cosmos

Design from here and beyond

English

Introduction

Not a day goes by without new images reaching us from Mars, captured by the Curiosity and Perseverance rovers, images recorded by telescopes scattered across the deserts and peaks of the world, photographs taken by probes, satellites and from the International Space Station. In April 2019, the whole world was left wide-eyed by the image of a black hole, a reality that is so hard to comprehend, not least because black holes are so dense at their core that the distortion of space-time swallows up everything that approaches them, light included. The success of the mainstream publications of NASA and other international and European space agencies, their Instagram and Facebook accounts, and those of astronauts such as Thomas Pesquet, shows just how fascinated we are by images of the cosmic bodies and phenomena that make up our universe.

Since the dawn of humankind, the visual arts, music, literature, architecture and other spheres have found wonder and inspiration in celestial bodies such as stars, planets, galaxies, nebulae and black holes, in dark matter, and in the universal physical laws that structure them and choreograph this great cosmic ballet. Design is no exception to this fascination. The exhibition *Cosmos* and its accompanying catalogue reveal the work of designers who have, in a conceptual, technical or poetic way, questioned the architecture of the universe and the hidden laws of physics that govern it. From Einstein's theory of general relativity to quantum theory, from gravity to the nature of space and time, from the micro to the macro, the modern image of the cosmos is embodied in design projects that lead us far beyond its scientific roots and reflect its mysteries and beauty.

Initially published online, this evolving catalogue gives a platform to the designers whose work is showcased in the exhibition and to the guests contributing to the programme of events to be held at the CID - Grand-Hornu between October 2021 and February 2022. Through the eyes of researchers, physicists, cosmologists, authors and designers, this exhibition casts light on the fundamental issues that drive and inspire artists and scientists. What is our place in this vast expanse of space, the origin of which dates back 13.8 billion light years? How did cosmic evolution unfold? What is its future? Are we alone? Why does the universe exist? We hope you enjoy your trip.

Marie Pok, co-curator

Interview of Thomas Hertog

Thomas Hertog, an internationally renowned Belgian cosmologist, is also the co-curator of the exhibition *Cosmos. Design from here and beyond*.

CID director and curator of the exhibition, Marie Pok, went to meet him at the faculty of theoretical physics at KU Leuven.

From string theory to his approach to the anthropic principle, Thomas Hertog brilliantly and eloquently sweeps through the Universe. “The Big Bang is the beginning of time, the beginning of space... It is, perhaps, a boundary of a physical reality,” explains the former colleague of the famous Stephen Hawking, who shares the hypothesis that our universe is not unique but that there are in fact parallel universes that coexist.

Thomas Hertog is a world-renowned scientist, and has been closely involved in the creation of our exhibition *Cosmos. Design from here and beyond*. Keen to bring scientific research into a cultural space, he argues that the language of art is most definitely particularly appropriate for describing the elegance of the cosmos, a concept developed by many physicists, from Einstein to Hawking, via Heisenberg and Greene. The discussion focuses on the one hand on the freedom that creatives have to approach the cosmos, and on the other, on the intuition and creativity that scientists bring to the subject.

Link to the interview.

The harmony of the Universe

Talk by Jean-Philippe Uzan

On 4 February Jean-Philippe Uzan took the CID audience on a journey through the Cosmos, introducing them to the planets, music, physics, mathematics, astronomy and much more.

Jean-Philippe Uzan is a theoretical physicist and cosmologist who spends much of his time building scientific representations of the cosmos and comparing them with observations collected by telescopes and satellites. His goal is to reconstruct the history of the Universe and the matter contained in it. In this quest for knowledge, the theorist enjoys reflecting on the different worlds that science suggests are possible and, more than anything else, he relishes speculating on the intimate nature of the Universe and of reality. This means that he ends up crossing paths with other disciplines related to this fascinating field, from history and mythology to esotericism and art. It is where these disciplines intersect and clash that interest him and drive him to fly the flag, not for interdisciplinarity, but rather indisciplinarity.

While the exhibition *Cosmos. Design from here and beyond* explores the interaction between science and design, Jean-Philippe Uzan has immersed himself in the relationship between music and astrology, mathematics and cosmology. *The secret harmony of the Universe*, this fabulous work that he brought to life during his talk, begins by immersing us in ancient tradition, the ideas put forward by Pythagoras and Plato, then of Kepler and many more. We heard about the Harmony of the Spheres, stellar pulsations, music by Lully, Bach and Scriabin. We were introduced to the blind astronomer Wanda Diaz Merced. And we end up being reminded of the time capsule launched by the Voyager probes in 1977, and in particular the pieces of music engraved on the Golden Record. And what did we listen to? Take a guess...

View the whole conversation through this link

Jean-Philippe Uzan is a theoretical physicist and an expert in the Big Bang theory. He is a director of research at CNRS/ Institut d'Astrophysique de Paris and deputy director of the Henri Poincaré Institute.

The Hidden Design

Thomas Hertog

Introduction

Science is not like fiction in which we imagine a world that isn't really there. In science our imagination is stretched just to comprehend the world that does exist. During our first encounter in Cambridge as his prospective doctoral student, Stephen Hawking said to me "*In cosmology, I will take you where Star Trek fears to tread.*"

Hawking's remark touches on a profound point. In trying to understand the world on scales inaccessible to the human eye, physics and cosmology have opened up a realm of reality far beyond what we could ever have imagined. We have discovered that both the microscopic world inside atoms and the cosmos on the largest scales do not behave like anything we are familiar with. Rather they act in their own inimitable way -- the universe turned out to be not only queerer than we supposed, but queerer than we could have supposed.

What is perhaps most remarkable is that physics has revealed an intricate design of reality that is encoded in the set of mathematical laws governing the world. Specifically, the laws of physics appear somehow designed to bring forth just the right Universe in which complexity and life can emerge. The origin and ultimate reason behind the Universe's apparent design remain hitherto mysterious but most scientists believe that the secret is held by the physical conditions governing the Big Bang itself.

We are evidently part of the universe and our ability to understand and to reflect upon the World around us may well constitute a novel layer of complexity. The hidden design of the Universe therefore also suggests a profound connection between our existence and the mathematical code governing the cosmos. It is a central challenge for cosmology in the 21st century, when it probes yet deeper into reality, to understand this connection and in doing so, to shed light on our place in the grand scheme of things.

In what follows I wish to provide the reader with a glimpse of the astonishingly strange and subtle picture of reality that is emerging from our scientific explorations of the cosmos.

Our cosmic habitat

In the 19th century Darwin showed we are the outcome of 4 billion years of biological evolution. In cosmology, scientists go back before Darwin's simple beginnings to understand the evolution of the universe as a whole and the physical conditions that have led to the emergence of life, here on Earth and presumably elsewhere as well.

When we look out at the night sky the stars we see are somewhat like our Sun. A good fraction of them have orbiting planets that are called exoplanets. Since the first discoveries in the late 80s, astronomers have found nearly a thousand exoplanets, some of which resemble planet Earth and potentially harbor life.

Stars themselves are grouped together in galaxies. Our own Milky Way is a typical galaxy, containing billions of stars spiraling around a massive black hole in the center. Each galaxy functions as a cosmic ecosystem in which gas is being recycled. Stars form in nebulae – huge clouds of gas – and can die spectacularly in supernova explosions, ejecting their material far into space where it seeds the formation of a new generation of stars. Inside stars the nuclear fusion, which makes them shine, enriches the gas with chemical elements like carbon, silicon and iron that are the building blocks of complex structures like us.

In a cosmological perspective, galaxies themselves are just the atoms so to speak of the large-scale universe. The celebrated Hubble space telescope has observed galaxies far into the distant universe. They appear as small and faint dots to our most powerful telescopes, because their light has taken more than 10 billion light years to reach us.

Cosmic Evolution: The Big Bang theory
For thousands of years, human beings have contemplated the world about them and asked the great questions of existence. Where do we come from, and why is the universe the way it is? Modern cosmology aims to elucidate these questions by developing theories of the Universe which are both mathematically consistent and observationally testable. Their mathematical basis means the theories are predictive – we can calculate in advance what we should see next with our telescopes!

This has led to the discovery that the Universe is not eternal and unchanging, as was once thought, but expanding, starting with a hot Big Bang 13.7 billion years ago.

Expanding space arises naturally in General relativity, Einstein's theory of Gravitation. George Lemaitre, a Belgian physicist, realized this and used Einstein's theory to develop the idea of an expanding universe into a novel physical model of the cosmos in which the universe expands from a hot, dense state at early times.

The Big Bang theory became one of the most groundbreaking intellectual discoveries of the 20th century. It shattered the old picture of an unchanging everlasting universe and replaced this by an evolving fabric of space and time, hereby transforming the debate about whether the universe had an origin.

The key observation that ultimately confirmed the idea of a Big Bang came in October 1965 with the (accidental!) discovery of a faint background of microwaves throughout space. This is the afterglow of the hot big bang, cooled down by now to 2.7 degrees above absolute zero by the subsequent expansion of the universe. It provides us with a snapshot of the universe at a time when it became transparent to radiation, about 300.000 years after the Big Bang.

The Van Gogh like pattern of different colors in the sky map of that radiation produced by the NASA WMAP satellite in 2002 and shown above, represent extremely small variations in the temperature of the radiation coming to us from different directions in space. The difference between blue (cold) and red (warm) amounts to no more than one hundred thousandth of a degree. However Einstein's theory predicts that these miniscule variations are just large enough to evolve under gravitational attraction into the large-scale configuration of galaxies seen in the Universe at the present time.

A universe designed to bring forth life?
Lemaitre's theory of an expanding universe gives a compelling account of the emergence of our complex cosmos from a nearly uniform, hot dense state somewhere at early times. In doing so it establishes a profound link between the earliest moments of the universe and the present.

At first sight the reality picture that emerges from the theory lends support to a Copernican worldview according to which Humankind does not in any sense occupy a privileged position in the universe. As Stephen Hawking eloquently put it in his book *A Brief History of Time*, "We are merely chemical scum on a moderately-sized planet orbiting an average star in the outskirts of an ordinary galaxy." However a closer look shows that in the big bang model, the emergence of life as we know it depends in fact delicately on a number of seemingly fortuitous features of the laws of physics.

An example of how the laws of physics seem to be designed for life is the production of carbon in stars, which requires a carefully "chosen" ratio between the strength of the nuclear force (which holds atomic nuclei together) and the more familiar electromagnetic force. If it weren't for a near perfect numerical "coincidence" there would hardly be any carbon in the universe, and probably no complex chemistry or life.

A different example concerns the temperature variations in the cosmic background radiation mentioned earlier. If these had been only slightly larger, say one ten thousandth of a degree, the present-day universe would only have black holes. By contrast, if these variations were slightly smaller they would not have condensed into galaxies but remained small forever. Neither scenario yields a habitable universe…

All four forces of nature are in fact implicated in the life story. Changing the strength of any of them, even by a small amount, likely renders the universe sterile.

Since the laws of physics emerge from the physical conditions at the beginning, the question arises whether the big bang has somehow been mysteriously designed to bring forth just the right universe in which complexity and life could emerge. But Lemaitre's model does not explain how the universe actually began. It only predicts how the universe evolves once it got started. To understand the origin of the universe's hidden design cosmologists now try to stretch their imagination even further and face up to the physics of the big bang itself.

The Quantum and the Cosmos … a Multiverse
At a mathematical level this requires a synthesis of Einstein's General Theory of Relativity, which governs the large-scale structure of the Universe, with Quantum Theory, the theory of the very small. I believe only a union of these two theories into a single overarching mathematical framework can potentially clarify the underlying origin of the universe's bio-friendly design and provide us with a deeper level of understanding.

The search for such an all-encompassing framework has led scientists to string theory, a quantum theory which treats particles as tiny vibrating strings moving in nine dimensions of space. A particular kind of vibration is responsible for gravity and leads, in a certain limit of string theory, to notions of space and time very much as in Einstein's theory of General Relativity.

The six space dimensions in string theory that we don't see must be extremely small in our universe. They are rolled up

in a complicated shape somewhat like a knot. Now, the shape of the six hidden dimensions determines the physical laws in the four large dimensions that we do see (we are including one time dimension here). Since the hidden dimensions can be curled up in many different ways, string theory ends up predicting an ensemble of different possible worlds. Together these form a kind of landscape.

String theory remains incompletely understood for now, but I expect it will once again radically change our view of reality. This is because it is an example of a quantum theory and quantum theory is fundamentally probabilistic. Any theory of cosmology based on quantum theory will not predict a unique universe. Rather the different kinds of universes in the landscape of string theory co-exist and form a multiverse. (One can think of a multiverse somewhat as a tree in which the different branches represent different possible worlds.)

Only a small fraction of the universes in the multiverse will be habitable universes like ours. Evidently we must find ourselves in one of those. We cannot jump from one universe to another but I believe it may be possible to infer the existence of other universes from theory and indirect evidence arising from a deeper level of understanding.

Therefore the picture that emerges from a synthesis of the quantum and the cosmos is that the origin of the universe may well be part of science, but that the laws of physics do not predict a unique world with a given origin. In string theory the universe does not have a single, unique history. Rather there are many possible histories, and the universe lives them all.

Furthermore we get to play a part in deciding the history of our universe, because our existence and actions as observers somewhere within the universe select the habitable branches of the quantum tree. Reality in a quantum world is thus much less Copernican than what emerges in the old Big Bang model. Indeed, as Hawking and I wrote some years ago, in a dramatic change from the position Hawking took earlier in A Brief History of Time, “In a multiverse we are not merely chemical scum. Perhaps the most significant fact about the universe is that life exists.”

Thomas Hertog
Institute for Theoretical Physics, KU Leuven

Thomas Hertog

« Arts and Science »

On January 18, a webinar gathered an audience from all over the world around Thomas Hertog, cosmologist at the Politieke Wetenschappen - Political Sciences KU Leuven, Monica Bello, director of the "Arts @ CERN" program and designer Laura Couto Rosado. Camilla Colombo (Ohme) moderated the discussion.

By Filip Depuydt, guide at CID

After an introduction to the Arts at CERN program and current physics issues, the guests shared their experiences and answered questions from Camilla Colombo and the audience.

CERN, considered the largest particle physics laboratory in the world, has as its main objective to understand the origin of matter, the Universe and ourselves. It is also open to other disciplines that share this questioning, notably art. The Arts at CERN program was created in 2011 with the aim of promoting dialogue between the scientific and artistic worlds. Residencies are offered to artists who wish to combine their practice with that of scientists. Employing 15,000 people in some 300 buildings, CERN is a very creative community: about 400 scientists have already been involved in artistic projects.

Laura Couto Rosado has benefited from one of these residencies and shares her experience. While photographing her new environment, she gradually discovered the aesthetics of the scientific installations and the buildings that house them. Her observations and exchanges with scientists allowed her to translate scientific research results into a creative object. Her *Quantum Nugget* is part of the exhibition *Cosmos. Design from here and beyond*.

Thomas Hertog insists that science is also a form of culture. The renowned cosmologist admits that our scientific observations are never 100% objective, because they are interpreted. Science considers reality from a certain point of view, subjective by definition. Where then are the limits of science? There are vast grey areas between quantum theory, Einstein's theory, the limits of our science and our observations. Artists can fill them according to their imagination, which is not the case for scientists.

Agreeing on the idea that science and design meet within the exhibition, the guests answer many questions from the audience. For example:

Is art on a mission to popularize science or to better understand it?

It's more like a new methodology or another approach. Her residency allowed Laura to develop a new working method that she still uses today. According to Thomas, art is not only used to illustrate science, but scientific data can become a source of inspiration for artists. Monica refers to Leonardo Da Vinci to explain that art can help create real scientific tools.

View the whole conversation through this link.

Monica Bello, art historian and curator, is curator and director of Arts at CERN, the arts program of CERN, the European Laboratory for Particle Physics in Geneva. Arts at CERN encourages dialogue between the arts and physics, creating new modes of exchange between artists and scientists, questioning the links between these disciplines and encouraging artistic innovation and openness to the world of research.

Thomas Hertog is a cosmologist and physicist. He studied physics at the KU Leuven and obtained his PhD under the supervision of Stephen Hawking at the University of Cambridge in the UK. He is now a professor at the Institute of Theoretical Physics of the KU Leuven where he leads a research group on the relationship between the Big Bang and string theory.

Laura Couto Rosado is a designer, drummer and shaman apprentice. Her practice has evolved from the form/function principle and the dogma of "problem solving" to other paradigms reflecting the complexity and acceleration of social change. She has been a resident at CERN.

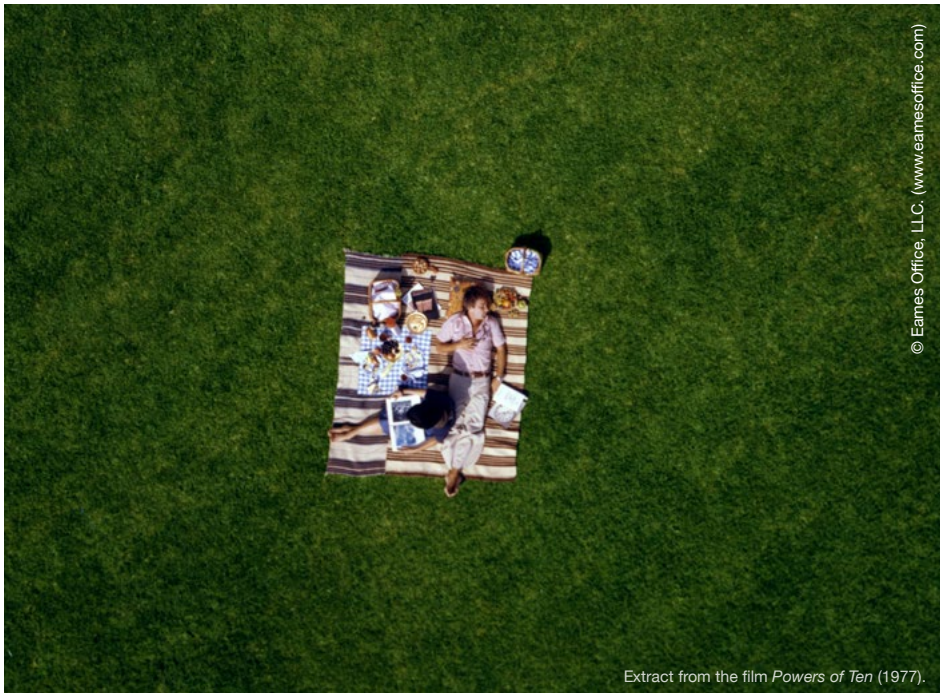
Ohme Studio is an organization that brings together artists and scientists to create new work, organize events, and support creators in interdisciplinary practices. Ohme explores the boundaries between artistic and scientific disciplines, rethinking practices and contributing to the development of new understandings of interdisciplinarity.

Micro Macro

“A genuinely complete cosmogony should be able to explain both atoms and suns”, declared Georges Lemaître (1894-1966), the Belgian canon now considered the “father” of the Big Bang theory. In the 1920s, seeking to link up nebulae with atoms using Einstein’s new theory, this physician and priest posited the idea that a primeval atom spawned an expanding Universe. The infinitely small was thus interconnected with the infinitely big.

In his cosmogony, Lemaître sought to reconcile quantum mechanics (which describes the microscopic Universe) with Einstein’s relativity (which applies to macroscopic phenomena). According to the astrophysicist Thomas Hertog, “the Big Bang and black holes are both quantum and gravitational. They tell us that the big and the small are fundamentally linked. In these extreme conditions, Einstein’s relativity and quantum theory should work together. Except that is not the case, which is widely considered to be the largest unresolved issue in physics.”

Moving from the micro to the macro also offers a cosmic scale to introduce this exhibition. Three works of contrasting scales invite us to think about our place in the Universe, a line of questioning that Arnaud Sprimont examines via his pn recreating a quark on a human scale. The film by Ray and Charles Eames explores the microscopic and satellite images that were available in 1974, whilst the video installation by Klaas Verpoest, made especially for this exhibition with a musical soundtrack by Benjamin Glorieux, draws us into the huge gap between these realities.



Extract from the film *Powers of Ten* (1977).

Charles et Ray Eames
Powers of Ten, 1977
Vidéo 9’

Charles and Ray Eames, the most iconic designers of the 20th century, changed the face of furniture and architecture.

When the Eameses came across the book *Cosmic View: The Universe in Forty Jumps* (Kees Boeke, 1957) they decided to use it as the basis of a film investigating the relative size of things and the significance of adding a zero to any number. This is how they made *Powers of Ten* in 1977, using exponential functions to visualize the importance of scale.

Powers of Ten illustrates the Universe as an arena of both continuity and change, of everyday picnics and cosmic mystery.

It begins with a close-up shot of a man sleeping near the lakeside in Chicago, viewed from one meter away. The landscape steadily moves out until it reveals the edge of the known universe. Then, at a rate of 10-to-the-tenth meters per second, the film takes us towards Earth again, continuing back to the sleeping man’s hand and eventually down to the level of a carbon atom.

A film by Charles and Ray Eames, © 1977 Eames Office LLC, preserved by the Library of Congress, Packard Campus, Audio/Visual Divison

© Photo Stijn Wils

Arnaud Sprimont
Microbiota, 2020
Bronze, maillechort, inox, ambre

Trained in contemporary jewelry and sculpture, Arnaud Sprimont is a hybrid creator.

“As the point of departure to understanding these jewellery pieces of Arnaud Sprimont, I would like to use an idea from French philosopher Blaise Pascal (1) as a reference: what is my place in the infinite, what is my place in nature?

At the genesis of Arnaud Sprimont’s work is the human point of view. It is of his privacy that he speaks to us here; the intimacy of his body, the privacy of his relationship with nature, and beyond nature, his vision of human nature.

At the outset, there is observation. Observation which is not confined to what the human eye can see. Using modern techniques, ranging from nano-scale imagery to satellite views, Arnaud Sprimont challenges the boundaries of his body and his perception of the world around him.

Reflecting and blending scales back and forth, the infinitely large finds meaning in the infinitely small, where an abyss of possibilities opens itself up to him.

Setting out from these studies, he then embarks on constructing a narrative. It is not about lending meaning to this infinite, but to talk about the tensions and romances felt, to highlight relations thought unlikely.”

Extract from the text by Marie-Luce Martin

The Solitary One

Performative installation

By Klaas Verpoest, Vincent Caers, Benjamin Glorieux, Stéphane Detournay

There you are, all alone in the middle of a pitch-black black hole. How did you get here, and how do you get out? Shouting, ranting, flashing, in every way you try to reach the outside world, but everything seems to come back to you like a boomerang. Nothing escapes the horizon, or does it? Is there anything or anyone out there who can see and hear what you are experiencing in there?

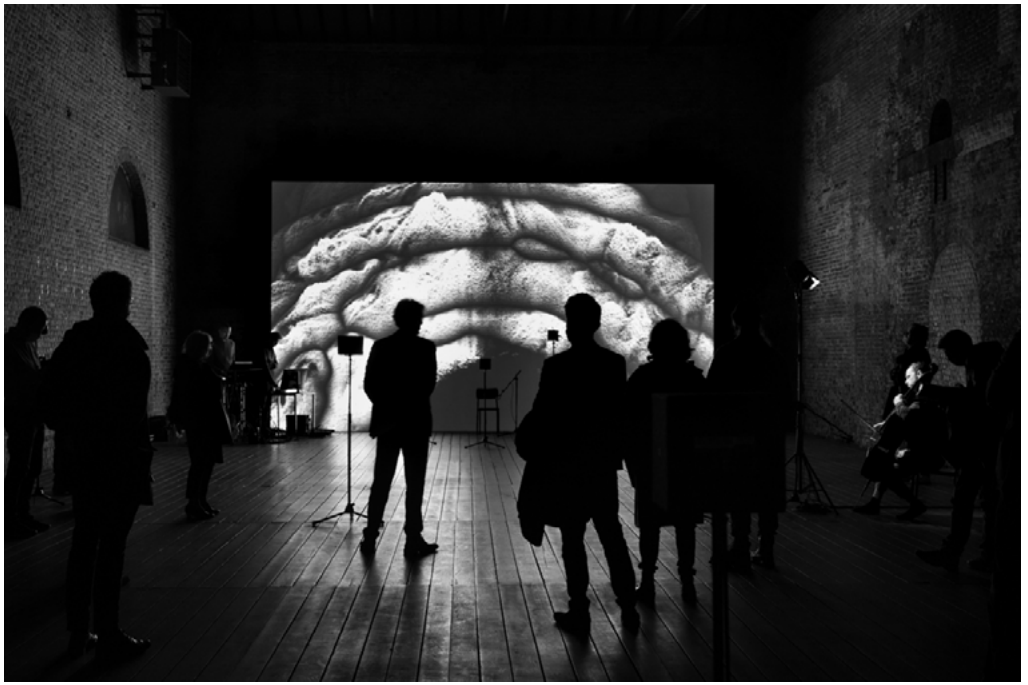
The Solitary One is a performative installation that transforms the most extreme and paradoxical object that houses our universe - the black hole - into an immersive audio-visual experience.

When entering the exhibition space, the spectator looks at the black hole from a distance. All matter in space circles in an accretion disk around a dark core. Matter that is in the spectator's field of observation can be heard as sound. Three semi-circles with speakers place this sound in the physical space. When the matter disappears into the black hole, the curvature of spacetime ensures that it remains visually perceptible on the wall-wide LED screen. In this way, time and space merge into a continuum in which matter circles like audio-visual particles. From a distance, this can be perceived as a structured whole on a macro level. As soon as the spectator moves towards the screen, the whole thing fades away and each tiny piece of dust comes increasingly into focus on a micro level. The spectator becomes increasingly aware of specific particles and gradually immerses himself in a maelstrom of audio-visual matter. Everything seems to be circling ever faster towards the core, but it gradually becomes clear that some particles do manage to escape from the observation horizon. In the particles, the visitor recognises fragments from the opening concert that shoot away through space, split up and fade away. As long as the exhibition is running, the resulting matter will continue to circle through space in a fragmented way, trying to escape the immense attraction of the core. The opening concert activates the black hole, while the closing concert leads to its extinction and the end of its cycle of existence.

Both in the contemporary art scene and in the academic world, there is a growing demand for projects that focus on the transformation of scientific insights into artistic realisations. Visual artist Klaas Verpoest, sound artist Vincent Caers and cellist/composer Benjamin Glorieux have been working on the interface between science and art for some time now, within their individual artistic practice and/or artistic research. A shared fascination for the incomprehensibility of black holes and concepts such as time and space and the intention to further explore the artistic potential of these phenomena, each from his own discipline, is the basis for their collaboration with theoretical physicist Stéphane Detournay (ULB). Their aim, however, is not to explain or clarify a scientific phenomenon; that task belongs to science. With this immersive installation, they want to make the cosmological phenomena and the driving forces and processes behind them experienceable for the public.

Credits: Klaas Verpoest: Video artist
Vincent Caers: Sound artist
Benjamin Glorieux: Cellist/Composer
Stéphane Detournay: Scientific advisor

© photo Virginie Schreyen



The Solar System

Our Solar System was born 4.6 billion years ago when a cloud of gas and dust contracted under the force of gravity. This contraction created a rotating, flat disc of gas and dust, with a cluster of very dense matter at the centre: the proto-Sun. When the temperature at its core reached a temperature of 15 million degrees, the hydrogen nuclei began to fuse, producing huge amounts of energy. A new star, the Sun, was born.

The majority of the matter not absorbed by the Sun clumped together in increasingly large fragments that ultimately became the round planets orbiting the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (in ascending order of their distance from the Sun). Pluto was ‘demoted’ to the rank of a dwarf planet. The rest of the surrounding matter formed planetary satellites, asteroids and comets. These eight planets are what remains of the initial chaos. Numerous objects of varying sizes collided with each other and were ejected from the system.

It is believed that there are billions of planetary systems in the Milky Way alone. These systems could be similar or very different to our own. Some only have planets as big as Jupiter, whilst others even have two suns. And some have not one but multiple planets within a “habitable” zone. Since the 1960s, the probes and telescopes exploring the Solar System have been supplying breathtaking images that have inspired our imaginations and sparked the creativity of artists and designers.

© Photo Blaise Adilon

Katie Paterson (°1981)
Candle (From Earth into Black Hole), 2015
Wax

Katie Paterson is an Honorary Fellow of the University of Edinburgh. Her projects question our place on Earth in the context of time and geological change. Her work uses sophisticated technology and specialist expertise to reduce the distance between the viewer and the farthest reaches of time and the cosmos.

A scented white candle that burns down over 12 hours, creates a journey through space via scent. The candle is formed of layers, each containing a unique perfume corresponding to a planet or place in the Universe: as if taking off from Earth, travelling to the Moon, the Sun, Mars and Jupiter, via the stars, and into a vacuum.

Collection CID – Province de Hainaut

Gio Tirotto (°1981)
Coexist, 2019, Secondome
Handblown borosilicate glass, stencil, lasercut brass

After graduating from the Polytechnic University of Milan (2007), Gio Tirotto founded his own design studio in 2010. His work focuses on graphic design, interior design, exhibition installations and more. Tirotto believes that ritual, knowledge and imagination are the essential functions of things.

In his two complementary projects *COEXIST*: the *MOD*. *GROUND* globe and the *MOD*. *SKY* stellar map, the transparent glass allows to look to the world and the stars in their entirety, overlapping far places close in the blink of an eye, underlining both their symmetries and differences. «Logic will take you from A to B, imagination will take you everywhere» A. Einstein said. Gio Tirotto challenges the geographic logic through these objects in which distances are nullified and infinite point of view cohexist creating a whole new imaginary.

© Secondome edition

Marc Sadler (°1946)
Eclipse, Nuance Silence, Olev
Glass, perforated metal

Marc Sadler is a graduate of the École des Arts Décoratifs (Paris). His work focuses on research in the field of materials and technologies.

The *Eclipse Nuance Silence* pendant lamp, designed for Olev, is made of iron and blown glass. The lighting system's radiation is reduced by the shaded glass sphere that contains it. The external disk, which reminds us of Saturn's rings, supports the light source and plays a soundproofing role thanks to its micro-perforated sheet. The narrative design here becomes functional.

Collection CID – Province de Hainaut

TEASING NEW WEATHER TV: POST-PRODUCING GLOBAL VIEWS

Simone Fehlinger (designer, born 1980, lives and works in Saint-Etienne, France)

Part of the design research project NEW WEATHER TV hosted by the Deep Design Lab—The material and the visual of the Anthropocene at the Cité du design in Saint-Etienne and in collaboration with the École urbaine de Lyon.

Which images do we want to become real?
The design of images, objects (and the use of objects), buildings or infrastructures is always the materialization of thought(s) and technique(s). Social and political ideologies become attitudes through concrete and everyday designed forms and styles—as they model our bodies, our landscapes, our relationships. In 2014 and 2015, the World Meteorological Organization (WMO) invited about sixty television weather presenters from around the world to imagine the weather report of the year 2050 with the purpose of promoting the Paris Conference on Climate Change (COP 21), the Sendai Conference on Disaster Risk Reduction, the Lima Conference on Climate Change (COP 20) and the United Nations Climate Change Summit New York. These media artifacts are essentially all the same: The planet is presented as a techno-sublime post-photographic satellite view—performing an overview that places our bodies outside the world. The Earth system is understood as a (weather predicting) computer model where natural phenomena (like pressure, temperature, precipitation, wind, humidity) are converted as numbers, icons, and coded color systems—developing the fiction of our environment as an external, calculable, normalized object. The weather map is identical to a political map—remaining on the nation-state even though winds and particle bodies do not care about political borders. Instead of explaining the complex and interconnected relationships of human and non-human actors, the current visual culture of climate change is furthermore reduced to images of extreme weather events like floods, heat waves, melting icebergs and drought—staging the sublime spectacle made by industrial man. This initially European worldview—based on the supremacy of a human elite at the stake of declassified human and non-human beings—daily penetrates our bodies through the (mainstream) weather report.

If reality is post-produced, it also means that we can intervene in reality with imaging techniques. The question may no longer be "What is represented in images?" or "How do we read images?"—although these questions still remain absolutely important. But as makers, producers and co-producers of images, additional questions are: which images do we want to become real? How do we change reality by the means of post-production? How can reality be photoshopped? How can reality be edited?
Hito Steyerl

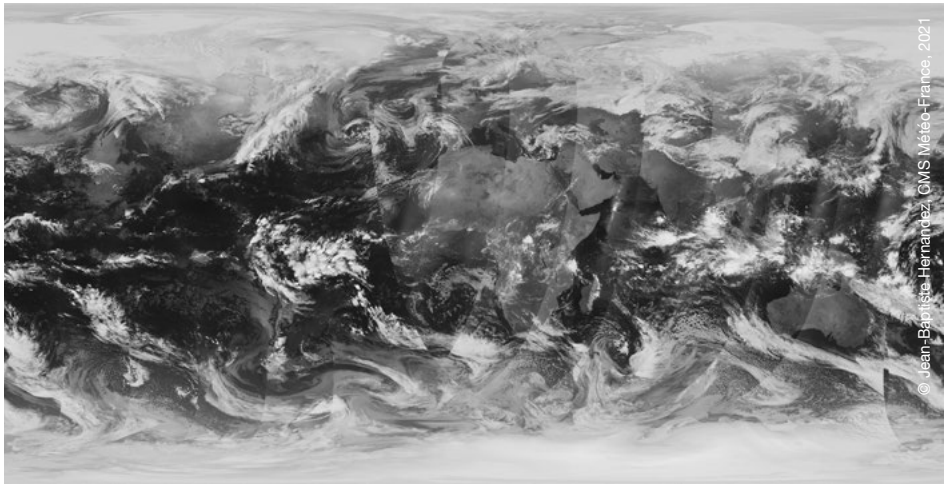
Since contemporary visual culture constitutes its reality in images, reality can be changed through post-production techniques. Assuming that the Earth has been transformed into a video installation, a television studio, a design studio, NEW WEATHER TV understands weather as an everyday screen practice that incorporates modern (and hence anthropocene) ideologies into our daily Western realities—global views, "objective" worldviews, borders and sublime images of disaster. Given that images represent, mediate and do realities, we need to question our most common representations in order to denaturalize the endlessly repeating standards of modernity. We have to critically reflect on our inherited modern archive—about the way narratives have been invented and to whom, what and which image-making tools they are mutually linked. What is the relation between the physical (weather) phenomenon and its image? Which thought(s) and technique(s) need to be edited in order to form a new media work SLASH reality? What future weather do we want?

Post-producing global views ...
Deeply engaged with modern history, the fiction of the global view—invented and continuously updated by Europeans since the 15th century—composes with the design of the globe, a small scale—and hence manipulable—model of our planet. Simultaneously art SLASH design object, iconography of power, and demonstration of scientific knowledge, Google Earth is maybe its latest redesign. Based on a geometric grid invented by Gerard Mercator in 1569, the 3D globe updates an overview that places our bodies outside the world and stages—once again—a human species as a godlike being able to smoothly zoom in and out of the world. Initiated during the Cold War, our current version of the global view moreover relates to a corporate-state-research-military complex that stimulates modern weather observation and modeling by means of satellite and computer technologies. TEASING NEW WEATHER TV: POST-PRODUCING GLOBAL VIEWS is the first of a series of short films, outlining (academic) arguments motivating the prototyping of new weather representations. Questioning the links between science and fiction that condition space exploration and contemporary imaginaries, the video shows

the outside view as a (political) design object that structures (via imaging techniques) the perception of (and the relation with) our planet.

Which images do we want to become real in order to perform post-anthropocentric attitudes? Can we redesign the iconic global perspective—building on the reality of ‘composite’ images materializing partial and situated images linked to other partial and situated images (captured by weather satellites and probes)? Stay tuned ...

Non-seamless composite image made of 10 consecutive orbits captured by the satellite MetOp-01.



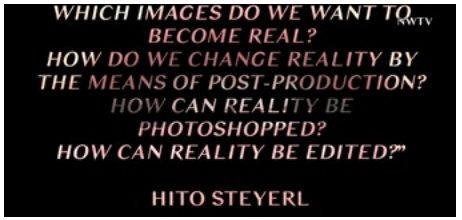
The following script segments and screenshots contextualize the chapter THE SCIENCE AND THE FICTION OF THE GLOBAL VIEW — shown as part of the exhibition *Cosmos*. Design from here and beyond at the CID (2021/2022) and the mudac (2023) — within the total video work.

PART 1/5 (INTRODUCTION): POST-PRODUCING REALITIES

Link to video

Weather is an everyday screen practice that incorporates modern worldviews into our daily Western realities – global views, 'objective' worldviews, borders, and sublime images of disaster – modeling our bodies, our landscapes, our relations, our attitudes.

These images are incorporated – digested – by the human body, linked to recorders, archives, players, screens, and speakers.

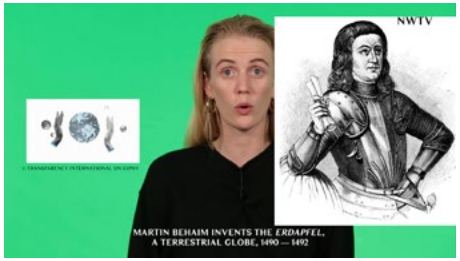


To change realities, we must change — redesign — post-produce — our already postproduced [re]presentations

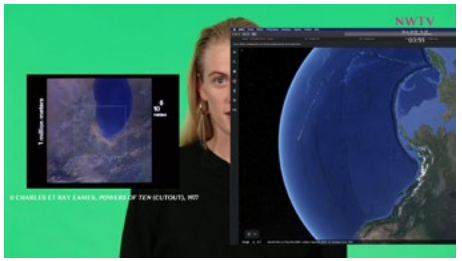
What images do we want to make real? How can chroma key technology — already commonly applied to weather data — interrupt, deconstruct, and redirect worldviews?
What future weather do we want?

PART 2/5: THE GLOBAL VIEW AS (MODERN) ARTIFACT

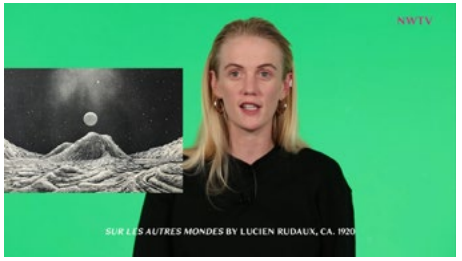
Link to video



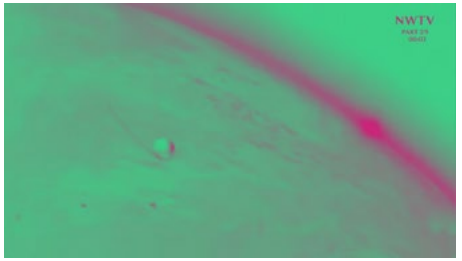
"The outside view of the finite world, which is at the origin of the mastery of the globe, features what anthropologist Philippe Descola has called the "naturalist" representation of the world [...]". This is "one of four dominant registers that make it possible to explain the relationship between man and nature in different societies and is defined, in the case of "naturalism", by an "objective" representation of the world, in which humanity's relationship with its environment is now carried out from subject to object, placing humanity in a strategically privileged position, that is outside a world to which it nevertheless belongs". Sebastian Vincent Grevsmühl



"Once again, despite the illusion produced by the toxic manipulation of 'Google Earth', the scale is the result of the number of connections between the localities, not the movement through I don't know which pre-ordered zoom ranging from the very large to the very small." Bruno Latour



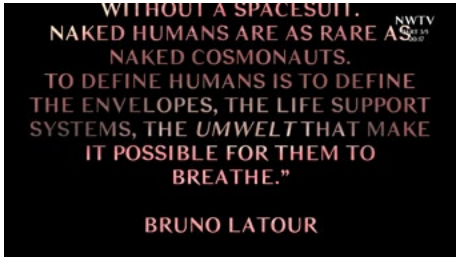
Once imagined representations of the Earth seen from outer space – naturalistic drawings made by astronomers and artists merging science and fiction – entered the fashion of a new "mechanical objectivity" conditioned by the invention [and linking] of photography, aviation and space exploration.



"In 1957 an earth-born object made by man was launched into the universe, where for some weeks it circled the earth according to the same laws of gravitation that swing and keep in motion the celestial bodies — the sun, the moon, and the stars. To be sure, the man-made satellite was no moon or star, no heavenly body which could follow its circling path for a time span that to us mortals, bound by earthly time, lasts from eternity to eternity. Yet, for a time it managed to stay in the skies; it dwelt and moved in the proximity of the heavenly bodies as though it had been admitted tentatively to their sublime company." Hannah Arendt

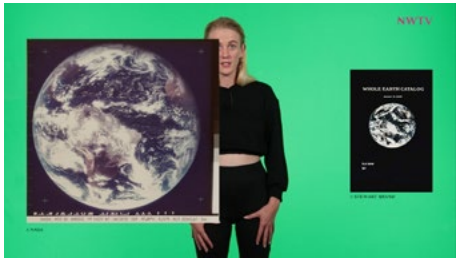
PART 3/5:
THERE IS NO OUTSIDE
Link to video

Inspired by astro-futuristic fictions, and in response to a potential environmental crisis, architects and designers materialized the utopia of climate control in order to inhabit new territories – inspiring since both a culture of geo-engineering and a [white] counterculture of ecological niches.



What would a design look like that represents the inside and the outside not as separated but as connected spheres?

PART 4/5: THE SCIENCE AND THE FICTION OF THE GLOBAL VIEW
Link to video



"It was February 1966 and I was twenty-eight and was sitting on a gravelly roof in San Francisco's North Beach. I had taken a mild dose of LSD on an otherwise boring afternoon and sat, wrapped in a blanket, gazing at the San Francisco skyline. As I stared at the city's high-rises, I realized they were not really parallel, but diverged slightly at the top because of the curve of the earth. I started thinking that the curve of the earth must be more dramatic the higher one went. [...] I imagined going farther and farther into orbit and soon realized that the sight of the entire planet, seen at once, would be quite dramatic [...]. And I figured a photograph–a color photograph [...]. There it would be for all to see, the earth complete, tiny, adrift, and no one would ever perceive things the same way."
Stewart Brand

ÉPISODE 5/5 : NOUS SOMMES TOUS DES ASTRONAUTES
Link to video

We Are All Astronauts. But not in operating a Spaceship Earth as Buckminster Fuller once suggested. We Are All Astronauts, precariously dependent on the material realities made of multi-layered environments that make it possible for us to breathe.

The green background is our new contemporary space. It is a container, a holder, a recipient. The weather woman is placed in the void of the green screen, without pole or perspective, and post-production gives her back–gives us back–in real time–a new world.

Pictures : *Teasing New Weather TV: Post-producing Global Views* (screenshots) © Simone Fehlinger, 2020.

The moon

Fiction and art anticipated humans' first steps on the Moon: our nearby satellite, visible and influential, remains an endless source of inspiration for the world of artistic creation. Born 4.5 billion years ago when the protoplanet Earth collided with a celestial body, producing various pieces of debris, the Moon orbits the Earth with the same side always facing towards us. Even without a telescope, in clear weather it is possible to see various details on its surface such as its numerous craters and seas, and the scars of old volcanoes, lava flows and asteroid impacts. So it is no surprise that numerous designers have studied the available images and our collective psyche to create lamps and other items inspired by the Moon. Space exploration, beginning with the launch of Sputnik in '57 then the first steps on the Moon in '69, triggered an optimism and faith in technology that heavily shaped the architecture and design of the 1960s. Although the CID focuses on contemporary design, we could not ignore some Space Age icons that take the Moon as their model in both texture and shape, as well as in its phases and the way it reflects the light from the Sun.

Verner Panton (1926 - 1998)
Luna wool rug, 1979, Verpan
New Zealand wool

Verner Panton, an architect by training (Royal Academy of Fine Arts in Copenhagen), is one of the personalities who had a significant influence on the development of design in the 1960s and 1970s. His work is recognized by its bright colors and characteristic geometric shapes.

At the end of the 1950s, the Americans and the Soviets waged a veritable scientific and technological war to send spacecraft, and then men, into space. With the first space flights in the 1960s, the conquest of space became a reality and occupied everyone's minds. Highly covered by the media, space then became a subject that was widely explored in various fields, including design.

The *Luna rug* is a good example. Its organic pattern consists of eight circles of yellow, grey or green hues, evoking the diffusion of the light emitted by the moon. The rug serves to emphasize and/or transform the dimensions of the space.

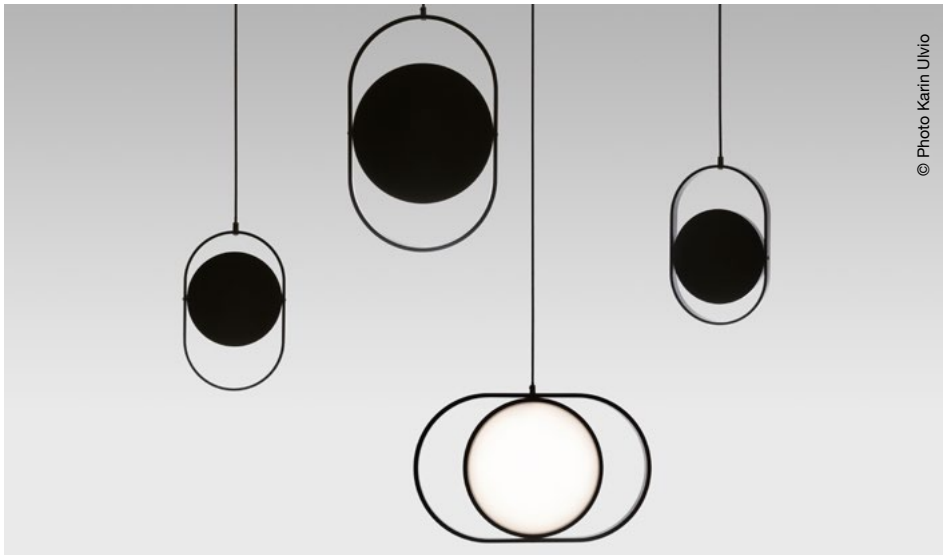
Collection CID – Province de Hainaut

Elina Ulvio (°1981)
KUU, 2017
Plywood, acrylic, LED

With a background in architecture, Finnish designer Elina Ulvio offers design described as functional art.

KUU is Finnish for moon. *KUU* pendant was inspired by the affection of Elina Ulvio to atmospheric illumination. The lamp that is adjustable from direct to indirect lighting according to the versatile needs we have regarding light during distinct times of the day. The movability of the lamp brings it a constantly
changing figure that forms different sized crescents and round shapes, reminding of the moon during various periods.

KUU pendant is awarded best product of the year by the Association of Finnish interior.



Oscar Lhermitte (°1986), **Alex du Preez, Peter Krige**
Moon, 2016
Rotocasted polyurethane resin, machined anodised aluminium, stainless steel, electronic components

Oscar Lhermitte is a French-born designer. After he graduated from Central Saint Martins School in 2009, he launched his own design practice and since 2012, has been the co-founder and director of the collective Sidekick Creatives LTD.

The project involves the use of the latest data from NASA's Lunar Reconnaissance Orbiter combined with advanced electronic and mechanical engineering alongside careful craftsmanship in mold making. Oscar contacted the team at the Institute of Planetary Research and they gave him access to their database. The data used are DTM (Digital Terrain Model) and are constructed from stereo images. The images were then worked on to achieve the correct scale of terrain and make it spherical. One full Moon was 3D printed in order to become the MOON Master (the one the molds are then made from). They used an industrial nylon printer, with a layer thickness of 100 micron. The globes are rotocasted from hard polyurethane resin. Each of them are pigmented in order to get a 'concrete' moon-like colour

In order to make the LED ring rotate in sync with the actual Moon, Kudu mimicked the Sun and Moon's real time path by building and coding a custom computer that precisely controls the motion of the light.
Its software and gearing system make sure it is perfectly in sync with the real-time lunar phase.

This results in a truly accurate 1/20 million replica of the Moon with surface features in every detail.

Nathalie Dewez (°1974)
Moon, 2012
Polycarbonate, mirror polished stainless steel rings, LED

Nathalie Dewez studied interior design at La Cambre. Her main focus is on lighting, with materials ranging from metal to glass and other sustainable resources. Her work incorporates the question of material/non-material duality, considering it as the very essence of any lighting object.

The *Moon* lamp has been commissioned by the Queen Elisabeth Music Chapel in 2012 to be part of the "New Building". The lamp is composed of a big flat translucent disk framed by a simple metal ring. The disk and the ring can slightly move in the other. Moon provides a soft light, similar to that of the full moon when it illuminates a night sky.

Collection Centre national des arts plastiques (France).
N° inventaire FNAC : 2019-0222

Jasper Morrison (°1959)
Superloon, 2015, Flos
Aluminium, LED

Jasper Morrison is one of the leading figures in industrial design of the last few decades. His work focuses on a sober design, described as "super normal".

Inspired by the luminosity of the moon, the Superloon is notable for its round, uniform diffuser that can rotate 360° to illuminate any part of the space.

Collection CID – Province de Hainaut - donation Flos

Unfold (2002)
Sea of Tranquility, 2015
Installation with colored sand, perfume and soundtrack

Founded in 2002 by Claire Warnier (°1978) and Dries Verbruggen (°1979), both graduated from the Design Academy Eindhoven, the Unfold studio
develops projects that explore new ways of creating, making, financing and distributing in a changing world.

Only twelve people have had the opportunity to smell the moon. Returning from a walk on the Moon, the astronauts of the Apollo 12 mission (1969) brought back samples of the ground in the lunar module where it reacted with oxygen and gave off an intense but brief smell. Since the lunar dust could not be isolated from the oxygen in the lander, the smell disappeared before the return to Earth.

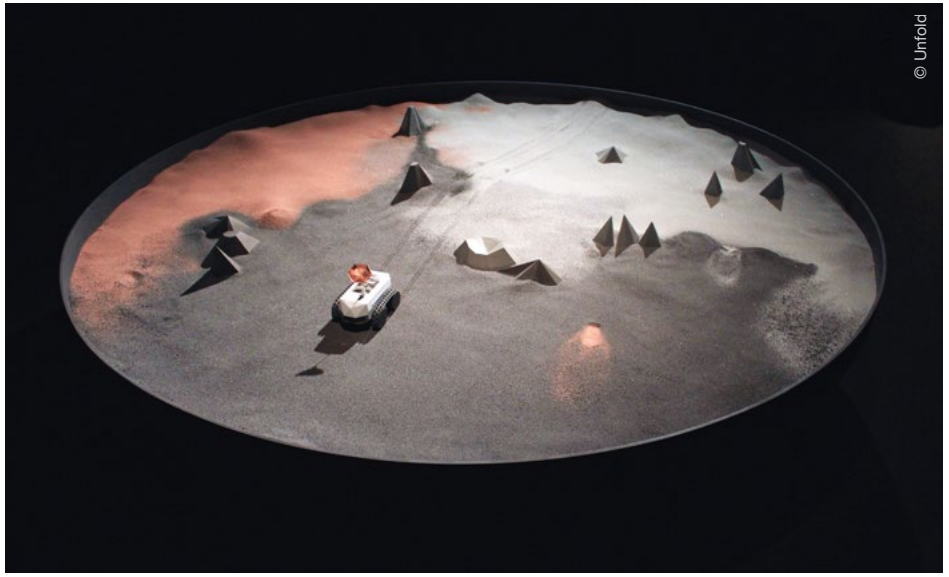
Unfold searched through NASA archives to find the various comments made by astronauts about the smell and appearance of lunar dust.

From this information, Barnabé Fillion created a fragrance with accents of silver, ozone, gunpowder, dust, musty and honey.

Sea of Tranquility is composed of a lunar landscape and a soundtrack of the original conversations about the smell and appearance of the lunar surface recorded during the Apollo 12 program.

This olfactory installation is the result of a collaboration between French perfume designer Barnabé Fillion and Unfold for the Precious exhibition (Maison&Objet 2015).

French curator Elizabeth Leriche commissioned Fillion and Unfold to produce a scent and olfactory experience for the exhibition ‘PRECIOUS’, part of Maison&Objet 2015.

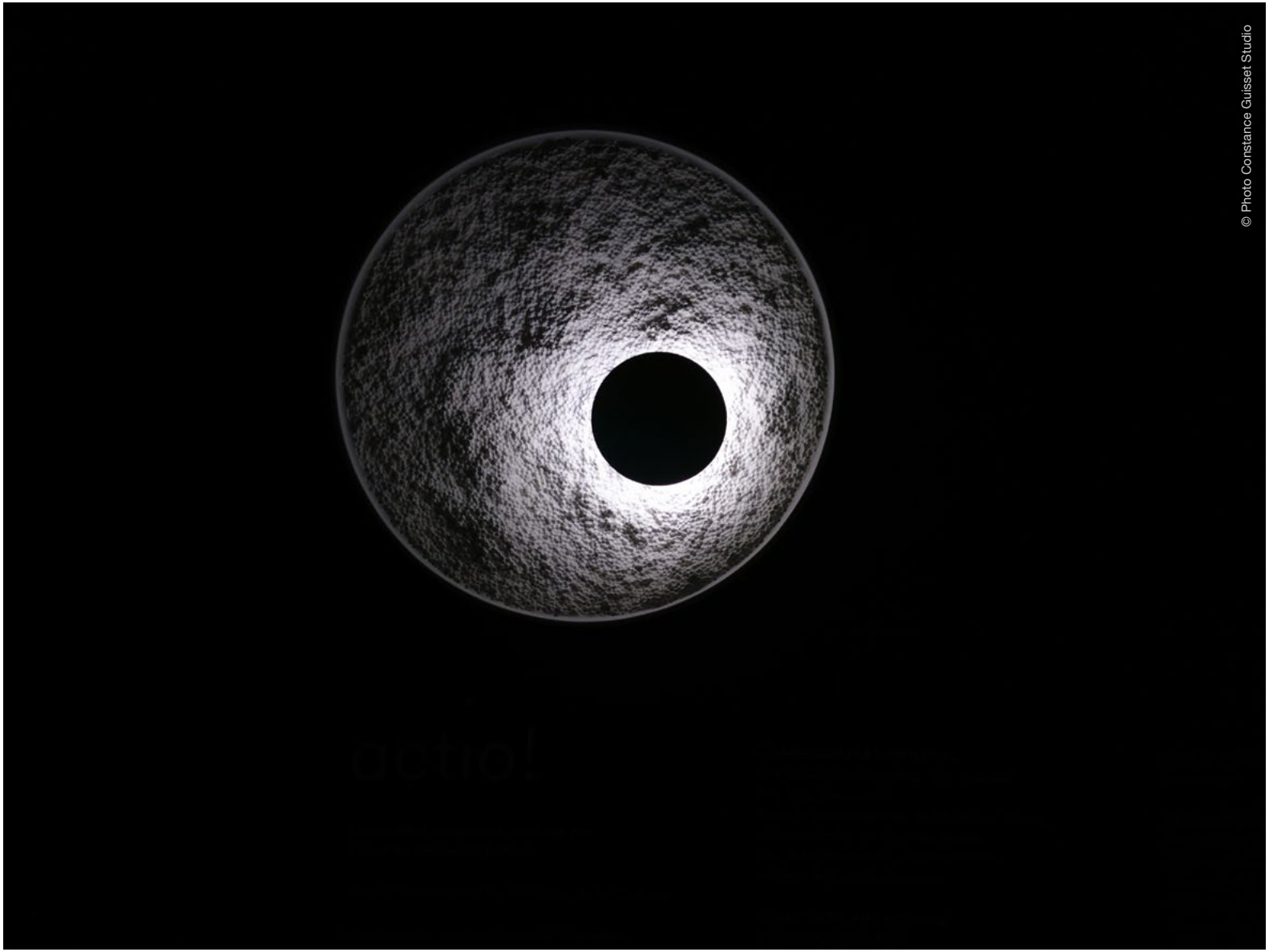


Constance Guisset (°1976)
Apollo, 2017
Plaster, metal, LED

After graduating from ENSCI - Les Ateliers (Paris, France), Constance Guisset founded her design, interior architecture and scenography studio in 2009. Her work is marked by a search for balance between ergonomics, delicacy and imagination.

The *Apollo* lamp is the result of numerous research into the effects of material, texture and the highlighting of its relief. As a wall lamp or table lamp, this lamp comes to life and creates a particular universe, like a moon rock or an autogenesis of underground concretions.

Collection CID – Province de Hainaut

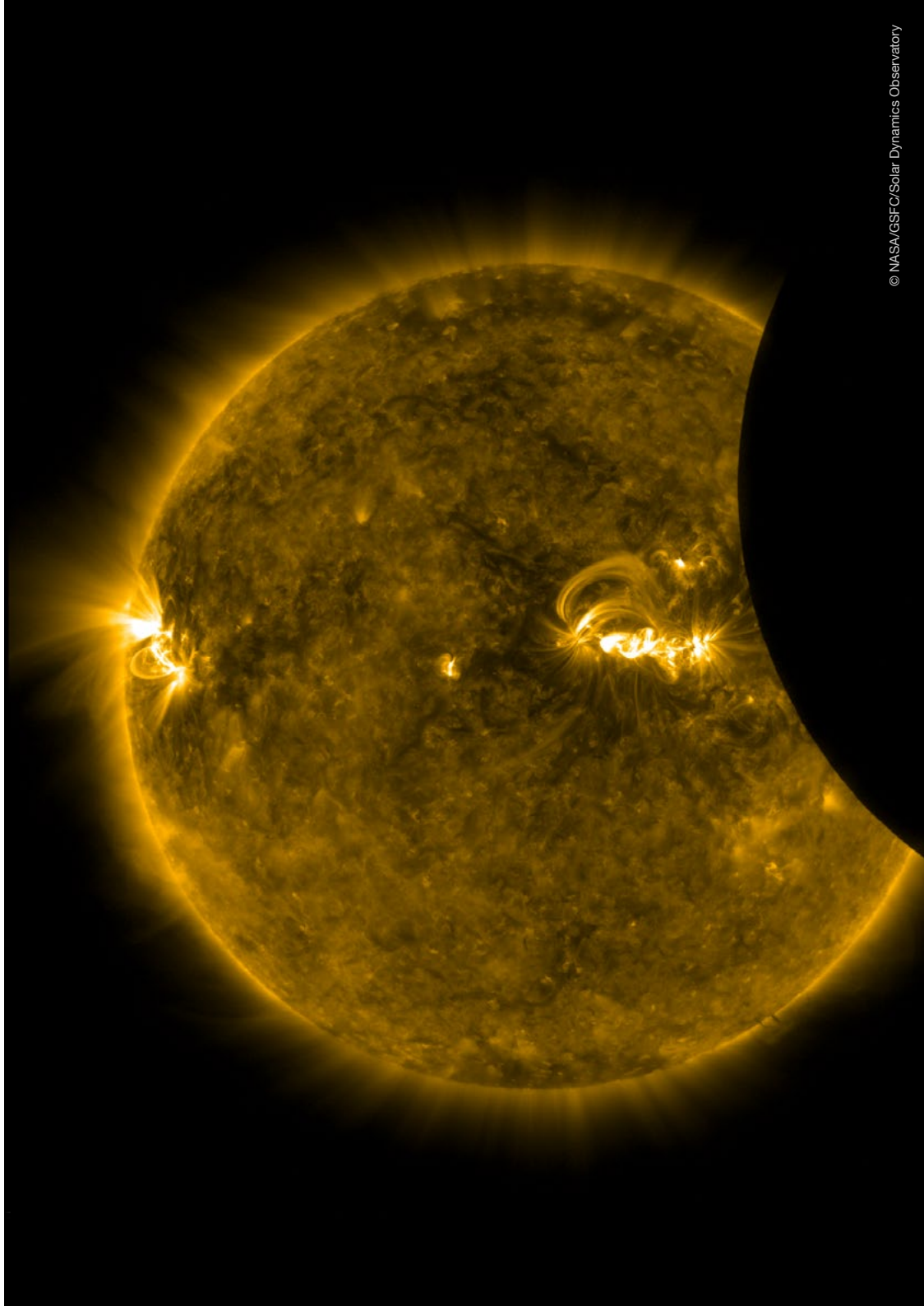


Eclipses

A solar eclipse happens when the Moon moves between the Sun and the Earth. The Earth is therefore in the Moon's shadow, creating darkness, something that has served as the source for many beliefs. A total eclipse occurs when the three celestial bodies are in perfect alignment. The apparent diameter of even a full Moon is slightly smaller than that of the Sun, meaning that a ring of light appears around the solar disc during a total eclipse. These utterly beautiful moments have been amazing humans since the dawn of time.

This is demonstrated by the substantial number of depictions of this pheno-menon in both art and design. In particular, there are countless lamps drawing on this interplay between light and darkness. However, eclipses are also very important moments for scientists. In 1919 British astronomer Arthur Eddington launched an expedition to West Africa and observed that the light from distant stars is deflected when it passes the sun during the 1919 solar eclipse.

This provided spectacular evidence supporting Einstein's theory of gravity over Newton's, propelling Einstein overnight from relative obscurity to international celebrity.



Vico Magistretti (1920 - 2006)
Eclisse, 1965, Artemide
Steel, technopolymer

Vico Magistretti is a famous Italian designer, known for his innovative experimentation with materials of his time.

The *Eclisse* night lamp represents the possibility of responding with simplicity to a practical need like adjusting the light while at the same time fulfilling criteria: such as economic accessibility and minimum overall dimensions. *Eclisse* is designed by juxtaposing three semi-circular shells: one acts as the base, the external shell is fixed and inside it the third mobile shell rotates on a hinge and its movement makes it is possible to grade the flow of light. The resulting light produces the effect of a solar eclipse. This diffuse and direct light lamp easy to upkeep, unbreakable and stable, was initially produced in aluminium, a material easy to shape on hemispherical moulds.

Collection CID – Province de Hainaut

Verner Panton (1926 - 1998)
Moon Lamp,1960, Verpan
White lacquered metal, LED

Verner Panton, an architect by training (Royal Academy of Fine Arts in Copenhagen) had a considerable influence on the development of design in the 1960s and 1970s. His work is recognisable by its bright colours and characteristic geometric shapes.

Moon is one of the first pieces of lighting designed by Verner Panton in 1960. It consists of a large number of discs, initially made of metal and later of plastic, lacquered white, in the shape of rings that encircle the bulb in the centre.

Moon is as complex as it is aesthetic. Simple in appearance, the lamp impresses by the way it diffuses light, first enclosing it and then allowing it to pass through small slits in a rather hypnotic way, like the light of the Moon.

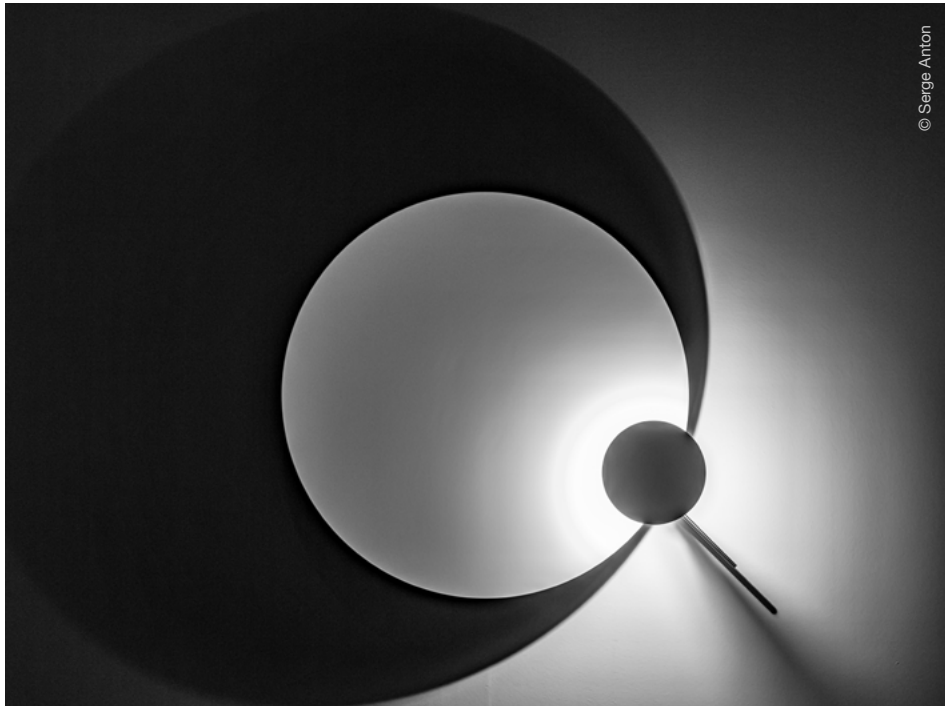
Collection CID – Province de Hainaut

Studio Élémentaires (2013)
Moon Lamp, Umbra, 2020
Aluminum, steel, low voltage lamp, electronics

Based in Brussels, Studio Élémentaires is a French studio founded by artists Apolline Couverchel (°1989) and Gauthier Haziza (°1989). At the crossroads of craft and new technologies, the duo creates from two fundamental elements: light and time.

Umbra is a kinetic sculpture inspired by the heavenly spectacle of a total eclipse. The perfect superposition of the moon on the sun can only be observed from the Earth. By this unique chance, we expect, live and contemplate the total eclipse as an exceptional event, a real show.

Umbra produces both light and shadow. Ruled by a random sequence, the duration of the rotation changes from a cycle to another and can be achieved in about five minutes as well as one hour. Thus, through its functioning *Umbra* evolves within its own system. The "eclipse effect" happens at different moments, by the random of its rotations.



Ingo Maurer (1932-2019)
Eclipse Ellipse, 2017
Steel, aluminum, LED

A typographer and graphic designer by training, Ingo Maurer began specialising in lighting in 1966. His best-known works include Bulb (1966), the low-voltage halogen lighting system YaYaHo and the Lucellino winged bulb (1992).

Eclipse Ellipse is a wall installation that produces light but also shadow. As soon as the lamp is switched on, elliptical compositions and circles appear. Both the inclination of the large disc and the position of the small disc are adjustable. Here, the user is also the designer. Ingo Maurer, like many of his other creations, leaves the user's imagination free..

Collection CID – Province de Hainaut

Meteorites

When the Solar System was formed, some fragments of matter were unable to clump together to form planets, in particular due to the effect of Jupiter's gravity. Stuck between the orbits of Mars and Jupiter, they formed the asteroid belt. These bodies of rock and metal vary in size from a few centimetres to several metres. Comets, on the other hand, come from within the Solar System and consist of a core of rock and ice that produces a spectacular tail of light. Fragments of asteroids and comets or planetary or protoplanetary debris, meteoroids are celestial bodies up to ten or so metres in size. When they become trapped in Earth's gravitational field, they pass through our atmosphere, where friction heats them up and creates a line of light. At this stage in their journey, they are known as meteors. Any that do not burn up entirely while passing through the atmosphere, and thus eventually reach our planet, are called meteorites. More than 230 fall to Earth every day. They were long ignored, but studying them is now enabling a better understanding of how the Solar System was formed and how life developed on Earth. These open books have also intrigued numerous designers.

WISE
Catches Comet 65PGunn

© Atelier de numérisation de la Ville de Lausanne, photographe Marie Humair

Yusuké Y. Offhause (°1985)
SPA SPA, 2017

SPA SPA (Japanese Honomatopoeia meaning "cut, slice") is a sliced ceramic meteorite. It is made up of plates and boards. The plates are enamelled to mimic the material of a planet like Mars or the Moon. These will evoke marble or volcanic stones as much visually as in their function. Indeed, these boards allow you to cook meats at the table in front of spectators, such as volcanic stone plates or like Teppanyaki.

In addition, the food is kept warm until the end of the meal. To store them after use, just superimpose them according to the meteorite's shape and place like a small Zen garden in a kitchen corner or on a table.

Collection mudac Lausanne

© Silvio Macchi

CTRLZAK (+ Nikos Sideris)
Sideroid Azimuth, 2017, JCP Universe
3D printed meteorite in resin with brass metalware

Founded in 2008 by artists and designers Katia Menighini (1981, Italy) and Thanos Zakopoulos (1978, Greece), CTRLZAK is a hybrid studio incorporating various disciplines and forms of expression. The duo is also in charge of the art direction and various creations for the JCP Universe. With artworks, design objects and spaces inspired by different cultures and natural environments, the duo wants to make people think about their actions and the world we live in. The object is the result of a collaboration with the designer Nikos Sideris.

The name *Sideroid Azimuth* refers to an object of desire coming from the stars [from sidus (genitive sideris) « heavenly body, star, constellation »].

An art object that doubles as a small container of precious items. Based on the scan of a real meteorite found in Sikhote-Alin, the impact site and then printed in 3d, the volume of the meteorite (Siderite iron) is segmented and encapsulated in a block of resin finished in brass details.

Collection CID – Province de Hainaut

atelier lachaert dhanis
Cosmos Wallscape, 2020
Silver, claiton, galenite, marcasite

"In the seclusion of a delineated space, a cosmos lies hidden. Otherworldly places that we unfold in our imagination and in which we transcend what in reality limits us. Imagined universes and colourful galaxies; places that vanish as soon as we are called back, by the doorbell or even by a dog barking in the neighbour's earthly garden.

It is part of our nature to be simultaneously on the spot and elsewhere, to travel in daydreams to destinations where gravity differs from ours. A distinctly human ability that atelier Lachaert d'Hanis captures in matter. With a selection from their series of unique wall ornaments – referred to as *Wallscapes* – that interrupt the even surface of the interior wall and expand it with alienating miniature landscapes to be explored in our thoughts. Irregular volumes set like precious stones in handmade silver holders according to goldsmith's techniques, as much sculpture as ornament, jewellery and artistic concept.

Individually, they prove to be unexplored areas that invite one to wander through space and where the beauty is unparalleled anywhere on earth. Combined, they form constellations that establish new correlations with every glance, appealing to the primal forces from which the Universe originated. They marvel and they amaze, they put our vanity in perspective; confirming that our own existence will always be in contrast with the immensity of a galaxy and with stars that already mesmerized the ancient Greeks."

Text by Jonas Lescrauwaet

Caroline Corbasson (°1989)
Meteor, 2020
Gelatin-silver prints on glass.

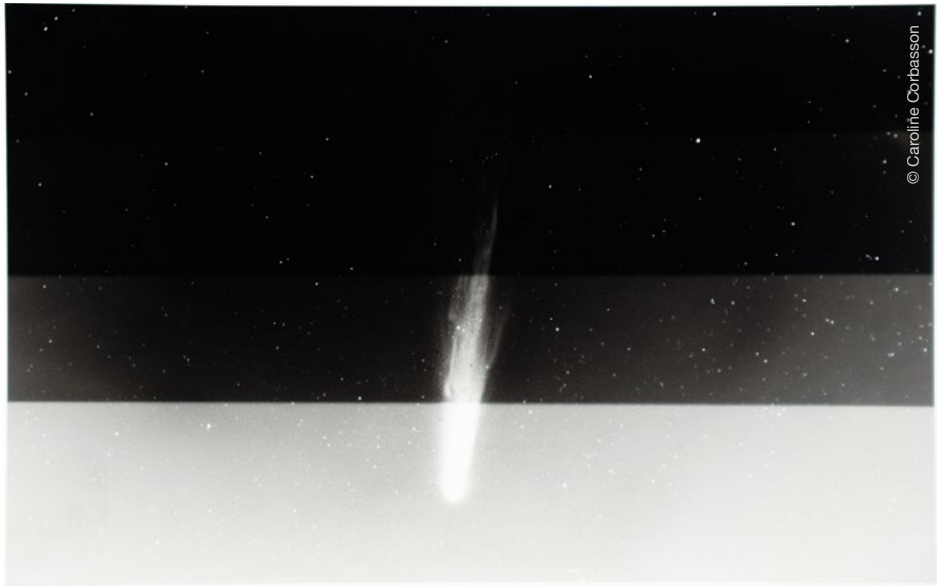
Since graduating from Central Saint Martins in London and the Ecole des Beaux-Arts in Paris in 2013, Caroline Corbasson has been inspired by science, astronomy, natural phenomena and vast landscapes.

Vigie-Ciel is a programme dedicated to observing meteorites run by the Muséum national d'Histoire naturelle. Using cameras all over France, researchers track down the precious stones that have fallen from the sky. These eyes of the night focus their mechanical gaze on the sky in the hope of catching a glimpse of the tiny trace of a passing meteorite.

Meteor takes this scientific and educational project as its starting point by looking at images from surveillance cameras. These Orwellian machines, which are usually used to monitor what is happening on Earth, are here given a different task by the researchers. This move re-connects humans with the sky that they no longer look at. This focus on the Universe has resulted in black and white photographs in which a minimal trace of light can be seen.

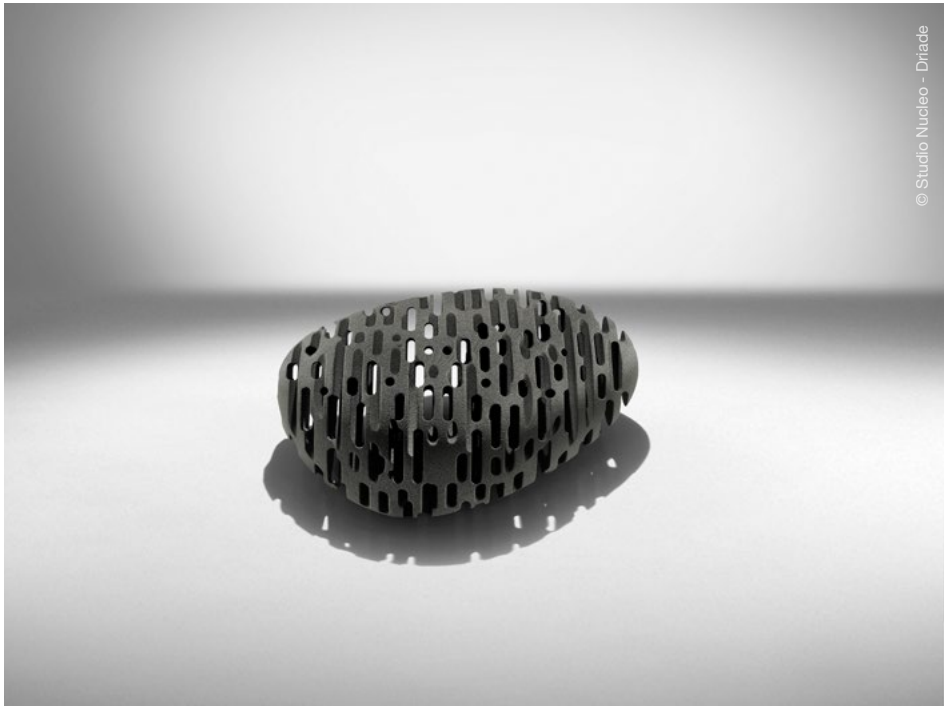
In this new project developed for the *Cosmos* exhibition, Caroline Corbasson creates a double twist. The night-time images are printed on telescope mirrors and backlit glass plates. The image and its medium are thus removed from their initial context and assembled, creating a poetic vision of scientific tools.

The mirror is an object that fascinates Caroline Corbasson, who likes to explore its ambivalence: sometimes domestic, sometimes scientific, it spans ages and cultures to offer us an infinite number of reflections of the world and of ourselves.



Space mining

The depletion of the Earth's resources – and perhaps also humankind's conquering nature – prompted our world to look out towards the stars, drawn not only to their stunning beauty but also to their geological wealth. The supplies of various minerals (lithium, cobalt, nickel, etc.) that have become increasingly vital, in particular for making electrical batteries, will one day run low. Planets and asteroids have significant quantities of these to offer. This new conquest of space shows promise, but also raises numerous questions from a scientific, technological, environmental, ethical and political perspective. Although the Outer Space Treaty of 1967 states that no country may claim sovereignty of planets (or their satellites), there is no clear framework for the exploitation of their resources. The 2020 Artemis Accords (taking their name from the NASA programme) set principles regarding industrialisation of this kind, but this does not prevent either countries or private companies from taking the plunge. In their position combining industry with creation, numerous designers have studied this subject from perspectives ranging from fascination to criticism. Will the next industrial revolution unfold in outer space? Will the next industrial revolution unfold in outer space?



Studio Nucleo
Moon Mission, 2018, Driade
Regolith sand 3D printed, phenol resin

Studio Nucleo is a collective of artists and designers directed by Piergiorgio Robino (°1969), based in Turin, Italy, active in contemporary art, design, and architectural fields.

On the occasion of the 50 anniversary of the man landing on the moon, Studio Nucleo selected Driade (Italian furniture company founded in 1968) masterpieces and has recreated them as were made on the lunar ground for a tour around time and space.

The objects have been re-designed – inspired by the studies of the European Space Agency – to be entirely produced and realized in 3D printing on the Moon, using the Regolith (extraordinary material present on its surface). The volumes of the objects are increased, in order to be used with space suits, and the surfaces eroded as by storms of particles.

The project's final result it's the first 3D outdoor furniture collection designed for the Moon.

Design project curated by Gianluigi Ricuperati, realized by IPW Institute of Production of Wonder, based on a concept by Piergiorgio Robino and Studio Nucleo, executive production by Barbara De Micheli.

Xandra van der Eijk (°1985) **et Kirstie Van Noort**
As above, so below, 2017
Installation made out of wood, plexiglass, microscope and glass objects. Collected dust from gutters.

Xandra van der Eijk, graduated from the Royal Conservatory in The Hague, links art, ecology and activism. Integrating theory, fieldwork, methodology and material development, her work reinterprets the landscape from an anti-anthropocentric perspective. Kirstie Van Noort, graduated from the Design Academy Eindhoven, is active in material research, especially in ceramics.

Finding it impossible to imagine the end of capitalism, mankind has to reinvent its purpose as hunter and collector. *As above, so below* proposes crowd mining as a new method and resource. As precious earth metals and minerals will eventually be scattered over the earth, re-use will gain new meaning.

Urban environments will turn into potential mines and its inhabitants will all become mineworkers, roaming their rooftops and gardens in search of specs of potentially valuable dust.

Project developed as a response to the exhibition theme *Harvest*, Dutch Invertuals 2017.

Margaux Hendriksen (°1993)
Scramble for the moon, 2017
Installation including video, prints, material samples

After graduating from Central Saint Martins College of Art and Design (London), French designer Margaux Hendriksen works as a creative consultant in companies, researching and expressing innovative and sustainable ideas, visions and strategies in emerging visual languages.

In her speculative project *Scramble for the Moon*, Margaux Hendriksen examines the economic and ethical implications of harnessing resources from space.

In her project, the designer questions humanity's political and economic relationship with extraterrestrial planets, and exposes the lack of regulations in the burgeoning space mining industry. Hendriksen draws attention to the abundance of resources such as helium-3 – a rare element that could theoretically be used as fuel in future nuclear fusion plants – oxygen-enriched air, fresh water and light in space. It is already evident that many private companies are investing in this new industry, without any prior international agreement. Hence Hendriksen's questioning of the outcome of this new economy, without laws or regulations.

The project explores the potential for these precious extraterrestrial materials to become future luxury goods and charts the history of Moon Origin, a fictional private company that over-extracts the Earth's moon's natural resources in its effort to meet market demands.

Studio Furthermore (2015)
Moon Rock collection, 2019
Aluminium

After their meeting at the Royal College of Art (UK), Marina Dragomirova (°1983) and Iain Howlett (°1980) founded the design studio Studio Furthermore (London) in 2015. Creating furniture, lighting and other everyday objects, the duo is constantly searching for materials inspired by scientific research and natural processes.

The *Moon Rock* collection consists of aluminum furniture and lighting simulating moon rock. Studio Furthermore describes the material as a moon rock, brought back from space and hand carved like one would work with marble or granite. *Moon Rock* provides a glimpse of a - hypothetically - near future in which the mining of lunar material would provide the majority of the scarce raw materials (on which Earth's industry depends) in order to relieve the Earth's load.

Galaxies

We are far from being at the centre of the universe. Our Solar System is part of the Milky Way, a galaxy made up of hundreds of billions of stars. Our Solar System rather lies at the outskirts of the Milky Way, that is part of a group of forty other galaxies, the Local Group, which itself is part of the larger Virgo Supercluster.

All of the objects within it (stars, planets, white dwarfs, etc.) are in constant motion, orbiting around the centre, where scientists have detected a huge black hole with a mass equivalent to four million suns. It manifests itself in its gravitational effect on the surrounding stars. Created shortly after the birth of the Universe, the Milky Way has grown by producing stars and absorbing both other galaxies and the gas from its own halo. Research predicts that it will ultimately merge with Andromeda, a neighbouring galaxy – in 7 billion years.

There are thousands of billions of galaxies like the Milky Way in the Universe. All of these galaxies are equally governed by four basic laws of physics: gravity, strong nuclear interaction which holds atomic nuclei together, weak nuclear interaction which is responsible for radioactivity, and electromagnetic force. The works exhibited here are loose interpretations of these universal principles, and in some cases even take an opposite approach, like Matthieu Lehanneur who imagines a world with no gravity where objects float above the ground. These are the four laws of physics that govern our Universe, including the emergence of life on Earth.

Laura Couto Rosado (°1984)
Quantum Nuggets, 2017
3D printing, resin, nylon sintering, powder coated paint

Laura Couto Rosado develops her practice beyond the form/function concept and the dogma of "problem solving"; she moves towards other paradigms that reflect the complexity and increasing rate of social change.

Quantum Nuggets is a project that generates organic forms from real data of particle collisions recorded by ALICE (Large Ion Collider Experiment), one of the 4 main detectors LHC (Large Hadron Collider), the world's most powerful particles accelerator at CERN. Particle collision data is concretely implemented in a computer program that allows to visualize them in motion and to print them in 3D.

These artefacts remind us of the familiar forms (gold nuggets found in a native state). They are transitional objects that connect our macroscopic world with the mysterious and seemingly imperceptible quantum world. These artefacts raise our perpetual questioning about the origin of the universe and life on Earth.

In collaboration with Jeremi Niedziela, Particle physicist at CERN.

Caroline Corbasson (°1989)
JWST, 2016
Heated and oxidized copper

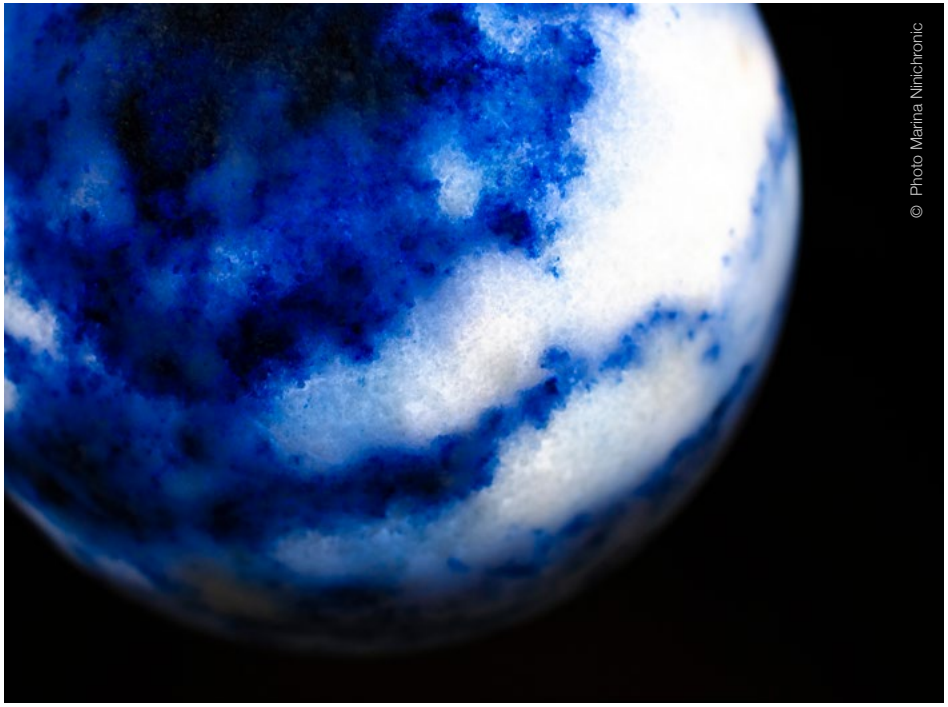
Since graduating from Central Saint Martins in London and the Ecole des Beaux-Arts in Paris in 2013, Caroline Corbasson has been inspired by science, astronomy, natural phenomena and vast landscapes.

Hubble's successor, the *James Webb Space Telescope*, will be launched into space in November 2021 by NASA as part of its Origins programme. By harvesting light from deep space, it will offer us new ways of understanding the remote Universe. The resolution of its instruments is to be used, among other things, to observe the first stars and galaxies that formed after the Big Bang.

Caroline Corbasson's work, *JWST*, is made up of hexagonal copper plates that are exactly the same shape as the mirrors assembled to make up the telescope.

The heat of a flame reveals nebulous colours and patterns on the surface of the plates, looking like the visions that are expected from *James Webb* images in the future.

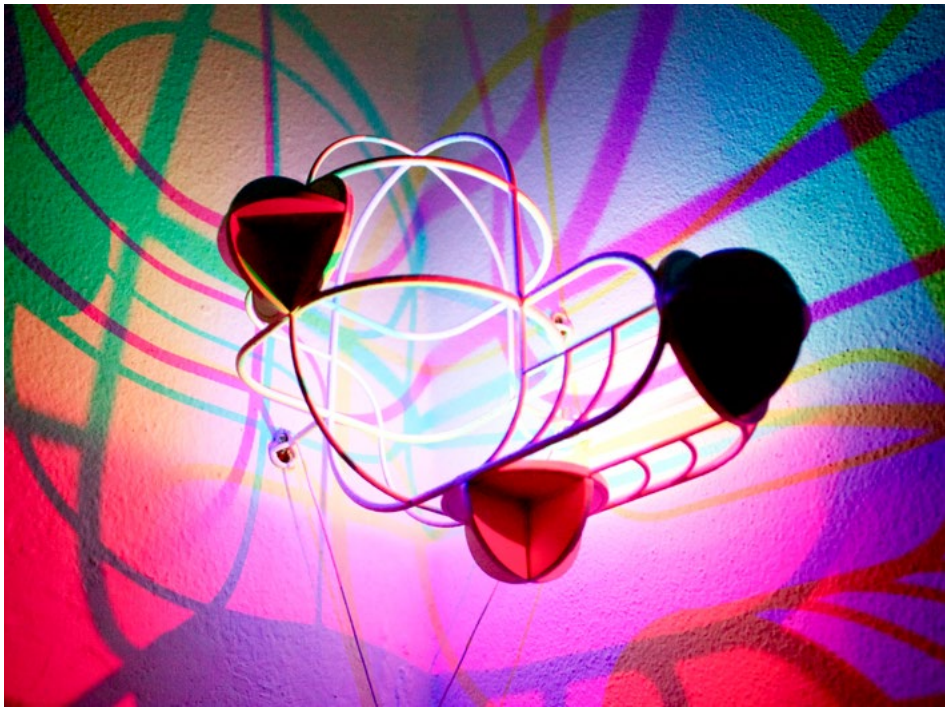
Thanks to mimicry - stars are born at temperatures reaching several thousand degrees - the process brings out the colours that were already there, contained in the metal itself, but which were invisible to the naked eye. Suspended like a domestic mirror, *JWST* attempts to bring the immensity of space down to a human scale, confronting us with these objects that convey the scale of the Cosmos and the quest to understand the birth of the Universe.



Roxane Lahidji (°1992)
Planets, 2021
Sea salt, resin

Roxane Lahidji graduated from HEAR (Strasbourg) in product design and illustration before studying social design at Design Academy Eindhoven in social design. She is now developing innovative and ecological materials, including *Marble salts*, a mixture of sea salt, natural resins and pigments that looks like marble. This is what she uses to make her *Planet* lamps.
They are inspired by scientific images from space and explore the material relationship between light, crystals and dust. The first exoplanet (orbiting a star other than our own) was discovered in 1995. We are now aware of about 4,800 of them (July 2021). They are fascinating because they reveal part of the history of the universe, but even more so because they are potentially habitable. Raising a lot of questions for us.

Collection CID – Province de Hainaut

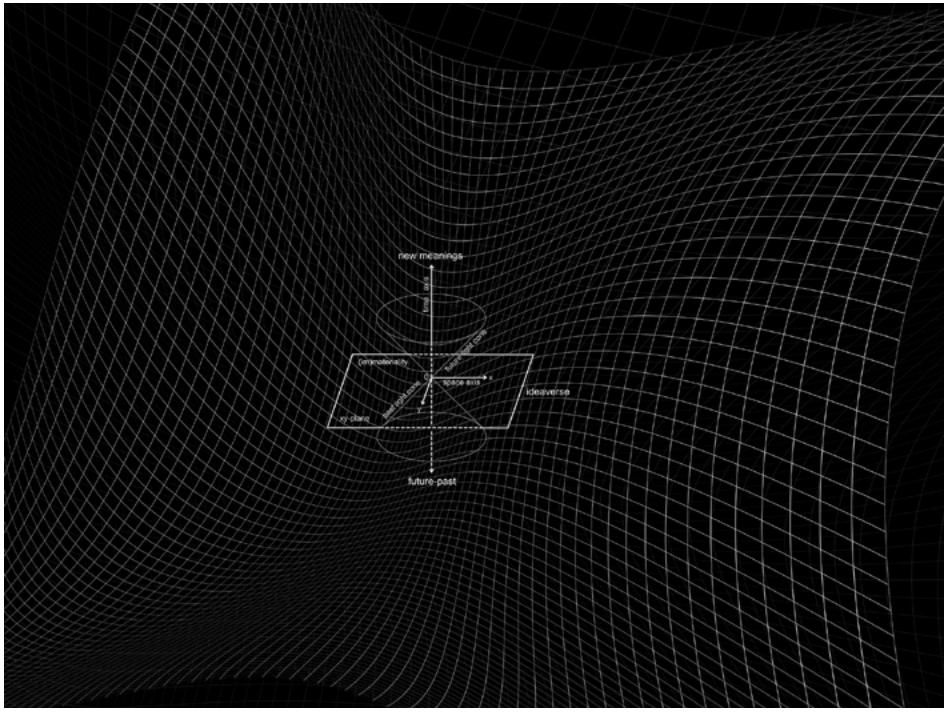


Dennis Parren (°1976)
CMYK corner, 2012
Printed nylon powder, aluminium, coloured LEDs, electronics

It is incorrect to say: "This chair is red".
In fact, the chair reflects red light while absorbing blue and green light. In physics, the word "colour" therefore refers to spectral colour, i.e. the sensory perception of the eye according to the wavelength of the light it receives.It is light that colours the world. According to astrophysicist Trinh Xuan Thuan, light "is the ultimate messenger of the cosmos. (...) It is what allows me to communicate with the cosmos and to study it. It is light that carries the fragments of music and the intermittent notes of the secret melody of the Universe, which mankind tries to recreate in its glorious beauty."[1] Here, Dennis Parren's lamp plays on the properties of LEDs to show how the primary colours of light (red, green and blue) interact with the colour pigments cyan, magenta and yellow. The result is a lamp that seems to trace spheres and orbits in a beam of coloured light, like dancing celestial objects.

Collection CID – Province Hainaut. Donation Fondation Boghossian

1. Trinh Xuan Thuan, *Le cosmos et le lotus*, Albin Michel 2011, coll. Livre de Poche, p.131-132



Thanos Zakopoulos (°1978)
Creation of a Universe, 2018, JCP Universe
Digital print on silk

Thanos Zakopoulos is an hybrid thinker. A creator of varied forms and contexts he orchestrates and makes research projects that balance between contemporary art & design making people reflect upon their actions and the world we live in.

At the turn of the 20th century German mathematician Hermann Minkowski unified the dimensions of space and time into a four dimensional whole he called *spacetime*. Shortly after Albert Einstein turned Minkowski's abstract spacetime into a physical fabric that can stretch and squeeze. Einstein's warped Universe takes us far beyond our ordinary experience of space and time. In his *Creation of the Universe*, Thanos likewise makes space and time come alive, evoking the giant leap from abstract concepts to the tangible physical world that makes Einstein's work so powerful.

Wyssem Nochi (°1962)
Universe Composition, 2012
Wool

Lebanese designer Wyssem Nochi graduated from the Architectural Association (London) and Parsons the New School for Design (New York). His works are in the field of urban design, architecture and furniture. In 2005, he founded ON/OFF - a design consultancy - in Beirut, which was unfortunately destroyed in the explosion of August 4, 2020.

Universe Composition is a rectangular black, grey and white wool rug showing the exact quantification of the matter making up our universe: dark energy (73%), dark matter (23%), intergalactic gas (3.6%), stars and others (0.4%).

Alan Bogana (°1979)
Diamond Mountain, 2013
Video

Alan Bogana is a multidisciplinary artist based in Geneva. His artistic practice involves sculpture, computer graphics, electronics, time-based media and holography. His works are usually presented in the form of installations.

This work is freely inspired by the discovery of an exoplanet named 55 Cancri e, which is speculated to be partially made of diamond. This computer simulation explores the refractive properties of a mountain made of diamond.

Jean-François D'Or (°1974)
L'indécis, 2021
Pendulum, black ceramic ferrite magnets

L'indécis is a metaphor for the influence of electromagnetic fields on moving bodies in space and time.

A magnetic-pendulum oscillates according to the law of universal gravitation.
Its magnetic fields meet other magnetic fields that are constantly influencing its movements.

Attracted, repelled, its indecision creates a random dance.A choreography that is sometimes calm, sometimes tightly coiled, The Undecided hints at a celestial ballet; making the imperceptible visible.

The electromagnetic force is one of the four fundamental forces of physics, together with the gravitational force and the weak and the strong nuclear forces. The long-range magnetic interaction, which is more powerful than gravitation, acts on electrically charged particles, causing charges of the same sign to repel each other, and charges of opposite signs to attract each other.

AATB
A particular score, 2019
Sound installation with musical triangles, electronics, steel

AATB was founded by Andrea Anner and Thibault Brevet. Andrea Anner was born in Zurich, Switzerland, graduated from ECAL in 2012 with MA in Art Direction: Type Design, and in 2008 from ZHDK with a BA in Visual Communication. Thibault Brevet was born in Lyon, France, graduated from ECAL in 2015 with MA in Visual Arts and in 2012 with a BA in Graphic Design.

Cosmic rays are highly energetic radiation, originating far outside the Solar System. Some cosmic rays originate from the supernova explosions of stars. Upon impact with the Earth's atmosphere, cosmic ray particles can produce showers of secondary particles that, at times, reach the surface of the Earth. For A Particular Score, studio AATB makes visible – through an audio score – the secondary particles that impact this specific location, in real-time.

The installation responds to the impact of these secondary particles by playing a note every time a particle hits the container. The score progresses with each particle hit on GH, taking the score one note forward and producing an irregular beat. The monolithic volume contrasts with the lightness of the sound; together, they make visible processes that are all around us, are much bigger than us, and bring us forward in the same way the universe moves all around us – inexorably.

Produced by Biennial da Maia, Portugal

DEEP DATA PROTOTYPES 1, 2 + 3

By Andy Gracie, a British artist whose work operates at the at the crossroads of art and science.

Since the early 1970s a number of robotic explorers have been launched into space in order to explore and measure the outer limits of the solar system. These machines carry arrays of sensors and probes with which to measure and define the characteristics of inter planetary and interstellar space, stretching our own sensory cortex, our own boundaries of experience and knowledge as they go. The 1970s were a utopian period in science and science fiction - we imagined that by now we would be regularly visiting the Moon, have a base on Mars and would at least know of the existence of other lifeforms.

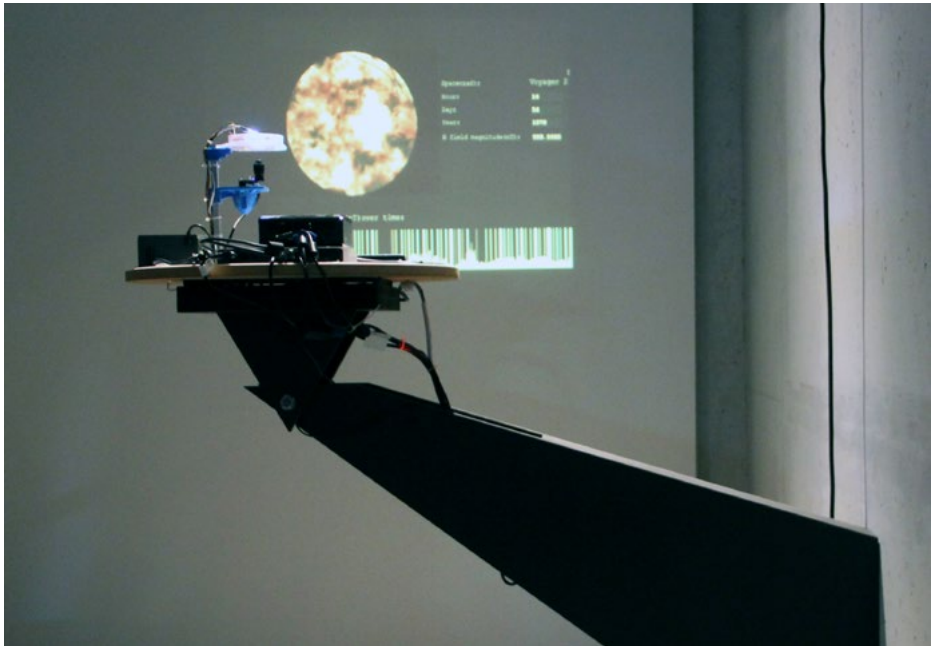
The recently established science of astrobiology seeks to define the range of conditions and environments that make life as we know it possible, and is based on a more pragmatic realisation. It is generally understood that, despite the increasingly regular discovery of new planets, we are more likely to find life, or evidence of past life, closer to microbes than to ourselves. In a true cross-disciplinary manner, astrobiology defines the boundaries of life, the forms it can take, and the environments that can support it. Meanwhile, an increasing number and variety of probes, orbiters and landers are providing an ever more lucid and networked impression of the Solar System. Through them our awareness is extended to extreme distances and we experience the distant planets via proxy. Via a simultaneous study of the data from deep space probes and of microbiological processes we can explore the twin concepts of possibilities for life and the foundations of life.

The long term Deep Data project has as its central methodology the parallel exploration of these two concepts, and features an arc of developmental work, prototypes and research connecting deep space exploration with terrestrial extremophiles, model organisms and the science of astrobiology. It sources data from deep space probes and research platforms in order to recreate elements of the solar system environment in which experiments are performed on cultures of the model organisms commonly used in astrobiology. Tardigrades, nematodes and arabadopsis plants are inserted into simulated deep space conditions within a series of DIY astrobiological laboratories. Within these experiments we can observe how isolated phenomena from non-terrestrial environments can influence the adaptive behaviour of simple organisms. While our human perspectives allow us to know the organisms are within a simulator, the organisms can have no such understanding. In each piece of the series, their own semiotic environment creates a temporary reality in which they live in space. Each individual work in the series can be seen as an observational simulator, a performative laboratory, each recreating a specific space experience for a specific organism.

Deep Data also examines the issue of systems boundaries, and proposes that we must keep looking outwards to find those boundaries, in order to find the limits of interacting factors. To accomplish this it looks at the outermost information we have, which is the information fed back to us by deep space probes, space telescopes, landers and orbiters. Deep Data also proposes a cultural and critical examination of our quest to find other forms, habitats and strategies for life by reviewing the technology and processes involved while asking philosophical questions about their possible discovery. In parallel we are asked to consider our own anthropocentric position and the notion of Earth and terrestrial life as somehow special.

To date, there are 3 works in the *Deep Data Prototype* series, named sequentially *Deep Data Prototypes* 1, 2 and 3. These were produced in 2010, 2014 and 2017 respectively, and the three works taken as a whole represent a real time astrobiological experiment, a performative laboratory, where custom built equipment operates according to data sourced throughout the solar system. In Prototype 1, polyextremophile tardigrades are exposed to the magnetic fields of the gas giants as recorded by the Pioneer and Voyager probes during their journeys to the edges of the Solar System. In prototype 2, eight cultures of a photomorphogenic mutant of the plant arabadopsis are grown under the light spectra of other planets. In Prototype 3, three cultures of the nematode Caenorhabditis elegans are subjected to the gravity wells of newly discovered terrestrial exoplanets. Each of these organisms has been a common passenger on space missions since the 1960s and are thus seen as ideal test subjects for further experimentation. They are pioneers, venturing into parts of the space environment that no other organism has sensed or witnessed. As with the robotic platforms that inform them, they become our space explorers by proxy.

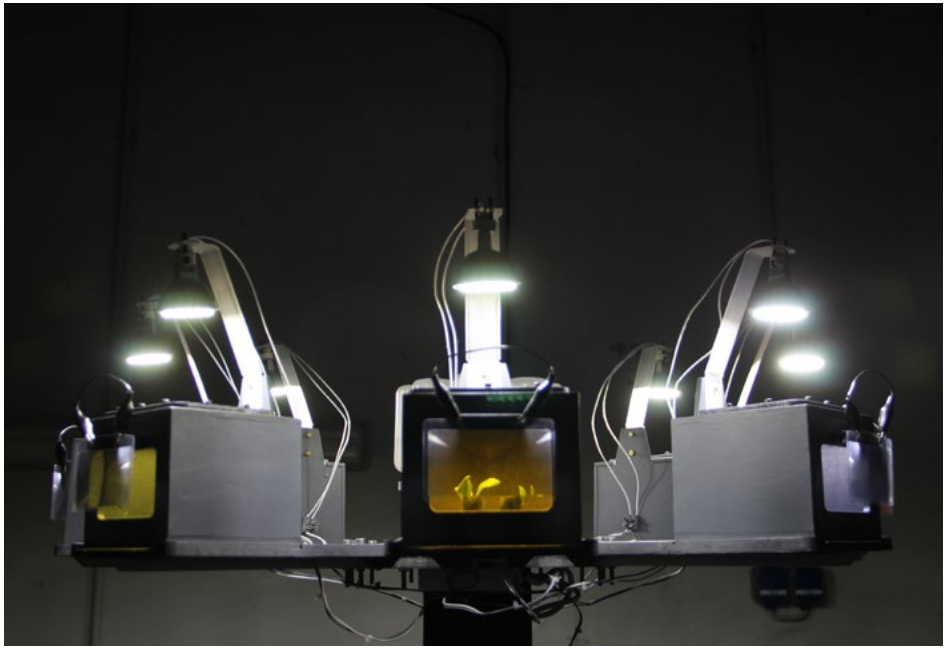
What all the prototypes have in common is that the experiment is an observational one. We are able to observe and witness the behaviours and reactions of the organisms according to the non-terrestrial environmental conditions they are experiencing. No empirical data of the outcomes is generated or recorded, thus denying us a level of abstraction and challenging the notion and purpose of experiment. Instead we are present with the organisms in the moment. We are aware that they are within a simulation, that their reality contains another layer of information, and that they will react accordingly.



The first work of the series, *Deep Data Prototype _ 1*, uses magnetometer data from the Pioneer and Voyager probes, launched between 1972 and 1977, from their journeys close to the giant planets Jupiter, Saturn, Neptune and Uranus and onwards towards interstellar space. The data is used to recreate the magnetic fields around these planets in order to perform experiments on cultures of tardigrades. These strange, microscopic organisms have become one of the most important in space bioscience due to them being poly-extremophiles (able to withstand many kinds of extreme environments) and due to their ability to enter a kind of suspended animation for long periods of time. These dual characteristics suggest answers to problems of life in inhospitable places and to space travel across generations.

Following an accelerated timeline the tardigrades experience the intense magnetic fields of the four gas giant planets in our Solar System and the more subtle and complex ones at its very edges. As these now ancient robotic sensing platforms reach the boundaries of our known immediate space, our perception is simultaneously collapsed into the subtle realm of microscopic processes. Scale, time and distance collapse at a point within the installation, where the experiment is performed and observed.

The installation consists of a custom designed microscope and electromagnetic culture vessel for tardigrades on a wall mounted platform. A wall projection displays the incoming data and a live video stream of the tardigrades in culture, allowing us to witness their experience and their response in real time.



Deep Data Prototype _2 forms the second stage of the Deep Data project research arc, creating living plant sculptures while considering the differences between science fiction fantasy and scientific knowledge. The piece uses light spectra from the one planet where life has been observed alongside the Moon, Venus, Mars and Titan; places where at some point there has been speculation that they might harbour life.

The work features 8 separate seed growing environments for the model organism arabidopsis, a plant commonly used to study the effects of zero gravity on shoot and root development. The mechanisms behind the sculptural growing apparatus are based on the microfluidic 'RootChip' device developed expressly for arabadopsis research. In this instance, the seed chambers model the light intensity and colour temperature of the Solar System bodies that we have imagined could be colonised by humans or where we could find extraterrestrial life. The Earth and the Moon are modelled as they are, while Venus, Mars and Titan model the light qualities as we now know them to be and also as they were envisaged in 1970s science fiction - that is to say, before our space probes and landers pushed back our horizons of knowledge.

The seeds used in this experiment are the NW67 long hypocotyl variety, a naturally occurring photomorphogenic mutation whose initial growth is affected by the amount the wavelength of light it receives is shifted towards the red or the blue ends of the visible spectrum. Therefore, the experiment produces organic micro-sculptures directed by the real and imagined light conditions on our Solar System neighbours, and their location within the general light spectrum.

Deep Data Prototype _ 3 uses data from Exoplanet search platforms such as Kepler, KELT and CoRoT. The receiver part of the installation mines data from these devices, looking for Earth analogs (rocky planets up to twice the size of Earth) and calculates their relative gravity. These gravity values are passed to the second stage which houses 3 computer controlled centrifuges, within which are cultures of Caenorhabditis elegans, a nematode worm and one of the most important and versatile model organisms used in space based bio-research. C elegans being flown into space for a microgravity experiment were the only living organisms to survive the ill-fated space shuttle Columbia mission STS-107 in 2003. The connection between C elegans, space and extremes of gravity is compelling.

The work presents another terrestrial astrobiological experiment, the nematode worms experiencing by proxy the parameters of gravitational reality on unexplored and possible future worlds. Our observation remains with the experiment, not the data of the experiment. While we can observe from time to time the behaviour of the organisms within the system, our attention is kept focussed on the narratives and concepts described by the scientific processes that the work frames. On the one hand we are reminded of the pressures and impacts that these microscopic organisms can withstand, and what that tells us about ourselves. On the other hand we are reminded how isolated we are on the Earth. That despite the increasing rate of discoveries of other planets, we only have the painful realisation that we may never know if other sentient creatures are there or not.

As the future of human life in space becomes a more familiar topic, either as a billionaire's dream, a techno-utopian fantasy or a last ditch escape strategy, and the discovery of exoplanets and the notion of what life might live on them increases, the topics engaged with by the Deep Data series become increasingly relevant. The project embodies intertwined narratives about simulation theory, bio-semiotics and the search for life which help us to understand our own place in the Universe.

Gravitation

The universe can be understood because it is governed by the laws of science. The first interaction to be described in mathematical language was Newton's law of gravitation, in 1687. It states that every object in the universe attracts every other object with a force proportional to its mass. However, this law was superseded by a new theory of general relativity, published by Albert Einstein in 1915.
Einstein viewed gravitation as a manifestation of the interaction between matter and spacetime, two inextricably linked concepts. According to his theory, massive objects (matter, planets, stars, etc.) curve spacetime and this curvature affects their movement (such as the trajectories of celestial bodies). The theory of relativity generated a host of other new ideas which we continue to unravel. It predicted gravitational waves, ripples of spacetime and mysterious objects later called black holes. Above all, Einstein's theory unlocked a whole new way of thinking about the universe as a whole and how it evolves.

NGC 5426 et NGC 5427

Mathieu Lehanneur (°1974)
Inverted Gravity Stool, 2020
Blown glass, handmade fabric

French designer Mathieu Lehanneur, a graduate of ENSCI - Les Ateliers (Paris), designs projects with a multidisciplinary approach, moving from product design to architectural, craft and technological objects.

Inspired by videos and stories of life in the International Space Station (ISS), the *Inverted Gravity* collection, innovative and poetic, is about gravity and our perceptions.

The *Inverted Gravity* collection is composed of blocks of marble and onyx suspended in the air, seemingly simply placed on transparent or slightly gray blown glass bubbles, each capable of supporting 250 kilos. The technical and aesthetic feat seems to reinvent the laws of physics by introducing the notion of weightlessness on Earth.

Hongjie Yang (°1988)
Gravitational Ring, 2019
Polished aluminum

Hongije Yang is a Chinese born designer based in the Netherlands. In 2015 he obtained his master's degree in contextual design at the Design Academy Eindhoven. His work explores the interactions between man, nature and the cosmos, considering that all levels of existence are identically structured and equal in detail, forming an interconnected whole.

Everything that exists in the Universe has mass and each mass exerts a gravitational pull. If the object is massive enough, it distorts light as it passes through, acting like a lens. In special cases, the light is distorted into a ring. To observe such a phenomenon, the light source, the extremely large mass (such as a black hole) and the observer must be aligned.

Inspired by this astronomical phenomenon, Hongije Yang created *Gravitational Ring*. A reflective object whose surface simulates the phenomenon of gravitational lensing, allowing observers to visualize how space-time in their environment is distorted.

© Photo Tijl dhe Nije

Jesse Visser (°1974)
Sphaera, 2010
Aluminium

Jesse Visser founded his design studio Jesse Visser Designprojects in Amsterdam in 2000. Collaborating with various craftsmen, brands, product developers, manufacturers and other creative thinkers, his work focuses mainly on furniture and lighting design.

Sphaera is a round aluminium table with a diameter of 200 cm, a surface thickness of 6 mm and a curved shape. A six-meter wide industrial machine was used to force the aluminum in a curved shape. Like a craftsman can beat out a copper sphere with a hammer. Thanks to this curved shape, the table becomes constructive and rigid.

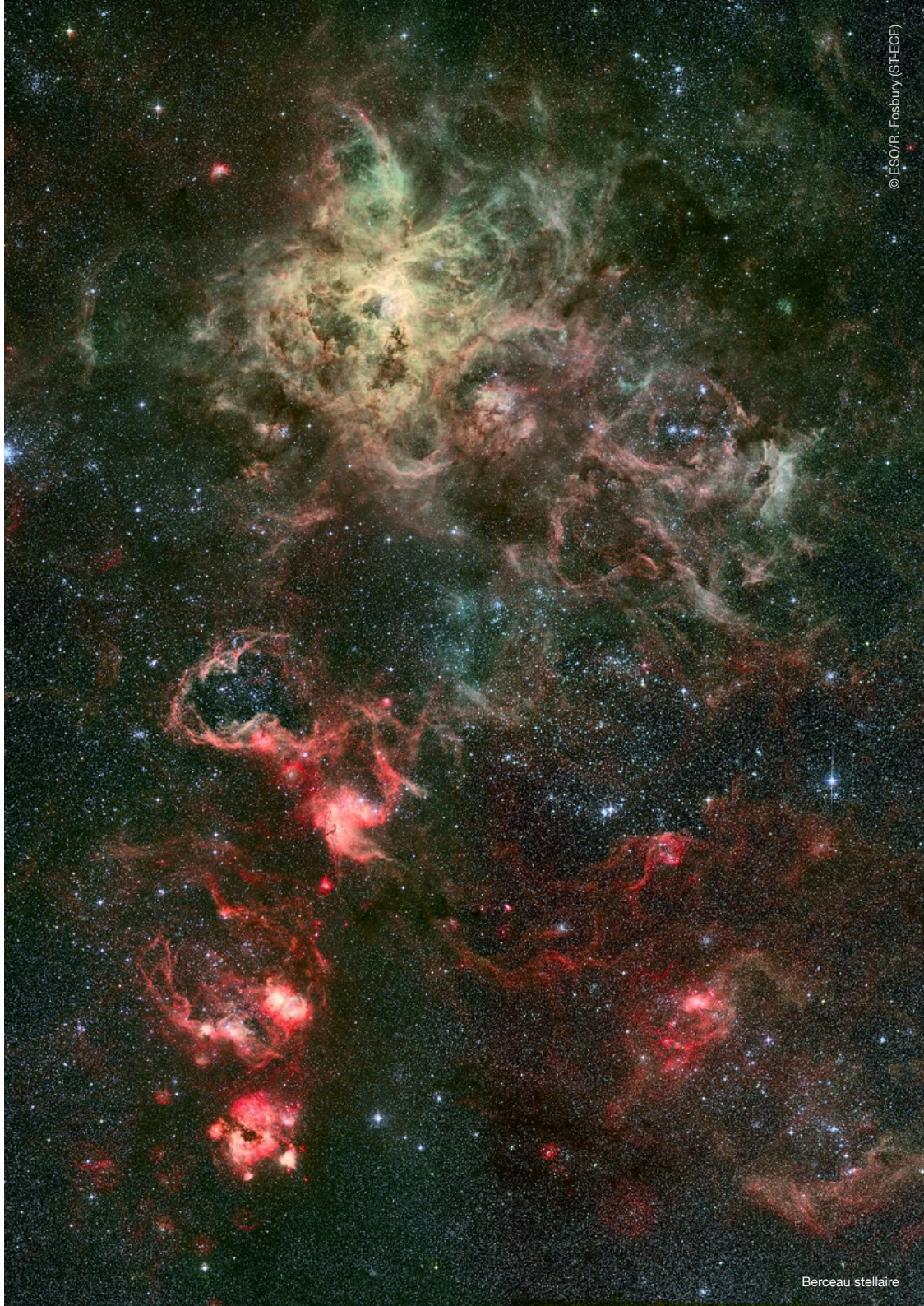
At first glance, it is difficult to tell whether the surface is flat or curved. To experience this curve, the table comes with a small metal ball which makes this table an interactive object. Simultaneously once the table is set, all the tableware will direct to one imaginary centerpoint.

This curvature, made visible by the trajectory of the ball, illustrates Einstein's principle of general relativity: space-time is not flat, as was previously thought, but curved and distorted by the masses and energy it contains.

© Photo Serge Anton

Stardust

Galaxies are nurseries for stars. And it is in these stars that the atomic nuclei making up our bodies are formed: carbon, nitrogen, oxygen and so on. At the end of their lives, stars collapse in on themselves under the influence of its own gravity, releasing these nuclei into interstellar space where they combine to form the molecules necessary for life, such as water and carbon dioxide. These ultimately clump together to form new celestial bodies. Thanks to the combination of an extraordinary number of necessary conditions, our planet spawned life out of these elements from the first generations of stars. It is thanks to this that we, like William Fowler, can describe ourselves as stardust. When the biggest stars collapse, they produce a fantastic explosion known as a supernova. In this exhibition, the *ALMA Musicx Box* offers a musical interpretation of the death of a star, whilst Frederik De Wilde uses the patterns on his textile samples to explain what remains after a massive star explodes: a neutron star spinning so quickly on its own axis that it emits a signal like a beacon. Stars like this are known as pulsars.



Berceau stellaire

Whatever + Bassdrum + Qosmo + Epiphany Works + NOAJ (°1979)
ALMA Music Box : melody of a Dying Star, 2014
Music box, disc case with 70 discs, laptop computer, exhibition stands, wireless video connector, video projector, power outlet

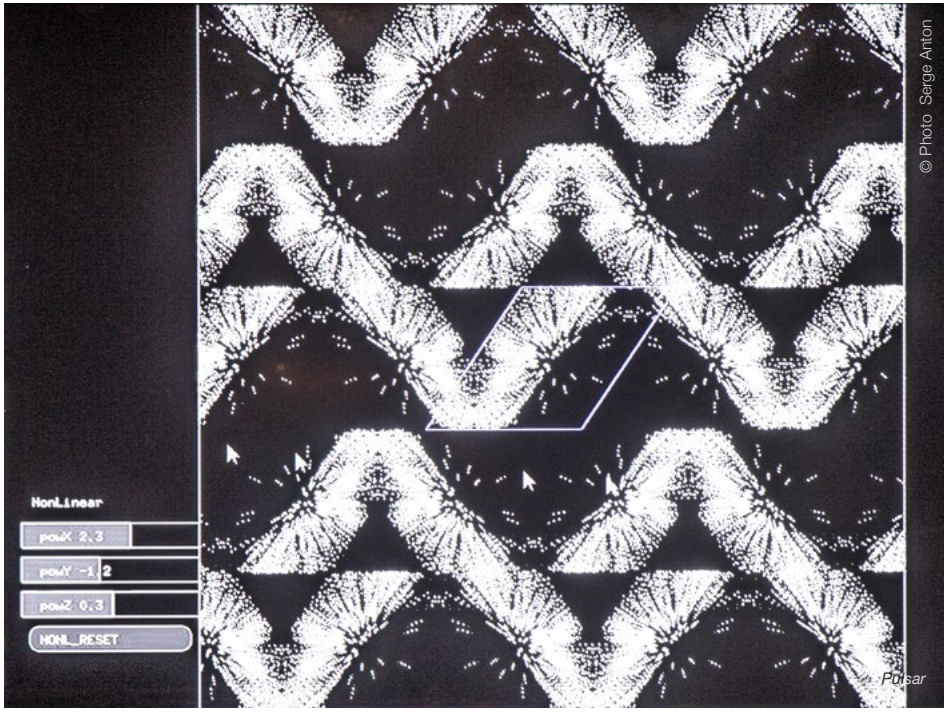
ALMA (Atacama Large Millimeter/ submillimeter Array) is a state-of-the-art radio telescope connecting 66 parabolic antennae deployed in the Atacama Desert (Chile). It detects faint radio waves reaching us from distant celestial objects to study the origin and evolution of galaxies, stars and planets. One of ALMA's goals is to find some clues to the origin of life.

In 2011, ALMA observed the radio waves of a dying star, R Sculptoris.
The *ALMA Music Box* used this data and converted 70 different radio images into 70 music records. The resulting sombre melody is a requiem for the distant dying star, 950 light years away.

Astrid Krogh (°1968)
Illimited, 2019
Optical fiber, aluminum, LED

Astrid Krogh is a graduate of the Textile Faculty of Denmarks Design School. She works as a consultant for architects and product designers, and also creates orders for public spaces and art installations.

Inspired by the infinite depth of the Universe, the Danish artist Astrid Krogh created the mesmerizing light sculpture *Illimited* from delicate optic fibers infused with changing light, protruding from a midnight blue box. Different light constellations appear and disappear in a slow pace, making the little square of the universe seem to "breath" like a starry sky.



© Photo Serge Anton

Frederik de Wilde (°1975)
PULSAR, 2021
Textile, software

PULSAR is an artistic data visualisation project at the fringe of science, art, fashion and design exploring big data, pattern making and textile weaving.

The iconic Pulsar signal cover of Joy Division's 1979 debut album *Unknown Pleasures* is perhaps the most enduring image of the post-punk era, and has since then appeared on millions of fashion and design items.

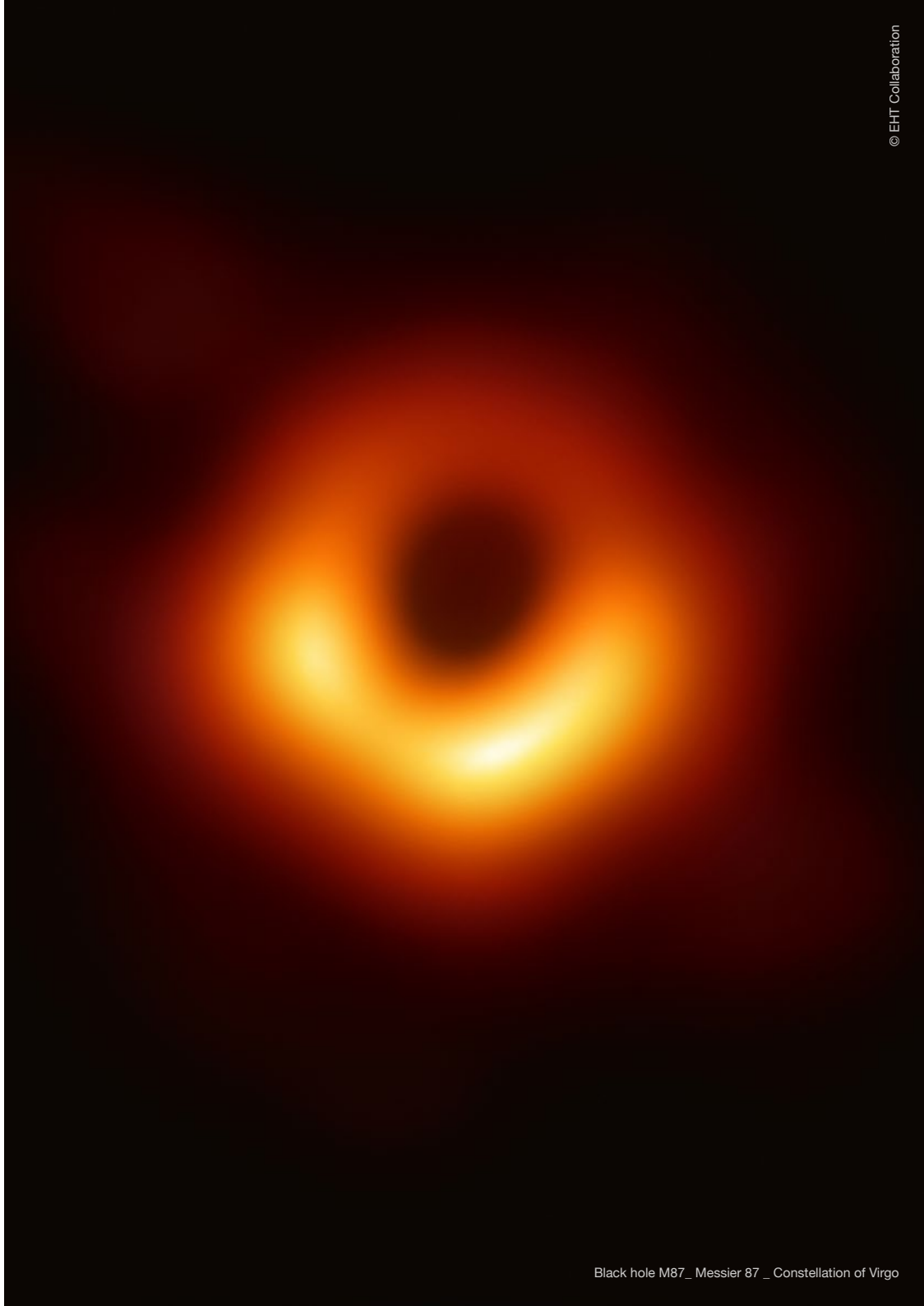
A Pulsar is a fastly rotating neutron star, or white dwarf, that emits a beam of electromagnetic radiation like a lighthouse. Their regular rotation makes pulsars the most accurate clocks in the universe. Together they form a celestial GPS.

The artist developed custom software and used a database from NASA containing datasets with information (e.g. frequency, energy, position in Galaxy coordinates, etc.) from about 2702 pulsars. The software uses this data to develop intriguing patterns from space. The result is a concept textile collection that bridges the gap between artistic digital information representation and physical materialisation.

Pulsar

Black holes

The first photo of a black hole was released to the world in April 2019. It is in fact a reconstruction of images recorded by eight radio telescopes across the world, all aimed simultaneously at the black hole known as M87. It is in the constellation of Virgo, 55 million light-years from Earth, and has a mass 6.5 billion times that of the Sun. The photo shows a patch of darkness surrounded by an orange halo, representing the burning matter that the black hole is in the process of devouring. The black centre is the point where the deformation of space is so powerful that every single ray of light bends inwards. A black hole is created when a star collapses in under the weight of its own gravity. The result is an area so dense that the associated deformation of spacetime traps anything that comes near it, including light. At the heart of a black hole is a singularity (an area where the laws of physics no longer apply), where curvature of space becomes infinite and time comes to a standstill. Astrophysicist Thomas Hertog viewed it as a mirror image of the Big Bang.



Black hole M87_ Messier 87 _ Constellation of Virgo

Shedding some light on black holes

On 11 November 2021, the CID welcomed Francesco Lo Bue for a talk on black holes. You can find the full talk here.

By Maryse Willems

Francesco Lo Bue is a physicist and Doctor of Science. He is the Director of Culture and Scientific Information at the University of Mons. Closely involved in projects designed to bring science and the history of science back into the domain of culture, among other things, he is in charge of the University's museum, the MUMONS, which is dedicated to Science, the Arts & Curiosities. He also chairs the University's Astronomy Circle, Olympus Mons, of which he is a founding member. With his team, he has carried out some major projects including the Foucault pendulum at Saint Waltrude Collegiate Church Tournai Cathedral, as well as the experiment to measure the speed of light from the Belfry in Mons. Lo Bue has worked extensively with the team from the RTBF programme "Matière grise", which awarded him its Trophée Coup de Cœur in 2018 for making science more accessible. He is a lecturer at UMONS, teaching special methodology for physical science and science communication, and is also in charge of practical astronomy for the "Universe: structure and constituents" course. His work positions him at the crossroads between researchers, students, teachers, the general public and the media: striving to understand and to help other people understand!

It was towards the end of the 18th century that an astonishing idea was planted in the minds of a number of physicists: black stars might exist, stars with a gravitational attraction so strong that they would be able to prevent any light from escaping! A revolutionary idea, but one that was soon forgotten.

The idea would reappear in the 20th century, within a totally different theoretical framework. At that time, a new paradigm was established to describe gravity. Gravity was no longer seen as some kind of magical force acting between bodies from a distance, but instead as a local effect of curved spacetime, distorted by the presence of masses... Within this context, light could also be affected by gravity!

Alongside these fundamental studies, physicists and astronomers began to look at the mechanisms that allow stars to shine. They were also keen to understand what happens when these mechanisms stop, because a star is born, lives and then dies.

One by one, the most brilliant scientific minds tried to address this problem. Decades of extensive work culminated in some clear conclusions. There are three kinds of stellar object. If the star is not too massive - if its mass is of the same order of magnitude as the Sun's - it will collapse into itself, thus creating an extremely compact object, which we call a white dwarf: imagine all the mass of the Sun concentrated within a volume equivalent to that of the Earth! This type of object is now well known and easily observable.

If the mass of the star at the end of its life is between approximately 1.5 and 3 times the mass of our Sun, the collapse will be much greater. It will produce an even more astonishing stellar object, one with a diameter of no more than about ten kilometres, with an astonishing density: a neutron star. And if, at the end of its life, the mass of the star is even greater, than according to current physics, nothing can stop the collapse. This takes us somewhere very strange, and very unusual. The stellar object becomes so dense that nothing can escape it, not even light. It seems to disappear from the Universe, but that's just an illusion, as its powerful gravitational force is still there. This object, which is almost impossible to imagine, would be referred to as a black hole. It includes one central peculiarity, which is technically impossible to really define today, surrounded by a no man's land, the event horizon: watch out anybody who dares to cross this invisible border!

Black holes have now stepped out of the world of theoretical speculation, and are just one of the celestial objects that are the subject of everyday study. Better still, research has introduced the idea of another kind of black hole, which on the face of it doesn't have much to do with stellar objects: black holes whose mass can sometimes be several billion times bigger than the sun, and which lurk in the heart of certain large galaxies. The mystery remains unsolved. Where do they come from? Is there a missing link between stellar black holes and supermassive ones? Flashes of genius, Benedictine calculations, collaborations, rivalries, lifetimes, transdisciplinary studies... The speaker presented the subject as a kind of "making of", looking back at the history of science. How did the very idea of black holes emerge? How did black holes go from being purely speculative objects to becoming the focus of the most ambitious observational projects we have ever seen?

CTRLZAK (2018)
Glome (X, Y, Z), 2018, JCP Universe
Mouth-blown Murano glass with metal base in polished black finish

Founded in 2008 by artists and designers Katia Menighini (1981, Italy) and Thanos Zakopoulos (1978, Greece), CTRLZAK is a hybrid studio incorporating various disciplines and forms of expression. The duo is also in charge of the art direction and various creations for JCP Universe. With artworks, design objects and spaces inspired by different cultures and natural environments, the duo wants to make people think about their actions and the world we live in.

The collection of *Glome (X, Y, Z)* vases are sculptures in their own right. Mouth-blown on the island of Murano, these glass pieces seem to give birth to natural phenomena of the Universe.

Glome X alludes to the very first moments of the universe's history, to an era known as cosmic inflation, in which the universe expanded from a microscopic seed to the size of a pea in the blink of an eye.

Glome Y is inspired by the classic depiction of a black hole singularity. Black holes are collapsed stars which are so dense that not even light can escape.

Glome Z depicts Nebulas - the nurseries of stars of our universe - and in this particular case the Pillars of Creation, an area of gas and dust in the Eagle Nebula, approximately 6,500–7,000 light years from Earth, where new stars are born.

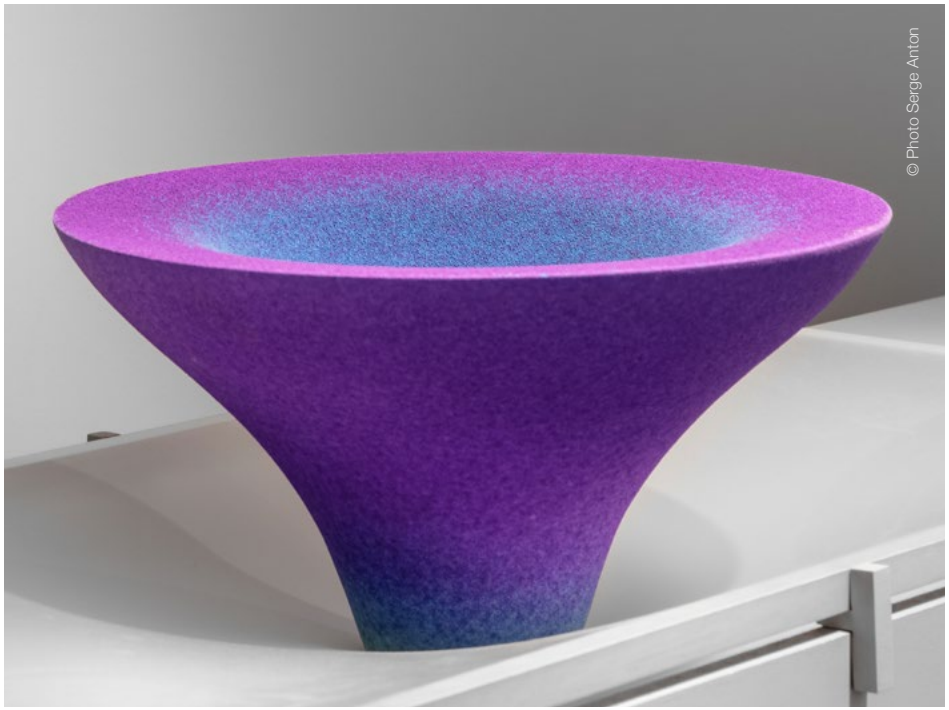
Collection CID – Province de Hainaut

Wyssem Nochi (°1962)
Wormhole, 2010
Plywood, fiberboard, cast resin, painted black

Lebanese designer Wyssem Nochi is a graduate of the Architectural Association (London) and Parsons the New School for Design (New York). His works are in the field of urban design, architecture and furniture. In 2005, he founded ON/OFF - a design consultancy - in Beirut, which was unfortunately destroyed in the explosion of August 4, 2020.

Wormhole is at first sight a table on which a hollow part (a space) is used as a fruit bowl. But it is also the representation of a space travel.

Wyssem Nochi is based on Einstein's theory where a wormhole would allow travel from one point in space to another, from one point in time to another, and from one point in space-time to another. The *wormhole* would form a kind of shortcut through space-time. It is symbolized theoretically as a folded and perforated sheet of paper, allowing to pass from one end of the sheet to the other through the perforation. *Wormhole* represents this linear journey from point a to point b.



Antonino Spoto (°1953)
Ève, 2020
Stoneware, copper-based enamel

A medical man, Antonino Spoto (born in Haine-Saint-Paul in 1953) built up his impressive savoir-faire at the Charleroi Academy. In addition to this training, Spoto honed his throwing skills in the workshop of his compatriot, renowned ceramist Antonio Lampecco.

Spoto's pieces are based on the truncated cone or hemispherical shape of a bowl. With each item, he changes the contours and so also the expression.This perfectly executed terra cotta bowl, created on a potter's wheel, is covered with a purplish-blue copper-based glaze. There is an orifice in the top to create its opening.

Daniel Malik (°1992)
Black Hole Rug, 2016
New Zealand wool

An architectural designer based in Sydney, Australia, Daniel Malik has a wide range of digital skills covering CAD, digital art, web design, 3D modeling and animation, as well as significant experience with digital fabrication processes.

Black Hole Rug, is a rug reproducing the effect of a three-dimensional "black hole". In 2015, the project received the People's Choice Award in the Designer Rugs Australia competition, which helped make the project a reality.

Collection mudac, Lausanne


NASA/JPL-Caltech/UCLA

Big Bang Festival

At the same time, from 22 October through 16 January, Thomas Hertog will be co-curating an exhibition in the Leuven University Library. In this majestic historical setting, you are invited to explore how science and art coalesce in weird and wonderful ways.

To the Edge of Time begins with the ground-breaking research of Georges Lemaître. He first formulated the Big Bang Theory at the dawn of the 20th century, at the University of Leuven. The exhibition then goes on to tell the fascinating story of modern cosmology through contemporary works of art and intriguing scientific objects. High accessibility makes this exhibition a treat for everyone; you don't have to be a science buff to enjoy it!

This exhibition is the product of a collaboration between KU Leuven cosmologist Thomas Hertog – long-time collaborator of the late Stephen Hawking – and independent curator, Hannah Redler Hawes (Londen, UK).

To the Edge of Time is part of the BANG! Leuven City Festival celebrating the Big Bang.

Check out www.knalfestival.be for more information.

Practical details & contact
To the Edge of Time runs from 22 October 2021 through 16 January 2022. The exhibition is open every day from 10 a.m. to 5 p.m.

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et de design
au Grand-Hornu

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Ghaith&Jad

Texts
Shahrazad Ameur, Thomas Hertog, Marie Pok

Translations
Shahrazad Ameur, Marc Holthof, Right-Ink

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The CID thanks the donors, designers and lenders

Special thanks for their valuable help in the long process of researching the exhibition:
Marco Costantini (mudac), Cristina Bargna, Sam Baron, Amandine David, Marie Douel, Guy Duplat, Pierre Echard, Françoise Foulon, Claire Fayolle, Sofie Lachaert et Luc D'Hanis, Louma Salamé, Benoît Watteyne.

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The npo CID - centre for innovation and design at Grand-Hornu is subsidised by the Province of Hainaut.
With the support of the Wallonia-Brussels Federation – Visual Arts Sector.


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