SPACE

art,
design,
architecture
and science

kvalitář

The exhibition SPACE / art, design architecture and science is kindly supported by Oldřich Th. Uttendorfský.

Jan Kaplický's projects could be part of the exhibition thanks to the endowment fund Kaplicky Centre.

SPACE
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"I am just a child who has never grown up. I still keep asking these 'how' and 'why' questions. Occasionally, I find an answer."

Stephen Hawking

The universe is a constant, a unit of measurement, the basis of everything and also an eternal enigma. The fate of mankind is to seek, to search for the essence of being and to explore everything around us. Science – the discipline of the greats – is one way to ask the questions and to search for answers. Another way to reach the essence of creation is through reflection or imitation – through art. At the beginning of any artistic creation or scientific exploration is a question – the pious basis of philosophy.

Our home – the Solar System is in all respects a mysterious place that harbors the worlds we know very little about. Certain information will remain hidden forever, while other is slowly revealed mainly thanks to the exponential development of science. Art and science accompanied the birth and evolution of humankind and mirrored its specific epochs and developmental stages. One theory of evolution says that a four-legged ape stood on two legs so that he could look at the stars and begin to unravel the mysterious correlations between them.

Megalithic structures were undoubtedly created by architects observing the movement of celestial bodies and the floor plans are still breathtaking testament to the sophistication of ancient civilizations. Greek atomists thought of the universe as a composite of invariant parts traveling through void. Aristarchus of Samos was the first philosopher who proposed the heliocentric concept of the universe, Ptolemy on the other hand was a supporter of the geocentric system. Aristotle concluded that since the Earth's shadow is circular in a lunar eclipse, our planet must be round.

Tycho de Brahe was able to measure the geometrical movement of Earth and Mars, whose lines create a precise ellipse.

Rudolphine Prague was full of astronomy and sculptures containing astrolabes, visors and models of the Solar system. Johann Wolfgang Goethe, René Descartes and Isaac Newton were fascinated by the light itself and tried to understand its essence. All these themes have their roots in the Universe, and these compulsive tendencies to understand the essence of it have become a continuous artistic motive from the Greek philosophers up to the present.

Every revolutionary discovery entails a paradigm shift that in turn directly influences other discourses – whether it is the heliocentric revolution, the emergence of Theory of relativity, or the long-awaited results of the scientific efforts of the European Organization for Nuclear Research (CERN).

The space exploration era pushes the boundaries of knowledge much further. For example, the Cassini probe photographed a gigantic hexagonal storm on Saturn's Pole, a giant gas cloud rotating in the shape of a hexagon – and of its origin we know almost nothing. On other gas giants (Jupiter, Uranus, Neptune) there exists a special phenomenon of diamond rain – the internal structure is aligned to the geometry of platonic bodies. The construction of orbital telescopes will allow us in a few years to observe occurrences that are even closer to the very beginning of the universe.

The above list of events and personalities is not a complex one and is abbreviated. Nevertheless, it illustrates humanity's long-term journey to the limits of knowledge. Night sky and the sequence of the annual cycle – these have always been the inspirational channels of art, philosophy and science – that ideally stand side by side and support one another.

The SPACE exhibition directly follows the concept of the Kvalitář Gallery to present Art, Design and Architecture altogether. We tried to imprint this principle of "Gesamtkunstwerk" into this exhibition and introduced those artists, designers and architects for whom the theme of the Universe is a natural inspiration, not just a motif that works only based on visual similarity or metaphor. We also invited Science – the mother of all rational and empirical knowledge – to join this trinity of art disciplines. It is this synthesis of artistic and scientific disciplines that should provide the observer with a broader horizon of knowledge. And if at the end the visitor leaves the Exhibition with a question in his mind – not with a mere statement – even better.

Jan Dotřel

Atacama Large Millimeter Array © (ALMA)

Jakub Berdych Karpelis and Josef Tomšej

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The space is mostly a quiet and dark vacuum. This tranquility is disrupted by the movement of planets, which is in most of the cases orbital and controlled by mutual gravitation. Sometimes it happens that one of the objects escapes gravity and begins to wander freely into space until it collides with something. These collisions of gigantic proportions usually mark the beginning of a solar system, and the birth of our Earth was no different. This brutal period of planet formation is made possible by explosions, melting of metals at enormous temperatures and subsequent millennial sedimentation of rocks.

Few designers choose such hard-to-process materials as rocks for their creative work. The stone as such has qualities more suited for sculpture – a discipline of free art, which may be the one most time consuming. Jakub Berdych Karpelis comes from this the traditional art and connects it in a sophisticated way with aspects of modern design. The design, however, goes against itself and denounces both characteristics of design – usability and reproducibility. Jakub Berdych's works are very often solitaires, originals, art signals or agents provocateurs. They often put together humor with semantic information, some may metamorphose several materials together. His work may be in a form of sedimentation work, other times it takes the form of aggressive design followed by subsequent long-term maturation.

The Meteorite Muonionalusta is the core of the iron-nickel asteroid originating from an area somewhere between Mars and Jupiter. This material reached the Earth's atmosphere about one million years ago and landed in what is now Northern Sweden. The Qubus Design Studio references the specific mysteriousness of this material in its Power-Button symbol.

This symbol represents a binary system, but with Zero and One intertwined. The One represents the truth, the Zero the un-truth. They both switch on and off together. The extraterrestrial material is therefore symbolizing the imaginary beginning and end at the same time. Why, that is the question.

“If you only knew the magnificence of the 3, 6 and 9 you would have a key to the universe.”

Nikola Tesla

Jan Dotřel
Other Worlds

Saturn's moon Enceladus is one of the most interesting places of the Solar system. Its surface is formed by a continuous layer of ice, which is wrinkled by crevasses, depressions and other deformations. Under the ice crust there are subsurface oceans with an average depth of 30 km – about 7 times deeper than those on Earth.

In the area of Enceladus' south pole there are geysers which spout water into space at incredible speeds. Thanks to flying through these eruptions, the Cassini-Huygens spacecraft discovered that the water was salty, and that gradual freezing and ice formation is transforming it into Saturn's E ring.

Titan is the largest moon of Saturn. Its surface has been studied in detail thanks to the fact that the probes have orbited it many times. It has a very dense atmosphere, compared to the other celestial objects of the Solar system and together with the planet Earth is the only known astronomical body that has a permanent liquid structure on its surface. There are huge lakes, riverbed systems and seasons with variable weather in the form of clouds and rain. Instead of water the liquid consists of hydrocarbons, mainly methane. From the astrobiology point of view, Titan is very attractive – its atmosphere is very similar to the one present on Earth during its Early stage. It could contain more complex organic compounds, most likely under the surface of the methane lakes.

Jan Dotřel has been dedicated to photography for a long time, concentrating on non-figurative, conceptual photography with a focus on landscape representation. In his current cycle, Other Worlds, his aim was not to capture nature by itself, but to use its morphology for metaphorical messages or to make it look like unreachable natural extraterrestrial conditions. For this reason, he captures mostly industrial landscapes or deserts and builds on its denaturation, damage and alien nature. The Other Worlds cycle thus focuses more on the morphology of these wastelands and combines it with Jan's long-term interest in astrophysics and astrobiology. In fragments of deserts, sediments, and kaolin quarries, he looks for similarities with the images from

probes aiming to suppress artistic impression to the level of scientific precision. He compares and puts together these similarities and creates collages out of them. This technique mimics the procedures used by the satellites themselves. Since similarities to orbital space images are often found in meanders of waste ponds and windblown sand, the scales get mixed – the macro becomes the micro, tens of kilometers turn into tens of centimeters.

Two types of photographs are presented here: the first is a closeby fly of the spacecraft around a space object. These stacked perspective photographs simulate the long-distance view from the probe on an orbital trajectory, and are presented against a black background, aligned to the way these images are usually presented. The second portion are photographs that depict the surface of foreign bodies from the perspective of a lander, a probe that rests directly on the surface, taking pictures and conducting field research. These photographs are similar in nature to classical landscape photography, but their significance is shifted to the level of a metaphor, as they represent a landscape that a human observer cannot yet see with his own eyes.

Jozef Mrva jr.

Duna Group
Would you like to die on Mars or in Most?

Elon Musk is an extremely capable entrepreneur, engineer, inventor and philanthropist. Founder of SpaceX, the CEO of Tesla Inc. and Chairman of SolarCity, a company that invests in installing solar panels on residential buildings. His career is defined by extreme work ethics and controversial visionary views. He is one of the leading personalities who make harsh comments on the rapid development of artificial intelligence, which he classifies as a significant potential threat to humanity. A substantial part of Musk's time and resources are aimed to reduce the cost of space travel. SpaceX partners with NASA, trying to launch missiles that are capable of subsequent landing, indicating their repeatability.

Using enthusiastic rocket engineering, Musk wants to develop vessels capable of colonizing Mars. It is nowadays feasible to transport a one-way mobile probe to the surface of Mars. But it is extremely expensive to develop a missile that would be able to return successfully. For the human crew that is supposed to colonize the Red Planet the mission would likely be a one-way journey, which is morally unacceptable to NASA. This attitude is based primarily on the American religious tradition and categorical rejection of the "sacrifice" of the crew.

The Dune Group, composed of Lenka Balounová, Ladislav Kyllar and František Svatoš is an artistic group reflecting especially new social phenomena. Their manifesto is addressing questions in the field of ecology, relationships between living organisms and their environment and geo-political problems. In their work, Beauty is How Objects End, they focus on the dispute with somewhat populist rhetoric of Elon Musk about how a trip to Mars could cost as family home in the near future. The Duna Group does not form a clear attitude towards this statement but emphasizes the question of how to manage energy sources. It is advisable to invest into expensive journeys to another planet or is the money better spent on trying to solve earthly problems. Earth is now a blue planet and Mars is a red planet, but Mars used to be blue as well, and it is only a matter of time before Earth becomes a dead, desert world. Do we, as humanity, speed up this process,

or are we capable to learn how to start protecting our environment? Are we able to survive on Earth as humanity, or do we have to move elsewhere?

Photographs: Personal archive of the authors

Herrmann & Coufal
Self-impact

The concept of light pollution refers to the problems associated with artificial public lighting. This topic is poignant not only from astronomical point of view – it makes it impossible to observe the night sky and the objects of the distant universes. An important feature of the night landscape that was there for millennia has started to disappear. Light pollution also has a negative impact on the natural life of fauna and flora, including the human health. Artificial night illumination of cities is too intense, too concentrated, too inefficient and often present in unnecessary in places, translating into negative environmental footprint and unnecessary waste of electricity. About 20% of global energy production goes to lighting.

Herrmann & Coufal's work was designed exclusively for the SPACE exhibition organized by the Kvalitář Gallery and it examines the topic of light pollution. The conceptual piece Self-Impact functions in a dormant state as a classic mirror, reflecting the surrounding reality. As the viewer approaches the mirror, a hidden layer lights up, acting as a light source, slowly changing the surface of the object from reflexive to transparent. The closer the onlooker is, the higher the intensity of the light and lower the reflective ability of the subject.

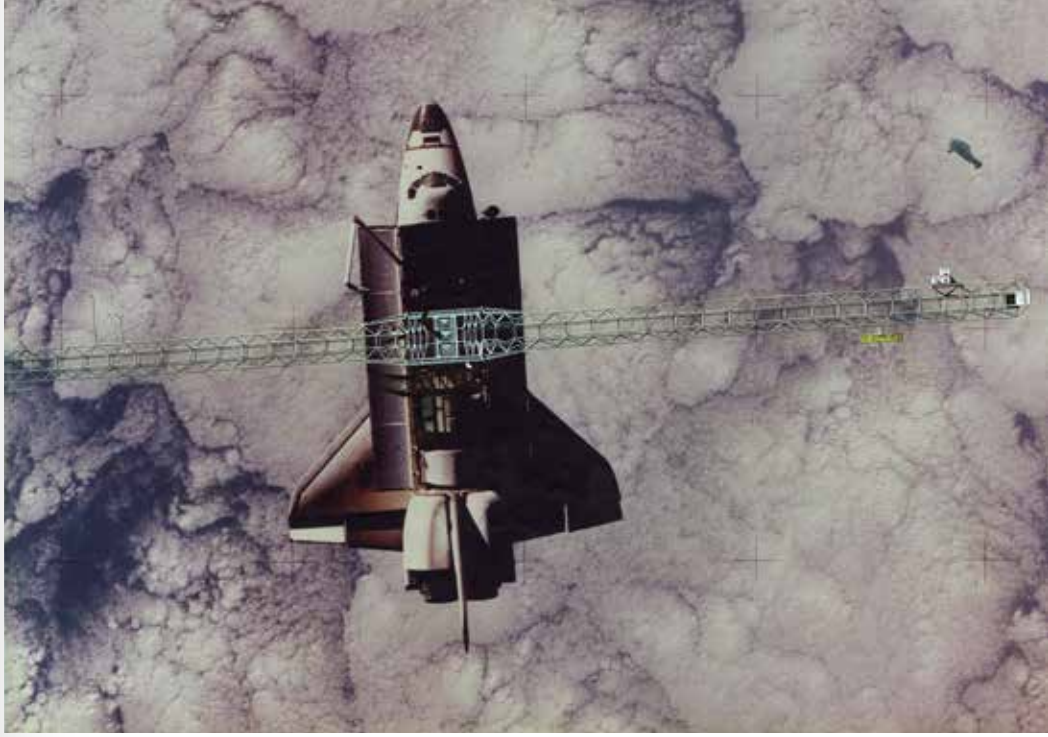
The work refers to the view of active or extinct plasma spherical bodies in outer space, that we call stars and whose observation is obstructed by the light pollution. There is a philosophical metaphor that says we are made of stardust – although the human body is primarily hydrogen, the rest of its atoms originate in stars and cosmic rays. Some elements of our body were formed during the Big Bang, others were created by various star types. As a result, with our exponential light production, we lose not only the possibility of observing stars, but also lose parts of ourselves. The second portion of the work Self-impact is more pragmatic, highlighting the possibility of dynamic lighting, which directly responds to the physical presence of man.

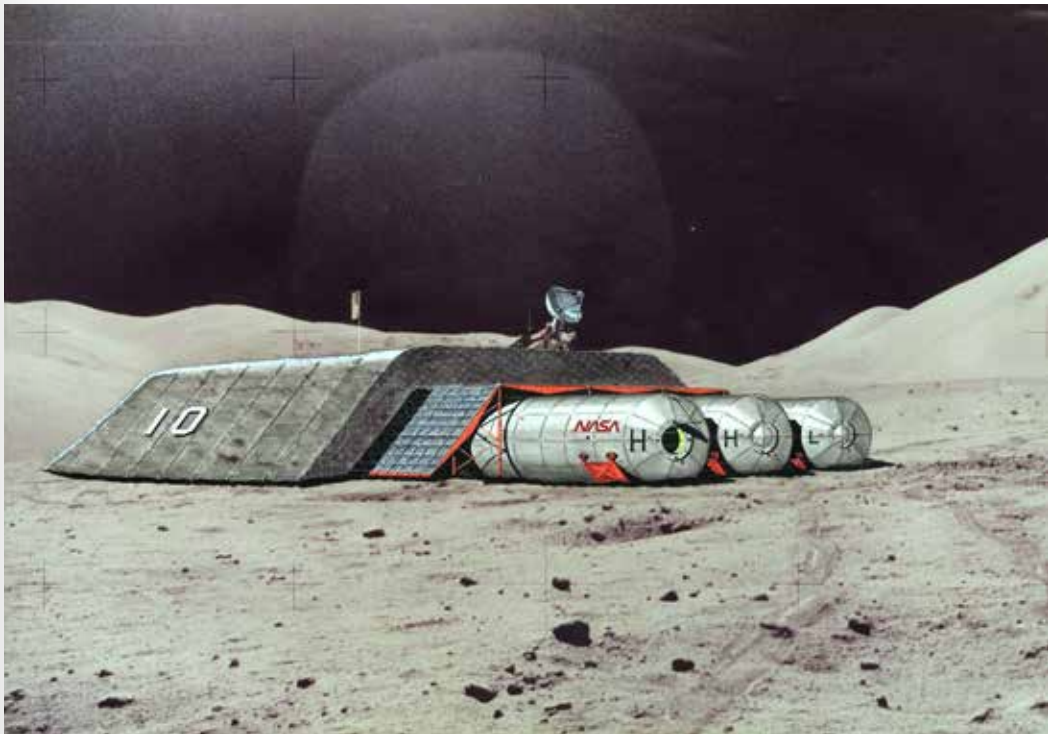
Jan Kaplický and Future Systems

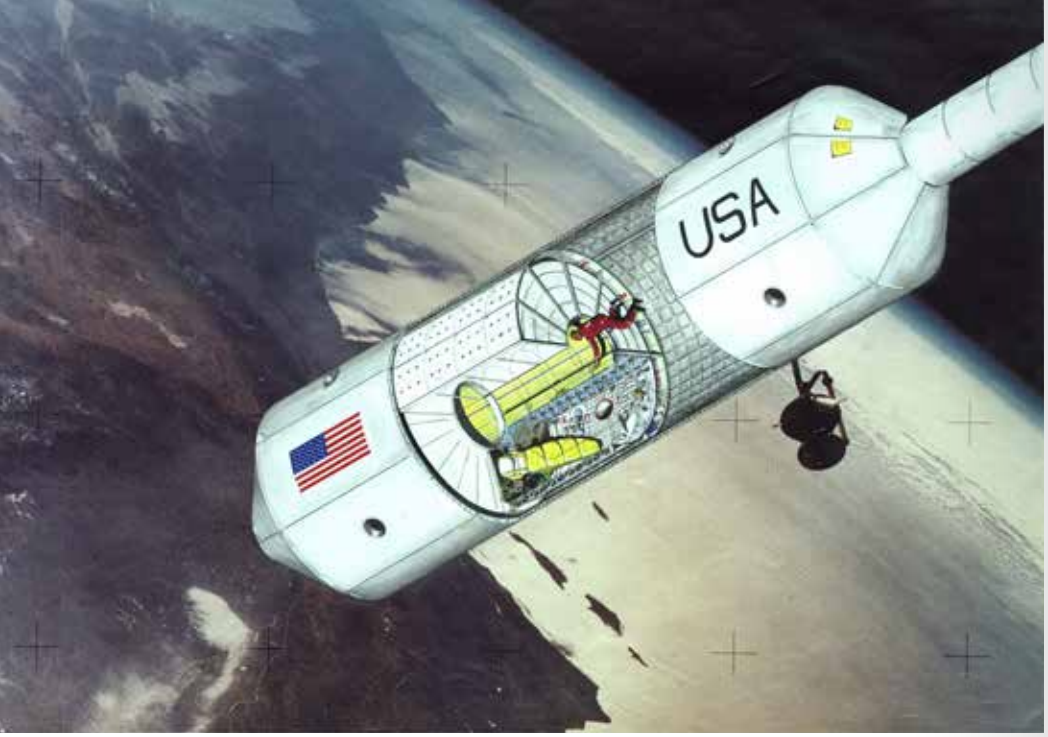
Space architecture is one of the most complex and difficult disciplines of technical engineering and science. The space environment is in all aspects inhospitable (vacuum, high radiation, extreme temperature variations, low gravity, and specific surface conditions on other planets) and the architect needs to consider many variables. The first branch of space architecture focuses on the construction of orbital buildings – space stations orbiting the Earth. Here it is necessary to pay attention to the astronaut's physiognomy, the effects of zero gravity, radiation protection and many other specificities of the environment. The second branch focuses on classical structures built on the surface of a cosmic object. While on Earth the statics of structures is based on bearing and support points – walls, columns and beams holding the weight of the building, extraterrestrial dwellings may be built on completely different foundation types. The third type of space architecture is the design of habitats, dwellings, or technical buildings, which are designed universally and can be constructed on the surface of the Earth as well as extraterrestrial at the same time. A space architect can rarely build based on past designs and historical experience and therefore he almost always becomes a visionary and pioneer architect. The Czech context of architecture is forever enriched by one of the most important pioneers of space architecture ever – Jan Kaplický.

In 1979, Jan Kaplický together with David Nixon, founded the British architectural firm Future Systems, whose specialty was an innovative technicist approach, experimentation with new technologies and a distinctive organic visual form. As early as in the 1980s, Kaplický and Nixon co-created the discipline of space architecture, an area that was until then exclusively serviced by public companies. At that time, they started to work closely with NASA on many projects ranging from simple design of basic components to complex structures of orbital and terrestrial architecture. For example, they are the authors of the extremely complicated space shuttle interconnection system and the Space Deployable Truss robotic telescopic structure.

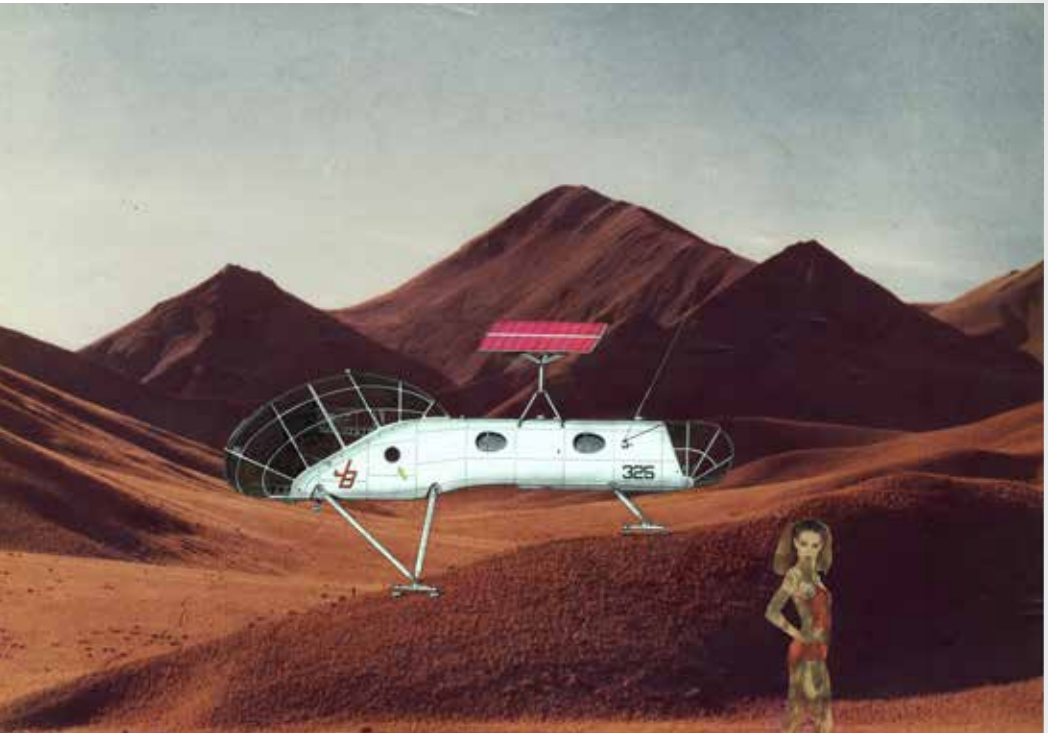
During the design work for NASA's orbital station, they focused inten-







© Future Systems, Jan Kaplicky from the archive of the Kaplicky Center Endowment Fund



sively on the life of astronauts on board and fathered unique concepts, such as NASA Sleep Restraint, which solves crew restraint in weightless conditions during sleep, or a visually interesting NASA Wardroom Table project dealing with the habitable module. The lunar base, special habitats and mobile houses are other examples of unique Kaplický architecture. Among these projects we can find many with universal use – for example in areas affected by natural disasters, natural preserves in a way that minimizes the impact of the dwelling on the environment. The designs themselves are of indisputable aesthetic value. Same applies to the visualizations, that Jan Kaplický combined with photographs and created original artistic collages.

The space program and science as such are often closely linked together in the form of science fiction, which does not provide exact contributions to science and technology but contributes to the progress with its innovative ideas. Nowadays, many scientists are reading science fiction novels because their authors offer ideas that can really push scientific development forward. The visions of Jules Verne, Isaac Asimov, or Arthur C. Clark are a thing of the past, but their insights into the future have undoubtedly become the basis for many scientific endeavors. In the case of Jan Kaplický and his Future Systems, the synthesis of art and science is a synergistic organism grounded in both art and science.

Jan Kaplický's participation on the exhibition was created with the support and cooperation of the Kaplicky Center Endowment Fund.

The Kaplicky Center Endowment Fund was founded in 2008 in Prague. Its aim is to preserve the legacy of Jan Kaplický and his vision for future generations, as well as the Future Systems brand. Its activities focus on the development and promotion of architecture and modern art, especially in connection with the legacy of the Kaplický family. The Endowment Fund also serves as a publishing house and supports all educational and cultural activities leading to the extension of the aesthetic assessment of life values for the general public.

Ines Karčáková
Symptoms of Naked Eye

The most distant object visible to the unaided eye in the bright night sky is galaxy M31 located in the Andromeda constellation. The Andromeda Galaxy is the nearest spiral galaxy to the Milky Way and has about a trillion stars. We know – thanks to the astrophysical calculations – that in 4.5 billion years these two galaxies will merge into one gigantic elliptical galaxy. Its central part is visible to the naked eye, but with a more powerful telescope, its total visual size in the sky is about six times larger than the full moon.

Space observation is full of various paradoxes and factual coincidences. For example, the Sun is 390 times larger than our Moon, but it is also 390 times more distant. That is why we can observe a solar eclipse. Similarly, the time it takes the light from the M31 galaxy to reach the Earth is about as long as the evolution of mankind itself, two and a half million years.

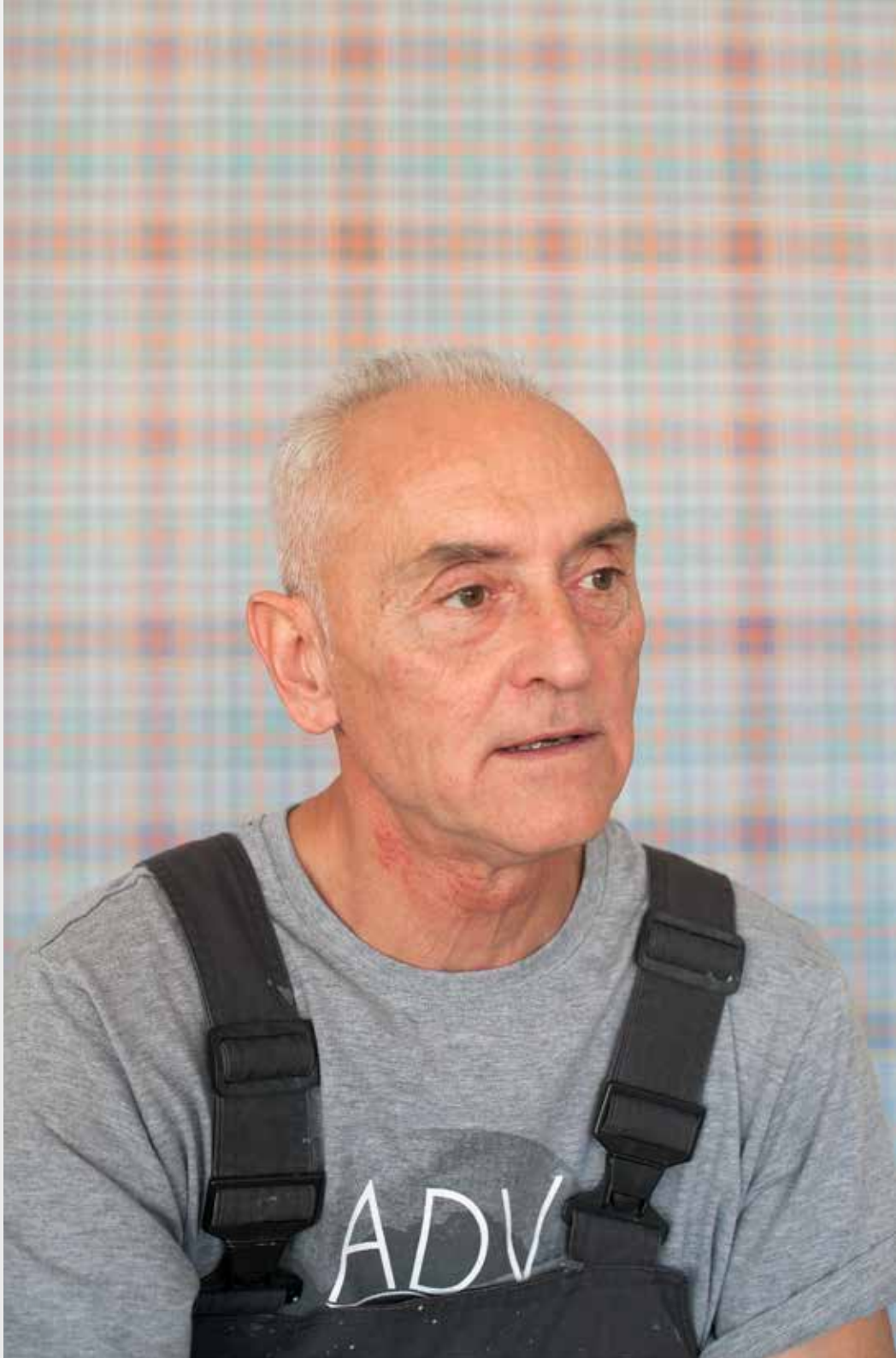
Ines Karčáková focuses on the photographic medium especially in the reflection of scientific and amateur astrophotography. Pictures that are presented to the public as realistic are very often too spectacle.These manipulated images has often very little to do with the realistic vision of reality. In her work Symptoms of Naked Eye she uses photography not as classic form of expression, but in the mean of metric system. Mankind, in the sense of understanding the surrounding reality, has created a metric system that serves as a global measure of knowledge. Ines created a construction carrying rulers and meters that, from the right angle looks like the Andromeda Galaxy. The viewer sees this constellation against the background of an orange curtain, which refers to the color of the sky contaminated by light pollution.

Jiří Matějů
Interference Color Fields

The universe is perfectly transparent in time (we literally see into the past), it is composed of known chemical substances and is governed by the universal laws of physics. One of the basic physical phenomena is the light interference, which proofs the wave nature of light. Waves as such are defined as oscillations that travel through space-time. In the case of light, the radiation source are the atoms that emit waves of different frequencies. The wave is constantly changing but remains invisible to the human eye.

Jiří Matějů's paintings build on the field of visual culture that reflects invisible elements of reality that cannot be fully conceptualized. The viewer standing in front of his work finds herself in the so-called "visual event", which may be accurately described by the Cartesian coordinate system, but whose quintessence may rather be a metaphysical one. The author somehow oscillates between the two levels – the scientific and transcendental knowledge. On one hand, it reflects the knowledge of numerical relations in Kabbalah (Jewish mysticism), mathematical values hidden in hieroglyphs, or in the Bible itself. On the other hand, the discoveries of the microworld captured mainly by quantum mechanics are an equally important inspiration for him. Jiří Matějů's works of art do not create an abstraction of a particular motive but portray reality in a way that can be more closely related to a mathematical or musical form.

In the specific case of Interference Color Fields (a work created exclusively for the Space exhibition) the author offers the possibility of immersion based on a visual experience but whose essence cannot be at the same time clearly visualized. The two-dimensional diptych thus points to the interaction and intersection of matter or phenomena in general, as they were described by quantum mechanics and interference. The most telling character in this sense is a ripple, in which the mass in some places intensifies and elsewhere cancels itself out.



“The most beautiful experience we can have is the mysterious. It is the fundamental emotion which stands at the cradle of true art and true science.”

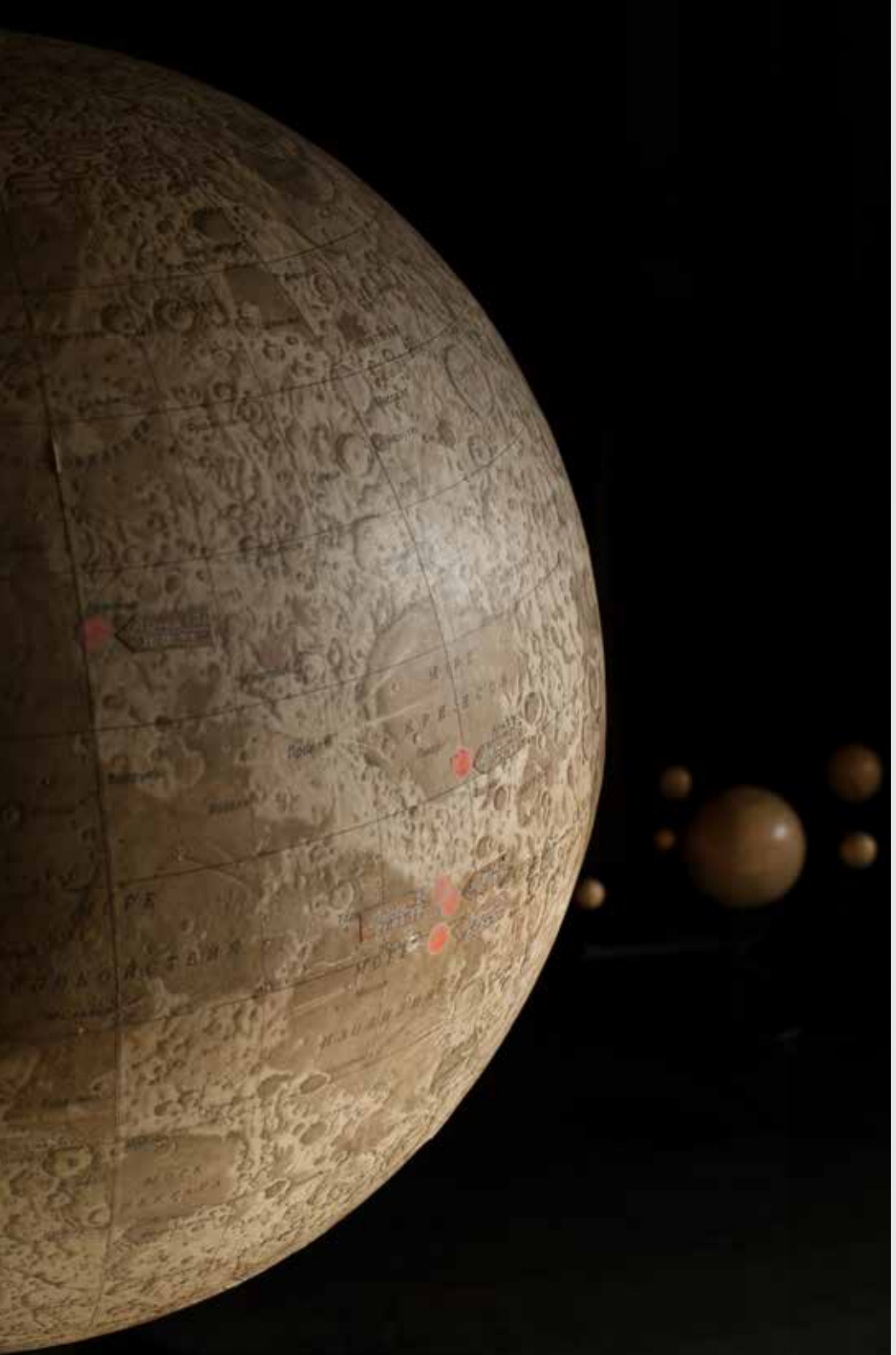
Albert Einstein

Yuri Naumovich Lipsky
Lunar Globe

The most likely theory of Moon formation (The Giant Impact Hypothesis) is based on the principle of collision of two cosmic bodies and their subsequent gravitational effect. About 4.5 billion years ago there was a huge collision between Gaia (the Early Earth) and Theia, two ancient planetoids of different sizes. This twin Earth is called after the ancient Greek goddess Theia – mother of Selene (the Moon). The asteroid that struck Theia was about the size of Mars, and at the point of collision, it heated the surface of both bodies to few thousand degrees Celsius. The surface material of both bodies was ejected into the orbit of the Early Earth and formed a huge ring around it. It took the gravitational forces a few thousand years to transform this ring into the shape of today's Moon.

For many centuries, the far side of the Moon has raised many questions, ignited ideas and created many expectations in the human mind. It remains permanently hidden due to the gravitational effect of the Earth, which has slowed the Moon's rotation so much that it has become invariant – synchronous. The first successful mission to the far side of the Moon was conducted by the Soviet spacecraft Luna 3 in October 1959 – it carried on board the most modern photographic system of that time, Yenisei-2. This device was a combination of an on-board darkroom and a fax machine capable of processing images depending on the intensity of sunlight and transmitting them to Earth. 17 photographs taken with this automated probe revolutionized the scientific community by uncovering the enormous differences between the far side of the Moon and the near side. There are many of the so-called lunar seas and almost no mountain ranges. The lunar seas were created thanks to the relatively thin crust of the lunar surface, which in the past was heavily bombarded by impactors and disrupted the crust in the thinnest places to the point that liquid magma began to flow out onto the surface and fill craters.

This successful Luna project launched its secondary mission – Luna E, aimed at detonating a nuclear charge on the near side. The nuclear explosion would be observable from the Earth with the naked eye, demonstrating the power of the



Soviet space program. Luckily, this mission was cancelled, and the Moon could have been observed and explored in a scientific way. In 1968, the first manned crew of the US Apollo 8 mission saw the far side with their own eyes, and one year later, the first man walked on the surface of the Moon.

Photographs of Soviet probes from Luna program followed by the information gathered by the Zond research project allowed creation of a detailed map of the moon in its three-dimensional design for the first time. The Lunar Globe, a complete sphere created by the orbital mapping of the Moon's surface, was created in collaboration with Soviet astrophysicist Yuri Naumovich Lipsky, a selenography (the study of the surface and physical features of the Moon) specialist. This 1: 10,000,000 Lunar Globe has Lipsky's own handwritten notes on its surface, depicting not only the landing of Soviet Luna probes but also the American Apollo mission. This piece is borrowed from Oldřich Th. Uttendorfski's collection is a unique original historical testimony to the first ever extraterrestrial topography.

borrowed from Oldřich Th. Uttendorfský's collection

Oldřich Th. Uttendorfský

Oldřich Th. Uttendorfský, M.D., PhD. is a diplomat, a former physician and a known art collector. He was born in 1945 in Jakarta, where he lived with his parents of Czech origin until 1956. He studied at a Catholic boarding school in the Netherlands and subsequently received a doctorate degree from the University of Amsterdam. In his professional career he specialized in obstetrics and gynecology, he was active in the field till 2005. After 1989 he was appointed Chairman of the Olga Havel Foundation and later became Honorary Consul of the Czech Republic in the Netherlands. He is currently the Honorary Consul of the Principality of Monaco in the Czech Republic. Mr. Uttendorfský is fluent in several languages and his art collection reflects his passion and love for history, fine arts and music.

Výstava SPACE / art, design, architecture and science vznikla za laskavé podpory pana Uttendorfského.

Jozef Mrva ml.
Curiosity

Astrobiology (exopaleontology or bioastronomy) is a scientific field analyzing the evolution, origin and possible occurrence of life in the universe. In the present, it focuses primarily on terrestrial (solid) bodies of the solar system, where it geologically examines the atmosphere and surface of these worlds. The planet that has been a target of the largest number of astrobiological probes is undoubtedly Mars. There are currently fourteen probes on the surface, two of which are still active. Thanks to orbital spacecrafts and rovers Mars is the most explored planetary body in the solar system, including Earth. This is mainly because it does not have liquid water on its surface, while the Earth's surface is made up of 71% of oceans whose bottoms remain largely unexplored. The Mars Science Laboratory, better known as Curiosity, is NASA spacecraft that has been actively moving on the surface of Mars since August 2012. The primary goal of Curiosity is to determine if Mars has ever been habitable for microorganisms.

Jozef Mrva jr. very often plays with the topic of topography, i.e. with a scientific discipline examining the Earth's or extraterrestrial surface. Mars' geographic information is freely available in NASA's database on the Internet, and Josef decided to represent this virtual alien colony artistically. No person has ever walked on another planet, but we have access to real images, elevation maps, or even a chemical-biological analysis of the Martian surface. Jozef Mrva artistically processes and transforms this data, creating supernatural motifs in a very earthly discipline – landscape painting.

Muonionalusta
Milan Mach and Jan Šiška

Muonionalusta Meteorite is one of the most valuable meteorites on the Earth's surface. It originated in the Main-Belt, which is located between the inner planets of the solar system and the gas giants (the region between Mars and Jupiter). This belt contains a large number of stone objects and smaller asteroids. Muonionalusta is classified as octahedrite, a metallic meteorite that has the exact geometric structure of Widmanstätten's patterns in its cross-section. These patterns are formed by a disordered structure of iron-nickel crystals and are naturally not occurring on Earth but only on extraterrestrial bodies. The metallic composition of the meteorite suggests that it is the core or metal shell of the smaller asteroid core. This asteroid hit the Earth about a million years ago. As it flew through the atmosphere it disintegrated into several pieces, which were spread over the territory of present-day Sweden beyond the Arctic Circle. Meteorite has remained hidden through four ice ages on Earth until it was discovered by meteorite hunters Rusty Pajcr Bros (Milan Mach and Jan Šiška) who dug it up from several meters underground during one of their expeditions.

Expeditions to hunt for meteorites can take different forms. The taiga on the border of Sweden and Finland by the Muonio River is an area with a high occurrence of this meteorite, but due to the past movements of glaciers the specimen is not located on the surface, but usually underground or at the bottom of lakes. Meteorite collectors wear large metal detector constructions that provide information if there is a metal object under the sound signal. In such case the hunters begin to dig and search for meteorite fragments.

“The ways in which people reach the essence of astronomical phenomenona seem to me almost as wonderful as these phenomena themselves.”

Johannes Kepler

Jakub Petr
Deterministic Chaos

Maybe chaos is everything. Physics and mathematics define it as a branch that deals (at least in classical mechanics sense) with the consequences of initial conditions. These initial conditions theory is also called the butterfly effect, an idea implying that even the butterfly flapping its wings can cause a fatal change in the weather in a few months. Systems that exhibit these seemingly random, yet causal signs are, for example, weather – atmospheric behavior, pendulum, economics, earth plate tectonics, fluid turbulences, or the solar system itself. The origin of these principles may seem random, but their nature is deterministic from the point of view of quantum mechanics, that is, put in place in a complicated manner by the previously occurring events. The ancient Greek meaning of the word chaos refers to the beginning of everything that exists, and this approach of seeking the root cause is ultimately inherent to the quantum theory.

The designer and glassmaker Jakub Petr translates this principle of deterministic chaos into the form of machine-made drawings and glass objects. The CNC programmable machine whose construction is based on the harmonograph principle, has three arms that generate three independent rotary movements. The machine receives the coordinates according to which the arms draw the lines, creating patterns whose accuracy is mathematically adjusted so that they do not repeat themselves and form an imaginary spiral. “This precisely defined information is transmitted as coordinates, and the machine through its hardware and software settings introduces an element of randomness into the final form of the drawings.” The resulting drawing is therefore materialization of the chaotic principles contained in deterministic systems, and the glass version of these drawings adds a transcription from the three-dimensional coordinate system (x, y, z) to the two-dimensional rotational system (A, B, C).

The analysis of the principle of deterministic chaos is one of the areas of contemporary science that has enormous environmental and energetic potential. Fascinating in this respect is the author’s ambition to popularize science without unduly simplifying it. Jakub Petr is one of the few authors of the Czech art scene who is able to move between the intersection of science and art with a conscious stability.

Serban Savu
Afternoon at the Office

Voyager 1 and 2 left Earth in 1977 and are still active in the outer space. The Arecibo Observatory is known for its radio telescope of 305 meters in diameter, making it the largest single-camera radio telescope in the works. European Space Agency's Rosetta probe landed on Comet 67P / Churyumov-Gerasimenko and was able to explore its surface. The Atacama Large Millimeter Antenna System (ALMA) is a desert station designed to explore the deepest parts of the universe. IKAROS, the first successful solar yacht launched by Japan Aerospace Exploration Agency (JAXA), flew past Venus. The Large Hadron Collider at CERN is a particle accelerator and one of the most complex scientific tools of today. The future James Webb Space Telescope will orbit the Earth with the main goal of exploring the evolution of the first galaxies and stars after the Big Bang and the search for life outside of the Solar System. Soyuz and Saturn rockets, Saljut, Skylab, Mir, ISS space stations, or Tiangong Heavenly Palace. Probes to the Moon, to the planets, to the Sun... This heterogenous list of devices is the result of the efforts of scientists and visionaries of famous names.

Space travel is extremely dangerous, so the protagonists are in most cases extraordinary individuals of famous names. Machines carrying interplanetary probes are among the most advanced technologies mankind has ever constructed and are named after the gods and giants of the past. This is possible thanks to the countless hours invested by researchers, officials and anonymous workers who rarely achieve the recognition for their contributions.

Afternoon at the Office by the prominent Romanian painter Serban Savu can be interpreted as a metaphorical monument to exactly to this anonymous space industry worker.

Robert Runták's collection

Štěpánka Sigmundová
The Last White Rhino

Štepánka Sigmundová / The Last White Rhino

The pole of inaccessibility is the geographical term describing the location that is most difficult to reach due to its position. There are several such poles on Earth. The Pacific Pole of Unavailability (48°52.6'S 123°23.6'W), also called Point Nemo, is a place in the ocean that is furthest from the coast in all directions. It is a territory of no one located almost 2,700 kilometers from the mainland. As astronauts find themselves on the Earth's orbit, they are closer to this place than any other human on Earth. This is also where most of the space satellites and ships are headed, when reentering into the atmosphere. Since 1971, NASA has crashed more than 260 satellites in this location, and the number of fallen Soviet and Russian machines has climbed over 150. Imagine the bottom of the Pacific Ocean, where you can find this quiet and dark cemetery of spacecrafts and probes, several kilometers underwater.

Štěpánka Sigmundová is focused on the artistic reflection of astronomical research and space expeditions. These scientific achievements are clear and explicit, but what often remains unnoticed are the residues of these missions. The author explores this human footprint, forgotten or retired objects. As an example – this principle was used in The Trash We 's Left on the Moon exhibition, where she gave the viewer a pragmatic account of what the astronauts left on the lunar surface during the Apollo missions. The trash included golf balls, Hasselblad cameras, the Fallen Astronaut statue or falcon feathers. Another example of how the author deals with the topic of leaving traces is through the creation of ceramic containers. They depict scenes from the history of cosmonautics or are branded with the logos of space agencies. Ceramics is a very old material and often serves as an archaeological indicator and testimony of the past.

The era of the 1970s, when the space programs of the United States of America and the Soviet Union were at its imaginary peak, is to some extent also related to the promotional activities connected to these missions. An effective form of public communication is television broadcasting, which

was not available to every household at that time. The situation when people gathered in front of the shop window and watched the screen together was quite a common occurrence. The main visual line is the video art piece The Last White Rhino, where the famous electric vehicle of Elon Musk – Tesla – that is flying in the Earth's orbit, is replaced by the last male specimen of the extinct white rhino. The extinct species is buried in space while the hymn played is a song by David Bowie. In the Earth's atmosphere, its body would start to decompose almost immediately due to bacteria. But if its body went through a mummification process and was thrown into space, it could travel indefinitely.

This scene is to some extent controversial, maybe even bizarre – like the fact that an electric vehicle with an empty space suit in it plays Space Oddity while orbiting the Earth.

Photographs: Personal archive of the author

Jiří Podolský
The Universe – Ancient Inspiration of Art and Science

Summary of the December 12 lecture in Kvalitář Gallery

Art and science are two integral components of human creativity, supporting the effort to represent, capture, describe and understand the world we inhabit. It is exactly this aspect of our emotional invention and rational intelligence that separates us from the animal kingdom to which we are otherwise genetically and environmentally related. The cultural connection between art and science can be traced back to the very beginning of humanity, as evidenced by findings in the Bruniquel Cave or Chauvet Cave, the oldest art gallery in the world.

Star gazing, the observation of the outer cosmos, had a very significant impact on the emergence of art and science. The oldest megalithic buildings in Western Europe demonstrate an excellent knowledge of the annual cycles represented by the regular sunrise and sunset of the Sun and Moon. They combine a remarkable astronomical construction with architectural monumentality, artistic appeal and cultural significance. We also know that astronomical phenomena have inspired the emergence of cult structures and artifacts of the great Bronze and Iron Age civilizations. Even in this case we find artistic, scientific and spiritual unity – the celestial objects identified with personalized goods.

In the ancient Greek times scientific thinking was born as a rationally constructed logical structure of knowledge about the world. In parallel, there is an unprecedented surge of all the artistic forms, especially architecture and sculpture. Similar to the other civilizations, astronomy was also in the center of attention of the Greek society. Theories of arche, vacuum, atomism, the formation and organization of the cosmos form the core of the classical natural philosophy. Aristotle's synthesis of scientific knowledge of that time culminates in a mathematically perfect system of Ptolemy's astronomy.

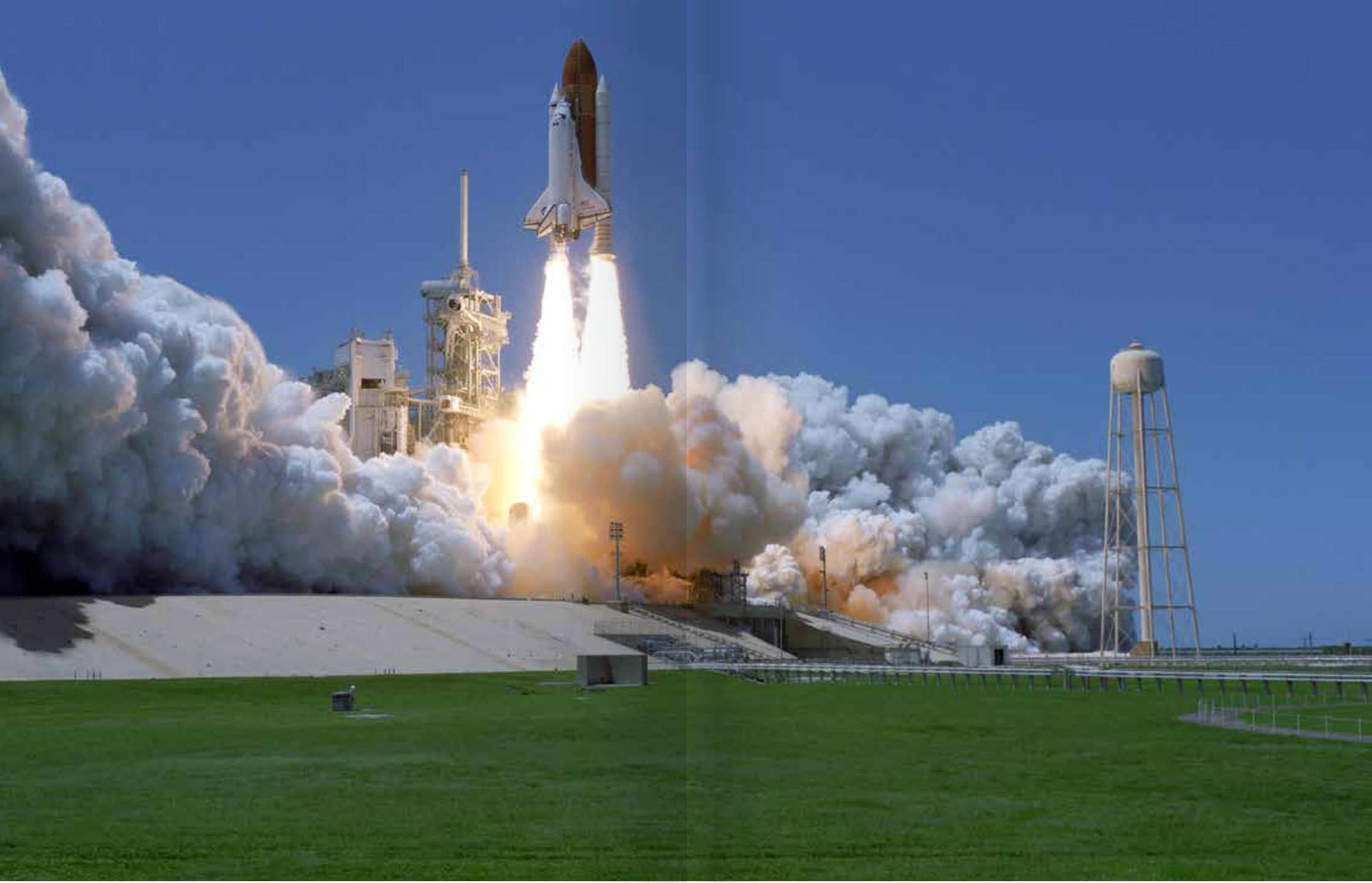
Aristotle-Ptolemaic cosmology remained accepted throughout the Middle Ages. It is represented mainly by beautiful astrolabes, the most beautiful of which is in Prague and is kinematic. The astronomical clock mounted on

the wall of Old Town Hall is a real gem of astronomy, mechanical watchmaking and Gothic architecture. Its creation in 1410 is closely connected to the foundation of Charles University, the oldest university in this part of Europe.

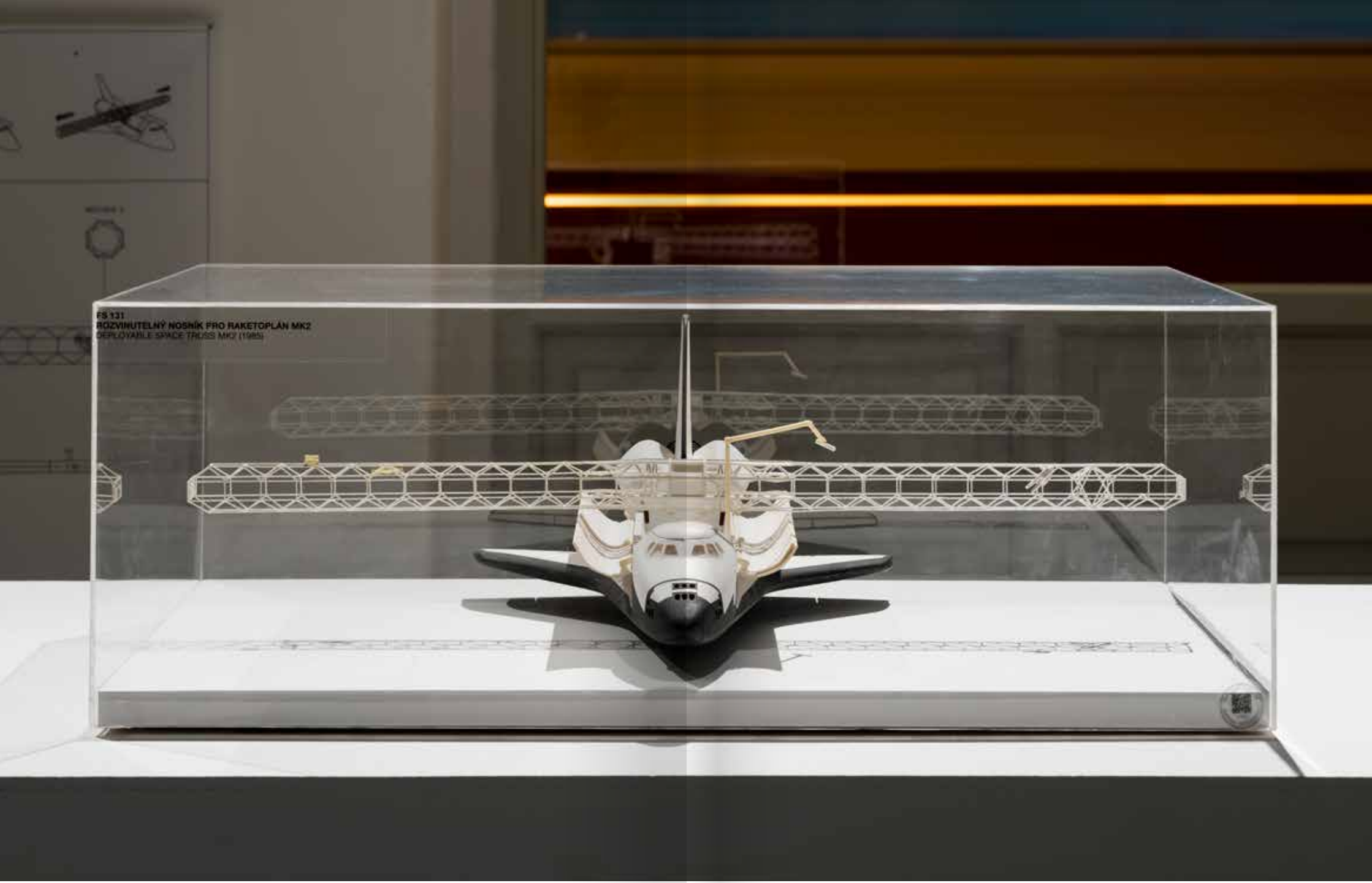
It is indeed a remarkable coincidence that the fall of the Aristotle's geocentric conception of the cosmos as illustrated by the Prague Astronomical Clock, was fundamentally accelerated exactly two centuries later also in Prague and at the same university. In 1609, Johannes Kepler published his fundamental work Astronomia Nova, in which he came up with the revolutionary laws of planetary motion. He deduced them using the highly accurate observations of Tycho Brahe who he met in Prague. So even in the Rudolphine Renaissance era, which favored the free development of artistic creation and scientific research, astronomy played a key inspirational role. Mathematically defined physics is born together with a completely new form of artistic representation of the world.

prof. RNDr. Jiří Podolský, CSc., DSc.

Professor Podolský is engaged in scientific and educational activities at the Institute of Theoretical Physics of the Faculty of Mathematics and Physics of Charles University. He is an expert on Einstein's theory of relativity, particularly gravitational waves, black holes and cosmology. He has popularized science, for example he has organized the series of lectures Modern Physics and Physics as Knowledge Adventure for many years. In addition to that, he studied the Queen's Court and Green mountain manuscripts and was also an expert advisor to the Genius series about Albert Einstein (directed by Ron Howard, produced by National Geographic). He also works as a translator – among the works that he translated into Czech are books by Stephen Hawking, Kip Thorn, Roger Penros, Stephen Weinberg or Carl Rovelli.



Discovery program NASA, © NASA



Jan Kaplický and Future Systems, Deployable Space Truss

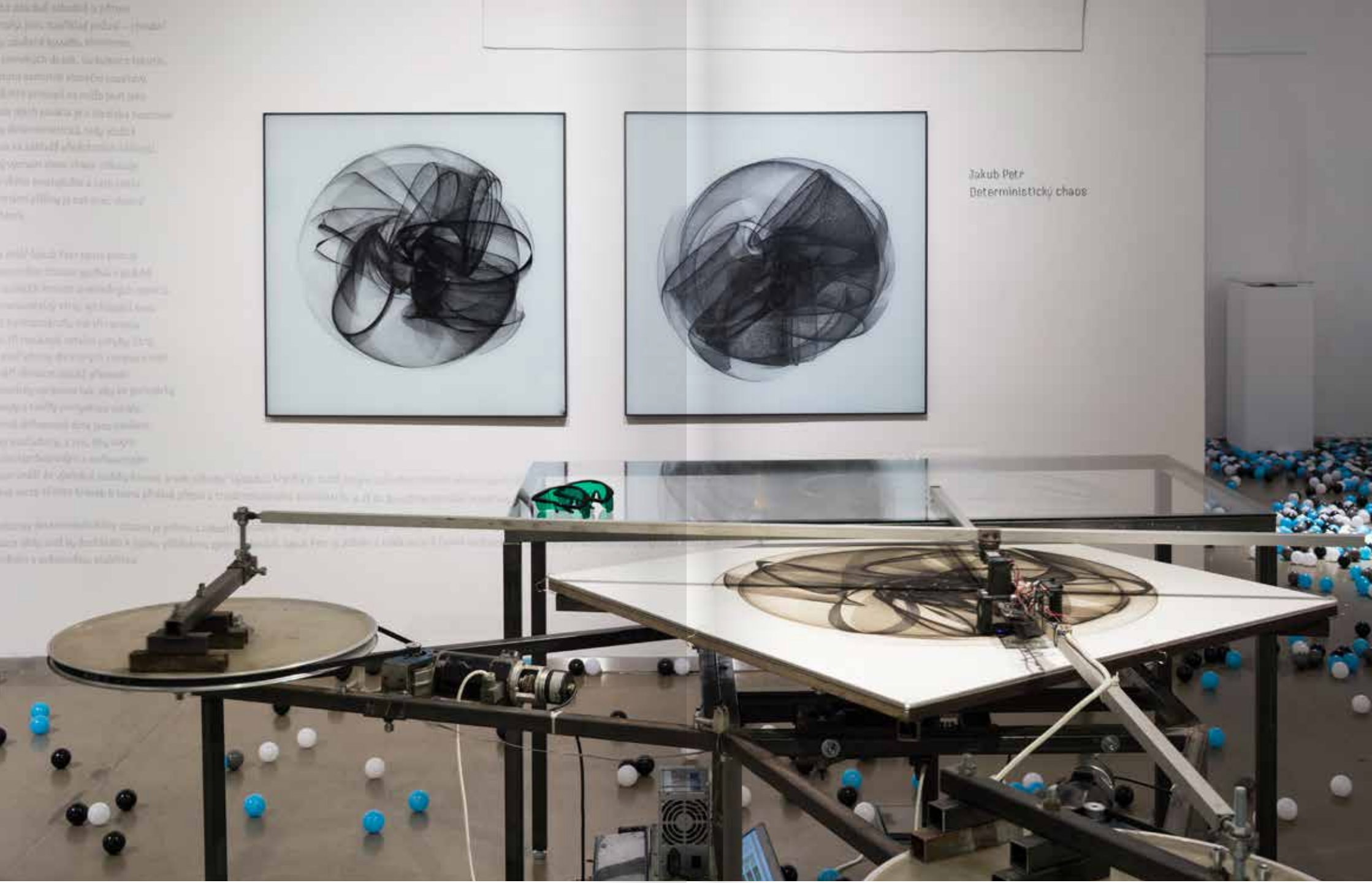
Innes Karčáková, Symtoms of the Naked Eye

Herrmann & Coufal, Self-Impact

Jakub Berdych Karpelis, Josef Tomšej, Q

Yuri-Naumovich Lipsky, Lunar Globe

Štěpánka Sigmundová, The Last White Rhino



Jakub Petr, Deterministic Chaos

Štěpánka Sigmundová, NASA Vases

SPACE / art, design, architecture and science

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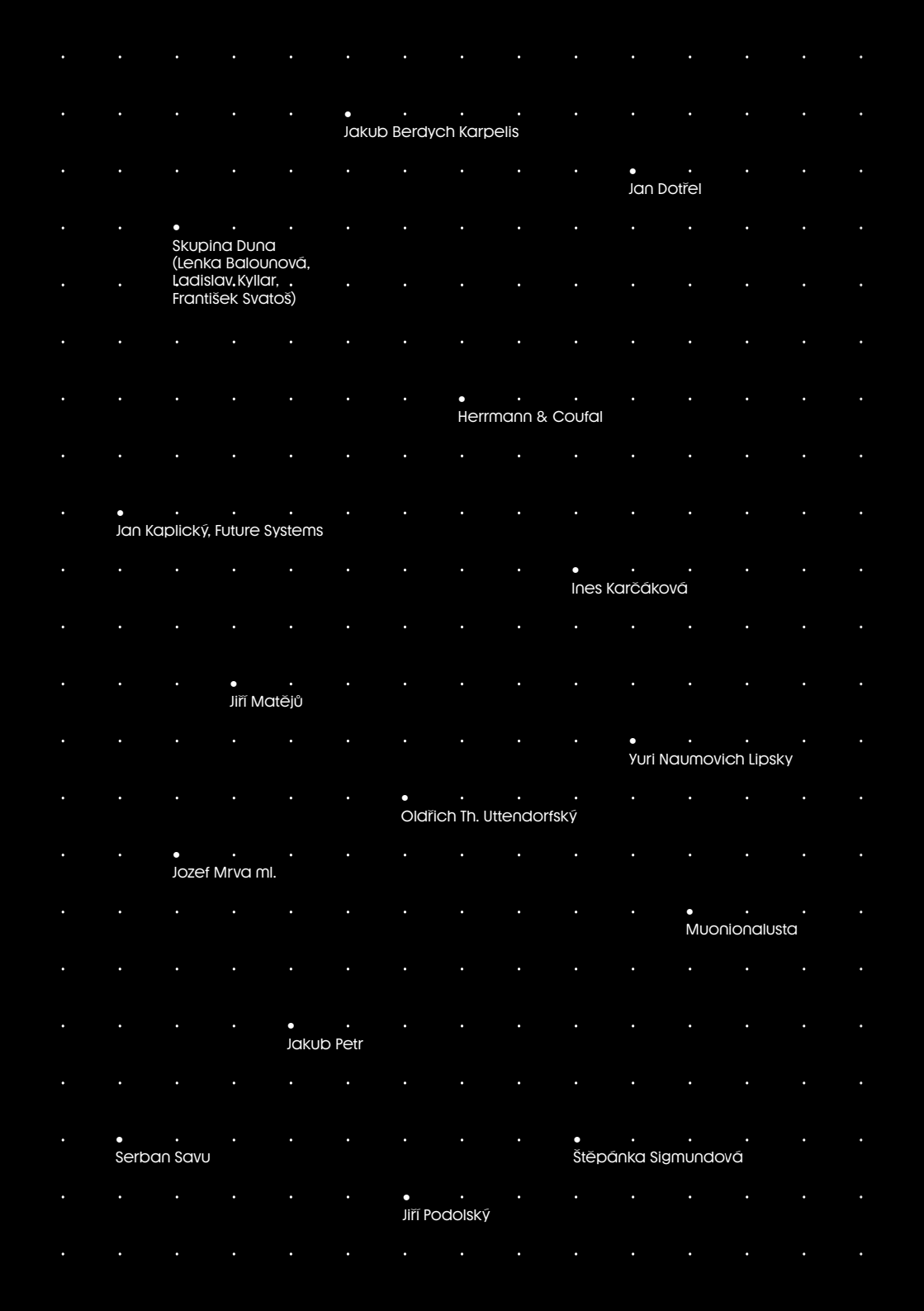
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