storm” on Saturn and prior to burning up in the planet’s atmosphere it “dived” through its rings 22 times.

A model of the **Cassini Probe**, with all the evocative power of its journey through space, is suspended in the MAXXI atrium together with **Aeroke**, the installation by **Tomás Saraceno** composed of two mirrored balloons that capture the imperceptible sounds dispersed in the atmosphere, and welcomes visitors to Gravity. **Imaging the universe after Einstein.** The exhibition, curated by **Luigia Lonardelli** (MAXXI), **Vincenzo Napolano** (INFN) and **Andrea Zanini** (ASI), with scientific consultancy by **Giovanni Amelino-Camelia**, will be open at MAXXI from 2 December through to 29 April 2018.

The project, strongly sponsored by **Giovanna Melandri**, President of the Fondazione MAXXI, is the fruit of an innovative joint-venture between the museum and the **Italian Space Agency** (ASI, presided over by **Roberto Battiston**) and the **National Institute for Nuclear Physics** (INFN, presided over by **Fernando Ferroni**), with the support of the **Ministry for Education, Universities and Research – Department of higher education and research**. The main partner is **Enel**, the Fondazione MAXXI’s first private partner, which has chosen to support this exhibition in particular due to its extraordinary cultural and research value, offering free admittance to a rich programme of seminars with scientists, philosophers and artists. **Leonardo** supports the educational activities associated with the exhibition.

EINSTEIN’S REVOLUTION

In late 1915 our vision of the universe was dramatically overturned by Einstein’s General Theory of Relativity. The concepts of space and time were no longer absolute but relative and dependent upon the observer. The idea took the form of a space-time in which the universe is composed of not three but four dimensions: three spatial and one temporal, inseparable from one another. Only the speed of light is an absolute and an insurmountable limit. Within this universe move the gravitational waves, “vibrations” produced by masses in movement that deform the *space-time*. **The discovery of gravitational waves, a century after Einstein’s prediction, was rewarded last October with the 2017 Nobel Prize for Physics.**

Relativity is a revolutionary theoretical context that man has necessarily had to tackle. New cultural and artistic imagery has consequently emerged, through which **Gravity** today accompanies its visitors.

THE EXHIBITION

Scientific installations, historical relics and simulated experiments, such as **Galileo Galilei’s Telescope** and **Virgo’s Mirror** (the laser interferometer that picks up gravitational waves), dialogue with **works by modern and contemporary artists**: from **Marcel Duchamp** to **Allora & Calzadilla**, **Peter Fischli** and **David Weiss**, **Laurent Grasso**, **Tomás Saraceno** who on this occasion is also wearing the *curatorial adviser’s* hat as well as that of artist, **in an immersive experience** that allows the public to access the innovations of modern physics.

The large and complex installation **Cosmic Concert** by **Tomás Saraceno**, where sound, vibrations and visual signals intersect with each other and with the movements of visitors, takes in the entire exhibition which explores **three key concepts** closely related to one another: **Space-time, Confines, Crisis.**

Cosmic Concert is a constellation of works that attempts to give concrete form to the invisible structure of relationships making up the universe. Within a dimly lit space, along with objects that explore the history of cosmic visions from antiquity to the present, the works of Saraceno give life to a new symphony, a sonic and visual journey through which we may intuit the interconnections between the universe, the human species, all

living things and the matter that surrounds us. ***Echoes of the Arachnid Orchestra with Cosmic Dust*** uses audio and video technologies to render visible the interactions of the public with the *cosmic dust* in which we are constantly immersed, while at the centre of the work, a spider, the *Nephila Senegalensis* weaves its web amplified via microphones capable of capturing its labours. ***Social Supernova Catcher***, realised with a type of interferometer modified by the artist, renders visible the vibrations generated by the spider on its web and the visitors in the hall. ***KM3Net***, realised in collaboration with the INFN, reveals the filtered sounds of the deeps captured by the KM3 submarine telescope located at a depth of 3,500 metres off Capo Passero in Sicily, while the video ***163,000 Light Years*** presents us with an image of the *Large Magellanic Cloud*, the galaxy 163,000 light years from the earth and the setting of violent phenomena that occurred millions of years ago, filmed in the *Salar de Uyuni* (Bolivia), the world's largest salt desert.

Placed at the heart of the exhibition dedicated to the theme of ***Space-time***, ***Cosmic Concert*** also features historical relics such as an **Armillary Sphere** from 17th century which was used to study the trajectories of the planets or the 1632 edition of Galileo's ***Dialogue of the two world systems*** and scientific instruments such as the **LISA Pathfinder** satellite, of which a model is on show, and the ***Nautilus Antenna***, both used in the research into gravitational waves. The same section also contains the work by **Marcel Duchamp** ***3 Stoppages etalon*** which the artist imagines a personal unit of measure, a reflection on the parameters whereby man gains awareness of space and time and a demonstration of how Einstein's thinking immediately influenced art too. Also on show is the video ***The Way Things Go*** by **Peter Fischli** and **David Weiss**, in which objects of all kinds, stripped of their original use, become protagonists in an unpredictable and apparently casual chain reaction.

The many instruments used by man to comprehend reality have over the centuries become increasingly more powerful and precise, allowing us to continuously expand our field of observation and the horizons of our understanding. The section ***Confines*** presents the experience of the limits of our knowledge.

The *fossil sound* of the Big Bang, a remote echo that still permeates the universe today, is the protagonist of **Laurent Grasso's** work ***The Horn Perspective***: a reconstruction of the skeleton of the Penzias and Wilson radio telescope that picked up that sound by mere chance in the early Sixties.

This work represents a reflection on a world and a universe impossible to perceive with our senses alone and is exhibited together with a model of the **AMS (Alpha Magnetic Spectrometer)**, currently in use on the International Space Station for research into cosmic rays, particles of primordial antimatter and possible traces of dark matter. While we might not know the nature of this last type of matter, we do know that it pervades the cosmos because we can see the gravitational effects it exercises on the aggregation of stars and galaxies. Visitors are invited to immerse themselves in an interactive installation in which they can imagine being able to decide arbitrarily the presence and the quantity in the cosmos of this still mysterious matter, thus determining the evolution of the galaxies.

The exhibition concludes with the area dedicated to ***Crisis***, one of the most over used words in our contemporary world and which, in the field of knowledge, has a positive value: only through crisis and the questioning of our certainties is it possible to change a model and therefore an evolution.

Alongside the ***Gravitational hole***, an exhibit presenting gravitational dynamics, we find the interactive video installation ***Curving space***, in which visitors "enter" into the *space-time* concept and determine its deformation with their mass. This interactive environmental installation reconstructs two facts fundamental to the experimental verification of Einsteinian relativity: the observation during the solar eclipse in 1919 of the gravitational deflection of light and the discovery in 2015, a century after their theoretical prediction, of gravitational waves. Lastly, the video installation ***The Great Silence*** by **Allora & Calzadilla**, realised by the artists in collaboration with the science fiction writer Ted Chiang, constitutes a reflection on humankind's relationship with the world and with the universe. The protagonists are the Arecibo radio telescope, one of world's most powerful, and a parrot with a particular gift for learning, both symbols of man's efforts to communicate with other living species.

GRAVITY. BEYOND THE EXHIBITION: PROGRAM

GRAVITY attempts to reveal the depths underlying the known universe, but also the mechanisms that unite all men in their search for knowledge, in a collective process in which artists, scientists and philosophers all have equally significant roles. To this end the exhibition is accompanied by a **rich programme of events** entitled ***GRAVITY. BEYOND THE EXHIBITION***, curated by **Vittorio Bo** and **Irene De Vico Fallani**, which explores the issues raised. The programme starts with a seminar featuring **Tomás Saraceno** and **Giovanni Amelino Camelia** on **Saturday 2 December** at 11:30 AM., the first of a series of such encounters with scientists,

philosophers and artists offered **free of charge thanks to Enel**. Among the protagonists: **Fabiola Gianotti**, the CERN Director-General, with **Fernando Ferroni**, president of INFN (8 February 2018); the artists **Allora & Calzadilla** with the evolutionist philosopher **Telmo Pievani** (14 February); the neurobiologist of international repute **Harald Atmanspacher** with the philosopher **Roberto Casati** (16 February); the philosopher **Massimo Cacciari** with the physicist and mathematician **Mario Rasetti** (9 March); **Mons. Gianfranco Ravasi** with the president of the ASI **Roberto Battiston** (22 March); the artist **Laurent Grasso** with the British neurobiologist **Semir Zeki** (27 April). Special guest: **Samantha Cristoforetti** (10 April).

The programme will also feature a documentary marathon in association with *National Geographic* – channel 403 Sky (from 20 January 2018); the film screening program **Space Time Cinema: Christopher Nolan and the restricted relativity of a film**, in association with the *Fondazione Cinema per Roma* (from February 2018); a special event based on culinary inventions in order to talk about physics and the universe with Fernando Ferroni, President of INFN, **Cristina Bowerman**, a Michelin starred chef and **Neri Marcorè** (27 March); the theatrical readings **Dear Albert** by Alan Alda, based on the letters written by Einstein himself, with **Pino Calabrese**, **Serena Dandini** and **Pippo Delbono**, live music **Teho Teardo**, directed by **Mario Sesti** (6 April) and that by **Sonia Bergamasco** based on the text by Vasilij Grossman, *La cagnetta*.

EDUCATIONAL ACTIVITIES

Sound performances inspired by the cosmos, the creation of stories set in alternative universes, exploratory-visits and workshops. The Education Office, with scientific consultancy from Luigi Civalleri and in association with the Psiquadro social enterprise, is proposing a rich programme of activities for schools, families and adults, all of whom are invited to discover and experiment with gravitational waves, space-time and the grandiose beauty of the cosmos.

Throughout the month of January 2018, 30 workshops for schools will be offered free of charge thanks to **Leonardo**, a leading company in the high-tech sector, which will be supporting the educational activities associated with *Gravity* (reservations are required and may be made by writing to edumaxxi@fondazionemaxxi.it). The *EduLab 1* space in the hall will, moreover, be animated by illustrations inspired by the issues raised in the exhibition and will house the workshops for families during which adults and children will take part in the construction of a reticular structure evoking the space-time weave and the spider's web in the installation by Tomás Saraceno. The Public Engagement Office, in association with the State Institute for the Deaf, will also be organizing guided tours in sign language (LIS) for deaf and hearing visitors together.

Please also note that in December, the last four workshops for families in the MAXXI for Kids project, are sponsored by BNL Gruppo BNP-Paribas and Mini-Gruppo BMW.

CATALOGUE

The exhibition will be accompanied by a catalogue edited by Luigia Lonardelli, Vincenzo Napolano and Andrea Zanini and published by Corraini. Along with the essay by Giovanni Amelino Camelia, Luigia Lonardelli, Vincenzo Napolano and Andrea Zanini and a text by Walter Benjamin, the volume features writings by experts in various disciplines including anthropologists, artists, biologists, physicists, cartographers, philosophers, religious figures and art historians asked to provide a personal response to the question: what might the universe represent today and how do we relate to science? Texts by: **Alberto Abruzzese, Allora & Calzadilla, Simona Argentieri, Vincenzo Barone, Massimo Campanini, Laura Canali, Marina d'Amato, Ernesto di Mauro, Gabriela González, Laurent Grasso, Hou Hanru, Stefan Helmreich, Pietro Montani, Gabriele Piana, Gianfranco Ravasi, Fulvio Ricci, Tomàs Saraceno, Emanuele Trevi, Riccardo Venturi, McKenzie Wark, Peter Weibel**.

The press kit and images of the exhibition can be downloaded from the Reserved Area of the Fondazione MAXXI's website at www.maxxi.art/en/area-stampa/ by typing in the password **areariservatamaxxi**

MAXXI – National Museum of XXI Century Arts

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opening hours: 11.00 AM – 7.00 PM (Tues, Weds, Thurs, Fri, Sun) | 11.00 AM - 10.00 PM (Saturday) | closed Mondays. Admittance free for students of art and architecture from Tuesday to Friday

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