

March 7, 2018

MA XXI



GRAVITY
IMAGING THE UNIVERSE AFTER EINSTEIN

MAXXI
GALLERY 4

02.12.2017 / 06.05.2018

Curated by Luigia Lonardelli, Vincenzo Napolano,
Andrea Zanini, with the scientific advice of Giovanni
Amelino-Camelia

Gravity. Imaging the Universe after Einstein

Gravity. Imaging the Universe after Einstein, develops from a long process of dialogues, debates and collaborations between the curatorial teams specialized in physical and spatial sciences (Istituto Nazionale di Fisica Nucleare and Agenzia Spaziale Italiana) and contemporary art (MAXXI), including the artists, with Tomás Saraceno and his studio designing the general “Cosmos” of the installation.

Art and science are human practices whose intention is to explore the truth of the world, from the infinitely immense Cosmos to the tiniest units of “matter” or “organization”. Sharing a common motivation, and somehow a common origin – human curiosity and the necessity to survive and improve living conditions in the sublime but often hostile “outside world” – both practices have developed different ways to probe into the meaning of the cosmos. Hence, to understand and grasp the meaning of existence. Tension and interaction between order and chaos, rules and accidents, from the everyday realm to the Milky Way, emerge to become the ground for their engagements.

In our contemporary time, the Theory of Relativity along with “Cosmological” concepts such as anti-gravity, Black Holes and so on, has not only revolutionized the knowledge of the Universe for the last century. Thanks to modern media and education development, they have gained unprecedented popularity across the world, provoking energetic and intensive imagination and productions in both high and low culture, namely “artistic realms” and entertainments. Contemporary artists have found new vocations and relevance in this process of investigating the “new world”.

The MAXXI, as the venue in which all these interplays unfold is turned into a stimulating laboratory where visitors can venture into a realm that converges creative energies from every field, with momentary enlightening shedding into the darkness of an imagined Cosmos.

Gravity. Imaging the Universe after Einstein

The tone of the dialogue is set from the very entrance of the museum, where a model of the Cassini Probe – carrying the evocative power of its space journey – is suspended next to *Aeroke*, Tomás Saraceno's installation, composed of two mirrored balloons that capture the imperceptible sounds dispersed in the atmosphere. In the gallery key works by Marcel Duchamp, Allora&Calzadilla, Laurent Grasso, Tomás Saraceno and Fischli&Weiss are installed along with scientific instruments such as Galileo Galilei's Telescope, Virgo's Mirror (the laser interferometer that picks up gravitational waves), and simulated experiments.

Composed of three primary interconnected and dependent concepts – spacetime, crisis and borders – **Gravity. Imaging the Universe after Einstein** reveals the unknown depths of the Universe, as well as the mechanisms that bind all mankind in the search for knowledge, as part of a collective process in which artists and scientists play an equally significant and fundamental role for society.

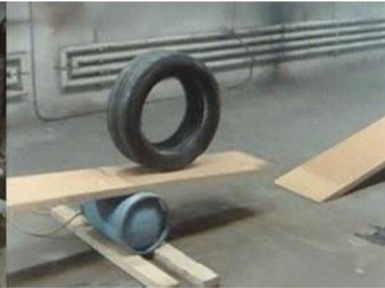
Spacetime

Spacetime: Albert Einstein's new understanding of space and time is based on a fundamental principle: the speed of light is a universal constant. No matter how quick one can move, its value—namely 300,000 kilometres a second—will always remain the same. However, this idea has counterintuitive consequences. If the speed of light is always constant, space and time must be the ones to change based on the observer. Moreover, space and time are no longer separate, independent aspects of reality, but form part of a single entity, a sort of four-dimensional “space”: a spacetime.

On top of the instruments that man has been using to describe the space and time of cosmic events ever since ancient times, this section also exhibits a model of the experiment that Albert Michelson and Edward Morley carried out at the end of the '800 to prove that the speed of light is the same for the observers in relative motion.

The relativity of measurement is the object of 3 *Stoppages Étalon*, an artwork that saw Marcel Duchamp randomly create his own unit of measurement. Fischli & Weiss, in their now historic video *Der Lauf der Dinge* (*The Way Things Go*, 1987) focus on the strict concatenation of cause and effect phenomena by showing an endless chain reaction of apparently insignificant events. Finally, Tomás Saraceno invites visitors to the exhibition to join his *Cosmic Concert*, which unveils the invisible fabric of cosmic connections underlying the universe. Time becomes intuition in the *163,000 Light Years* video, where a still picture of the starry sky is the crystallized image of the past, yet perceived as our present, thanks to the effect of the high, however finite, speed of light.

Gravity. Imaging the Universe after Einstein



Specchio del rivelatore di onde gravitazionali Virgo, European Gravitational Observatory fondato da INFN e CNRS / Mirror of the Virgo gravitational wave detector, European Gravitational Observatory founded by INFN and CNRS, ©INFN, Photo Simone Schiavon

Peter Fischli e/and David Weiss, Der Lauf der Dinge (The Way Things Go), 1987, © Peter Fischli David Weiss, Zürich 2017, Courtesy Sprüth Magers, Matthew Marks Gallery, Galerie Eva Presenhuber

Sfera armillare, fine del secolo XVII/ late Seventeenth Century, Courtesy Direzione Wunder Museum, Liceo Classico Statale E.Q. Visconti, Roma

Crisis

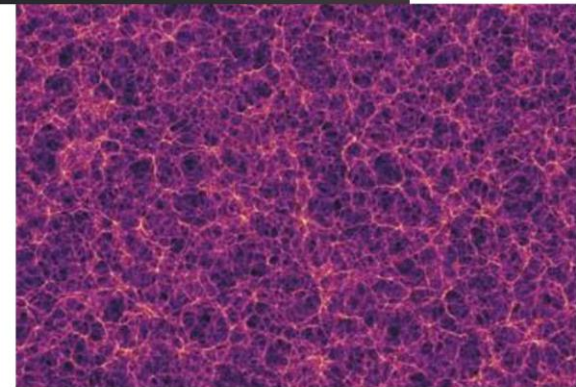
In every field of knowledge a crisis, namely the moment when the current vision flakes apart and the most legitimate beliefs collapse, is the necessary premise for the creation of new interpretations and reference models. It has an entirely positive value as a moment of revising personal certainties in view of the creation of a new model. Even Einstein's first theory of relativity — known as Special Relativity — responded to a crisis, namely the one experienced by classical physics due to the new discoveries on the propagation of electromagnetic waves and light.

It also led to another crisis, namely the one experienced by the Newtonian law of universal gravitation due to the relativistic nature of space and time, which had just been discovered. In order to emerge from this crisis, Einstein completed his new paradigm with the theory of General Relativity. In this new vision, spacetime is an elastic fabric deformed by stars and planets, which leads the other bodies to slide along its curved surface. Thus, gravity is but the manifestation of this mutual interaction between celestial bodies and the cosmic fabric of spacetime.

The above vision is difficult to picture, and is therefore disorienting. For the audience to better grasp the dynamic and visualise the structure of spacetime, the installations contained in this section provide it with virtual and interactive experiences revolving around the immersive tale of two decisive pieces of evidence supporting the Einstein model: the gravitational deflection of light, which was first observed in 1919, and the discovery of gravitational waves, which was made in 2015, a century after their theoretical conception.

The video entitled *The Great Silence*, which was made by Allora&Calzadilla, is a reflection on the concept crisis, albeit from a different perspective: indeed, it revolves around the actual ability of people to interpret the signs of nature. The artwork hints at the lack of communication between humankind and the other species inhabiting Earth and the universe, thereby highlighting our inability to decipher the messages that come from the world we live in and the cosmos.

Gravity. Imaging the Universe after Einstein



Laurent Grasso, The Horn Perspective, 2009,
Courtesy l'artista / the artist, © Laurent Grasso by SIAE 2017

AMS-02, rivelatore di astroparticelle, indaga sull'animateria,
la materia oscura e i raggi cosmici/ an astroparticle detector,
studies anti-matter, dark matter, and cosmic rays, © ASI © Photo NASA

Laurent Grasso, The Horn Perspective, 2009,
Courtesy l'artista / the artist, © Laurent Grasso by SIAE 2017

Simulazione dell'universo su grande scala /
Software simulation of the large-scale structure of the Universe,
© Max Planck Institute for Astrophysics

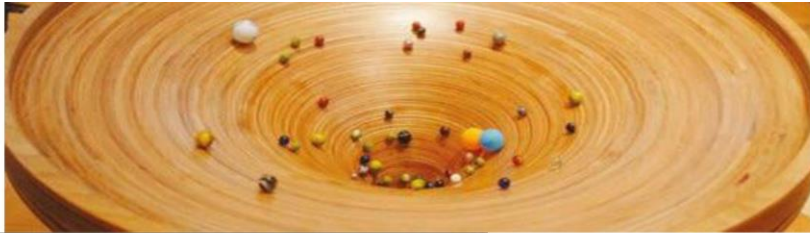
Borders

Borders: The cosmos has always been the ultimate horizon of our desire for knowledge. The more we have been able to observe it with our artificial eyes, the more its borders have broadened and drifted away from us: witness the discoveries made by use of Galileo's telescope or its more powerful versions orbiting around Earth. We now describe the universe as "the whole", while we trace back its origins and predict its evolution. However, our experience has enabled us to understand the unmeasurable scope of cosmic phenomena and the limits of our knowledge. Relativity has shown us that a portion of the universe is inherently hidden from our sight, and we know that its observable borders are ever more rapidly drifting away from us, as though the very universe were escaping in all directions. We know that a dark matter fabric probably pervades the cosmos like an immense spiderweb, the threads of which saw the birth of the first stars and galaxies hundreds of millions of years after the Big Bang. Alas, we do not know the nature of this matter, nor can we unveil it. What is known as "dark energy" seems to be causing the universe to expand ever increasingly, thereby predetermining its destiny.

The ambivalent nature of human knowledge inevitably is studied by contemporary artistic research: witness *The Horn Perspective* installation by Laurent Grasso, which focuses on the ephemeral boundaries among science, fiction, real perceptions, and artistic suggestions, thereby reminding us how difficult it is to decipher and interpret the messages coming from the cosmos.

Eventually, probing the Universe signifies, above all, venturing into our own inside- our own Universe. We need to learn how to push the restart button of life and face the unstoppable gravitational wave that is blowing across the mountain and oceans, reaching into the depth of our souls!

Gravity. Imaging the Universe after Einstein

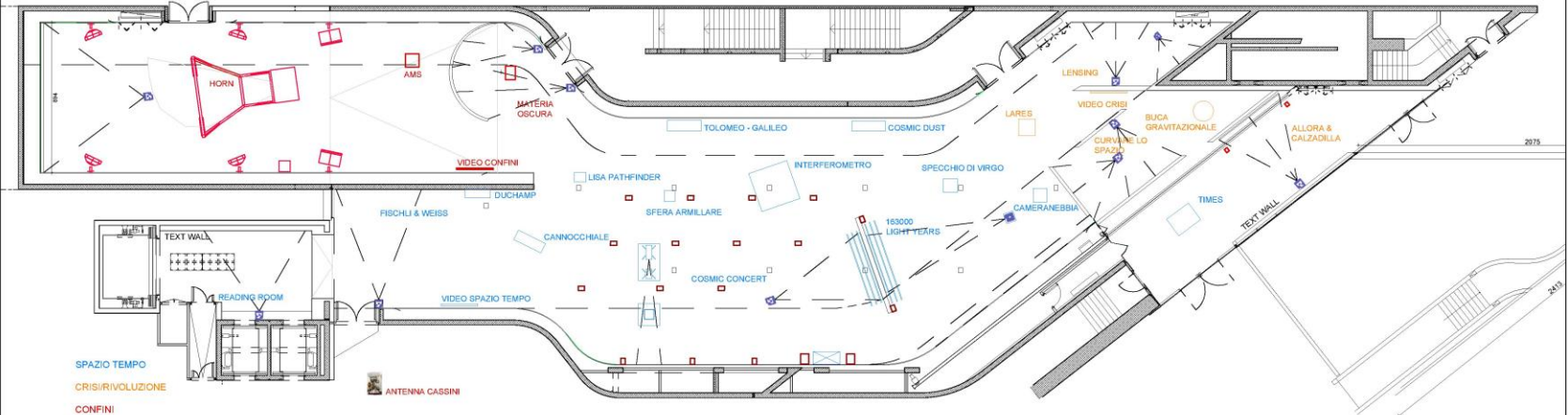


Buca gravitazionale, gioco interattivo sulla curvatura dello spaziotempo /
interactive game involving the space-time curvatures, Arsenali Digitali 2017
Photo: Stefano Grande

Curvare lo spaziotempo, 2009, INFN

Allora & Calzadilla,
con la collaborazione di / in collaboration with Ted Chiang,
The Great Silence, 2016, Courtesy gli artisti / the artists

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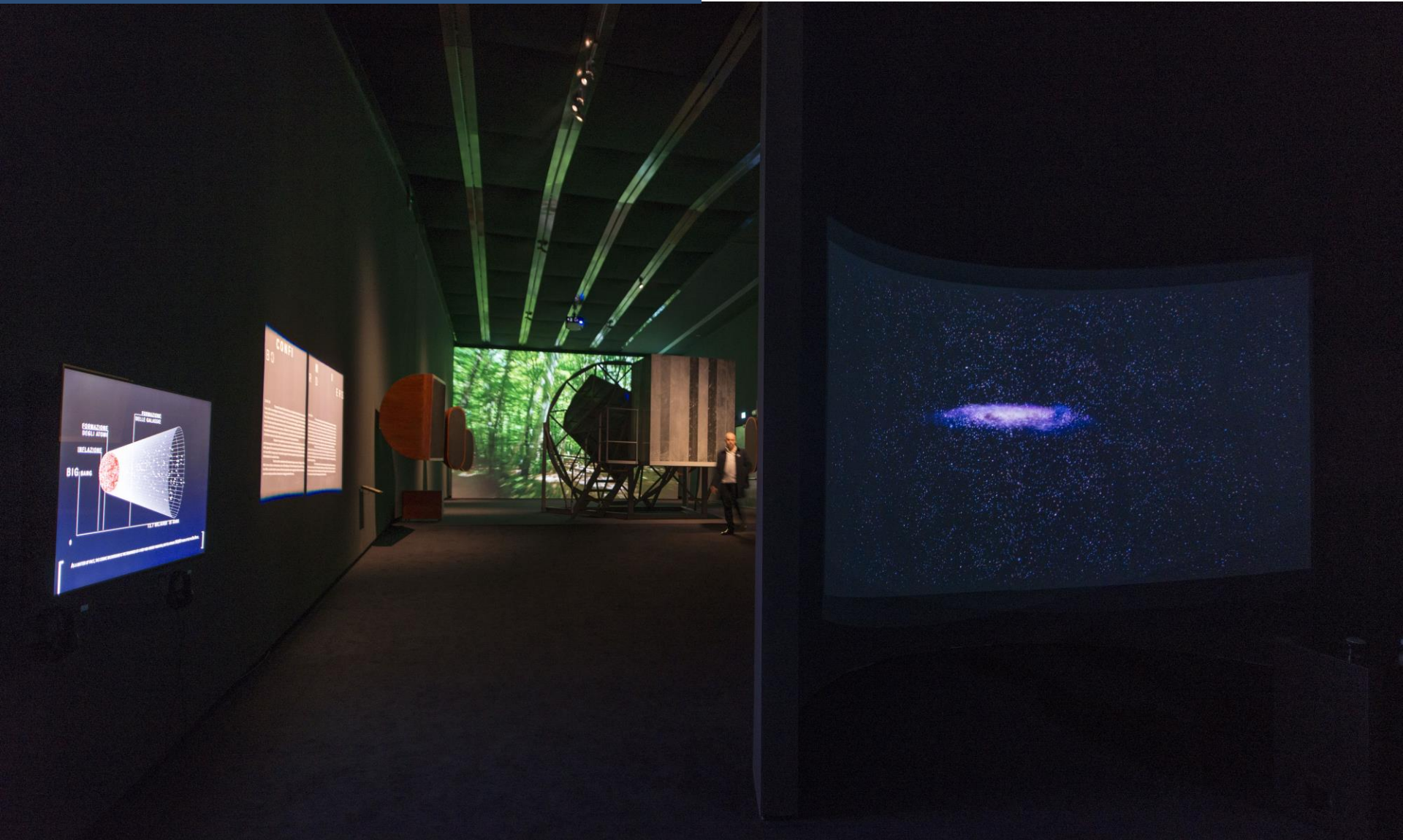
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Monocular (1640 –1645 circa)
Installation view

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Installation view

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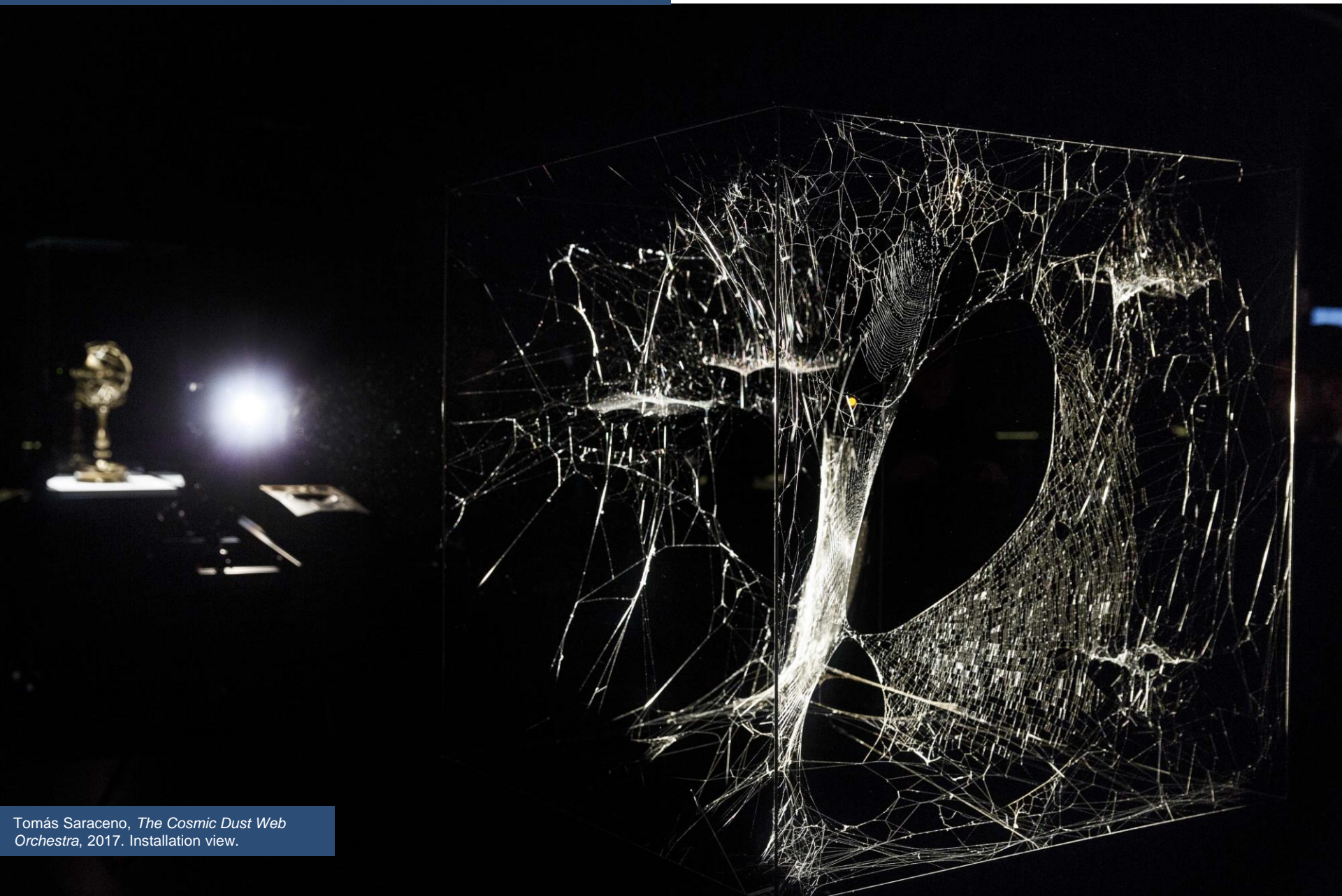


Tomás Saraceno, *The Cosmic Dust Web Orchestra*, 2017. Installation view.

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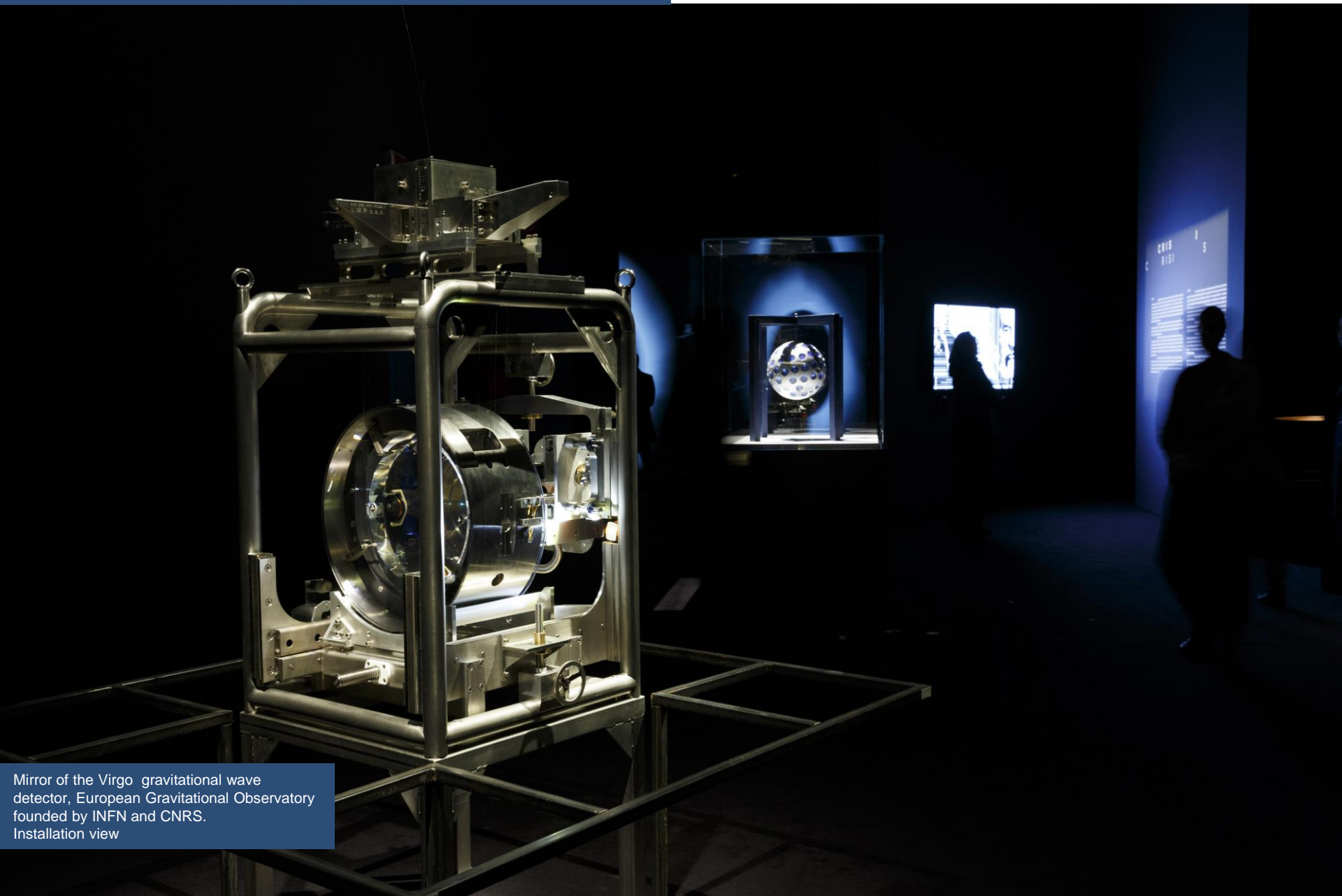
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Tomás Saraceno, *The Cosmic Dust Web Orchestra*, 2017. Installation view.

Gravity. Imaging the Universe after Einstein



Mirror of the Virgo gravitational wave detector, European Gravitational Observatory founded by INFN and CNRS. Installation view

Gravity. Imaging the Universe after Einstein



Installation view

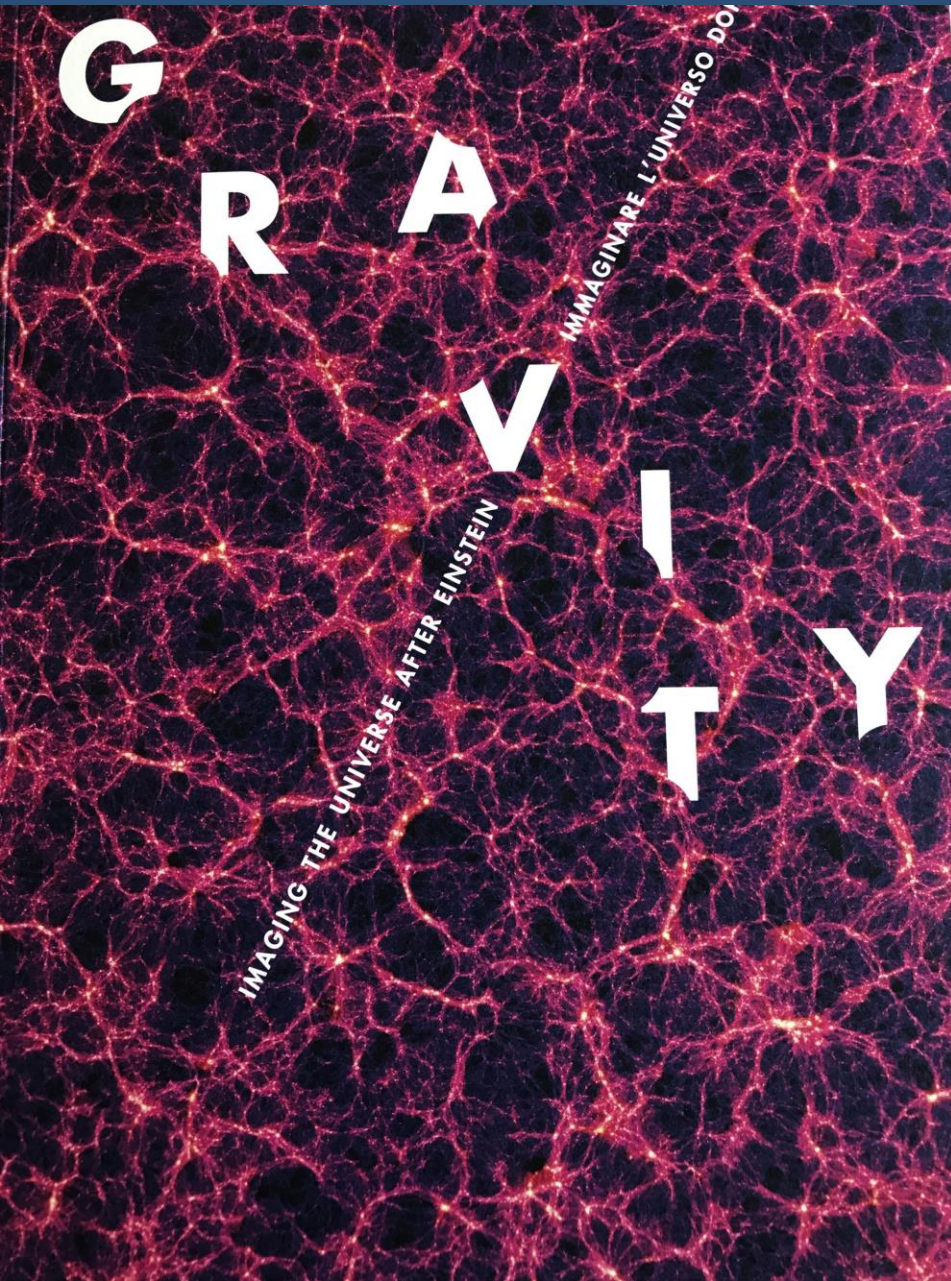
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Curving spacetime, 2009, INFN
Interactive video installation
Installation view



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