

TURNING THE WORLD INSIDE OUT

Anish Kapoor
Manipalpi, 2006

Anish Kapoor is renowned for his enigmatic sculptural forms that permeate physical and psychological space. Most often, the intention is to engage the viewer, producing awe through their size and scale, evoking mystery through the works' dark cavities, tactility through their inviting surfaces, and fascination through their reflective facades. Throughout, he has explored what he sees as deep-rooted metaphysical polarities: presence and absence, being and non-being, place and non-place, the solid and the intangible. His most recent works are mirror-like, reflecting or distorting the viewer and the surroundings.

Ins, 1998

Turning the World Inside Out II, 1995

AIR-PORT-CITY

Tomás Saraceno
Indescent Plant Medium with Lamp, 2009
 Photo by Tom Dulbeck

DARK MATTERS

The balloons awaits release from the launch vehicle / T. Gregory Guzik / Nature.

In 2008 the Gamma-ray Large Area Space Telescope (GLAST), later renamed the Fermi Gamma-ray Space Telescope (FGST), was launched into a low Earth orbit. One of its objectives was to shed some light on the nature of the mysterious dark matter, supposed to constitute 80% of the matter in the universe. Scientists expect that the mission would decisively implement the data already coming in from another satellite, the Payload for Antimatter Matter Exploration and Light-nuclei Astrophysics (PAMELA), launched in 2006. Our view of the universe would be dramatically changed, ceasing to have laws of physics.

At the end of 2010, however, the riddle of dark matter remained unsolved.

(Photo: NASA)

FOLDING SPACE

Marin Hendriks
Gradually...Then Suddenly (white version), 2010
 Still from a single-channel video, 1 min 59 sec

ESLOV METEORITE

Meteor impact at 06:41 am

In the early morning of November 7, 2007, Eslov, reputed to be the most boring town in Sweden, was hit by a meteor. The event was witnessed only by a few. The blast, with an energy estimated to have been between 1 and 2 megatons of TNT, left a hole of 13 metres wide in a field near Eslov. The meteorite was dug up by Maarten Vanden Eynde and put on display in front of the Meelbarghuus as part of the 2nd Eslov Biennale.

Meteor crater near Eslov

Maarten Vanden Eynde
Eslov Meteorite, 2007

THE SEARCH FOR EXTRATERRESTRIAL LIFE

Jim Plaxco
Martian Crater, 2005
 Source: Mars Global Surveyor Narrow Angle Camera in July 1998. The target area lies in the Cerebralia quadrangle of Mars. It is located on 33.25° latitude and 246° longitude. The crater is approximately 4 kilometers in diameter.

The **National Aeronautics and Space Administration** In 1958, the United States Congress created the National Aeronautics and Space Administration, or NASA. Its purpose was to coordinate and conduct all aeronautical and space activities for the United States of America, except those of the military. Among the many programs which NASA now runs, one is to search for life outside our home planet. NASA is currently examining our neighbor planet Mars for signs of life, as well as the moons of other planets in our solar system. NASA has advanced technology for the search of life outside of our own solar system, such as special radars and infrared telescopes.

For centuries now, a fierce debate has been going on over whether there is or has been life on Mars. The observation of so-called canals on the red planet at the end of the 19th century led some scientists to propose a long-gone highly intelligent civilization of Martians. Others argued that the extreme environmental conditions on Mars could make life as we know it impossible. The two Mars landers, Viking 1 and Viking 2, that Nasa sent in 1975, failed to detect any organic compound on the surface.

ALH84001 In 1984, a meteor was found in Allan Hills, Antarctica. This 4 billion-year old meteorite fell to Earth 15,000 years ago. It was thought to hail from Mars. In 1986, scientists announced that it might contain evidence of Martian life, in the form of chains structures of carbonate globules, that could be the fossilized remains of bacteria.

Apart from those biologists, whose intriguing pictures already seem convincing enough, the case for life on Mars further rests on the presence in the meteorite of complex organic molecules (polycyclic aromatic hydrocarbons), and on the occurrence of a form of the mineral magnetite that, on Earth, is associated only with biological activity.

However, skepticism still remains. The biometric could have been formed by inorganic processes. The presence of organic molecules could be due to contamination from the Antarctic ice. The "bio-silicate" grains could have the same origin. And it is agreed that to be really convincing, pro-lifers would have to produce evidence of cell walls, of cell division, and of chemicals more closely associated with living organisms as we know them. And so the debate rages on, while the scientific community continues to look for signs of life on Mars, extinct or extant.

Published: Scjorner On July 4, 1997, NASA dropped another Mars lander, called the Mars Pathfinder, on the red planet. The lander carried 16 light-weight, low-cost spacecrafts' boomed several times before coming to a stop. The airbags deflated, the pod opened, and out came a rover that explored the Martian soil. Mars was the last of the Jet Propulsion Laboratory in Pasadena, California, was to examine the Martian atmosphere and soil.

During the following three months, far longer than programmed, the rover, called Sojourner, analysed rocks and soil samples on 16 locations near the lander. No Mars probe since Viking has tested the soil. The signs of life? Speculatively, the mission's main mission is focused on the question whether there was or ever had been water on Mars, which would be a requisite for life as we know it. In the near future, NASA will continue to send landers and rovers to examine the Martian atmosphere and soil.

Simulated view of a black hole in front of the Milky Way. The hole has 10 solar masses and is viewed from a distance of 600 km. An accretion disk of about 400 million g is necessary to sustain this distance constantly.

COLD MATTER MACHO

Corneelia Parker
Cold Dark Matter: An Explored View, 1991
Cold Dark Matter began life as a garden shed filled with objects (from Stella Parker's own and friends' tools and things bought at a car boot sale. She then asked the army to blow up the shed under very controlled conditions. The objects, along with the fragments of the shed, were collected and suspended in a cloud of smoke in an attempt to recreate the moment just after the explosion. The installation is at a single light-bulb at the very centre of the arrangement, casting shadows on the walls. The title gives us a whole new way of understanding the artwork, making us think of other dramatic moments of destruction and creation in the much wider universe.

COMPOSITION OF THE UNIVERSE

Marjolijn Dijkman
Composition of the Universe (variations), 2010

SPACE TIME

Mungo Thomson
TIME, 2007

WHEN SUDDENLY IT HIT ME

Rinus Van de Velde
When It Suddenly Hit Me, 2005
Maarten Vanden Eynde
Dip-Stick, 2005

THE SCALE OF THE UNIVERSE

Toril Johansson
The Scale of The Universe The Past 100 years, 2009

At the beginning of the 20th century the estimate of the size of the universe increased radically.

At that time, an extensive project to photograph and map the entire sky was under way at the Harvard College Observatory in Cambridge, Massachusetts, under the direction of Edward Pickering. Seller photographs, plates amassed, waiting to be examined. A

The material had to be able to withstand the extreme conditions on Mars, with temperatures dropping to minus 70 °C, and the pre-launch sterilisation which heated the painting to 135 °C. The painting was integrated in the technology of Beagle 2. The colour spots were to be used to calibrate the X-ray spectrometer, the camera, and the instrument to analyse iron in the minerals in the Martian soil.

The pop group Blur wrote the call sign that Beagle 2 would have send to mission control when it landed on Mars (listen to the song on the BBC website).

But Beagle 2 never made it. It was last seen heading for the red planet after separating from the Mars Express on December 19, 2003. Part of a mission with an estimated cost of \$85 million, it vanished without a trace ...

The mean distance from Earth to the Moon is 384,400 km. The Moon's radius is 1,738 km; mean density is 3.34 g/cm3.

BIG BANG THEORY

The Big Bang theory is the dominant scientific theory about the origin of the universe. It states that the universe literally started with a bang, the "explosion", 13.7 billion years ago, of an unimaginable and undescrible "something" called a singularity, not even a single point, that nevertheless "contained" all matter. Time and space were created on the spot. Fractions of a second later the universe was an incredibly hot and dense ball, expanding and cooling rapidly.

In 1927, the Belgian mathematician and Catholic priest Georges Lemaitre was the first to propose an expanding universe, based on Albert Einstein's general theory of relativity and inspired by the growing number of redshift measurements for distant objects. In 1929, Edwin Hubble published a simple linear relationship between redshift and distance: the further away an object, the faster it sped away from us, as predicted by Lemaitre.

In 1951 Lemaitre went a step further. He argued that if the universe was expanding, it should be shrinking if you went back in time. Ifll you came to an initial point, which he called the primeval atom, and described as an exploding cosmic egg.

In January 1953, Lemaitre and Einstein traveled to California for a series of seminars. After the Belgian detailed his Big Bang theory, Einstein supposedly stood up, applauded, and said: "This is the most beautiful and satisfactory explanation of creation to which I have ever listened." Lemaitre's notion of a beginning of time and space, marked with fireworks on "a day without yesterday", was a radical departure from the prevailing cosmological model of a perfectly static universe without beginning or end.

The Big Bang theory received its strongest confirmation in 1964, when Arno Penzias and Robert Wilson, who later won the Nobel Prize, discovered the background radiation, the residual "afterglow" of the "explosion", as predicted by the theory.

Maarten Vanden Eynde

Pre-Cosmological Research, 2000
 (400cm x 400cm x 40cm)

This work was made without the use of glue, welding, binding or screwing. The parts generate force in a small square core. The tension is holding everything together. It creates an implosion as well as an explosion. But because the inward and outward forces cancel each other, everything freezes in an eternal stillstand that represents the end as much as the beginning.

THE CONTROLLER OF THE UNIVERSE

Damian Ortega
Controller of the Universe, 2007

Damian Ortega's *Controller of the Universe*, a collection of found hand tools suspended in mid-air, is a site of danger and otherworldly lines. As if in mid-explosion, the objects appear to have been frozen in time and space by a force of nature.

Cosmic Things, 2002

CHAOS THEORY

Unlike what is commonly thought, chaos theory isn't merely an elaborate way of stating the obvious fact that the world is chaotic. Nor does it refer to entropy, the natural tendency of systems toward disorder. Chaos theory is concerned with the uncertainty inherent in measurements and predictions, and with the non-linear behavior of seemingly linear systems. It studies the behavior of dynamic systems such as the weather, that are highly sensitive to initial conditions, popularly referred to as the butterfly effect.

Chaos theory became being equally known towards A and B. It needs to keep moving towards the future. And on top of that spacetime, created in the Big Bang, is expanding at an accelerating rate. Time moves faster and faster towards its final destiny. Will this be the end or a new beginning?

The Lagrangian points are the five positions in interplanetary space where a small object affected only by gravity can theoretically be stationary relative to two larger objects (such as a satellite with respect to the Earth and Moon). They are analogous to geosynchronous orbits in that they are "fixed" positions to be in a "fixed" position in space rather than in an orbit in which its relative position changes continuously.

Maarten Vanden Eynde
Genetologic Research, 10, 2004
 (back: 100cm x 100cm x 150cm; front: 40cm x 70cm)

The work consists of wooden, plastic and metal objects trouves, collected during one month in the streets of Naples, Italy, and pressed into an oval frame made in a 40 cm thick wall. The art piece presents a flat, ordered, "abstract" image. The back shows an explosion of energy, space where a third body, of comparatively negligible mass, could make life as we know it impossible. The two Mars landers, Viking 1 and Viking 2, that Nasa sent in 1975, failed to detect any organic compound on the surface.

During the period of the 19th century, the two Mars landers, Viking 1 and Viking 2, that Nasa sent in 1975, failed to detect any organic compound on the surface.

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EXPANSION IN FINANCE AND PHYSICS

Toril Johansson
Expansion in Finance and Physics, 2010

Abstraction in Finance and Physics, 2010

Detail from Expansion in Finance and Physics, 2010

THE GOD PARTICLE

Alexandra Mir
The Dream and the Promise, 2009

The Large Hadron Collider, (CERN)
(Photo: Maximilian Beck, CERN)

If you were to dig 300 feet deep in the center of the charming French village of Croaz, you'd pop into a setting that calls to mind the subterranean lair of one of those James Bond villains. A garishly lit tunnel ten feet in diameter curves away into the distance, intersected every few miles by a series of chambers crisscrossed with heavy steel structures, cables, pipes, wires, magnets, tubes, shafts, catwalks, and enigmatic grilles.

The technological networkwork is one very big scientific instrument, specifically, a particle accelerator – an atomic peashooter more powerful than any ever built. It's called the Large Hadron Collider, and its purpose is simple but ambitious: to crack the code of the physical world: to figure out what the universe is made of; in other words, how it got to be the way it is.

There's one puzzle piece in particular that physicists hope to pick out of the debris from the LHC's high-energy collisions: Some call it the God particle.

The preferred name for the God particle among physicists is the Higgs boson, or the Higgs particle, or simply the Higgs, in honor of Peter Higgs, a physicist at the University of Edinburgh, who proposed its existence more than 40 years ago. Most physicists believe that there must be a Higgs field that pervades all space; the Higgs particle would be the carrier of the field, the way a field knight in Star Wars is the carrier of the "force" and would interact with other particles. The Higgs is a crucial part of the standard model of particle physics – but no one's ever found it.

LOST ASTRONAUT

Alicia Franks
Lost Astronaut, 2009

DARK MATTER MACHO

Dennis Feddersen
Dark Matter 002, 2009

The works of Dennis Feddersen truly occupy space. He experiments with different types of materials. Flexibility is one of the most important criteria. For his choice of material, Feddersen has a list of possibilities that may arise during the creative process. He constantly adjusts his flexible sculptures in a series of trials: i.e. he reacts to the surrounding architecture and adapts its sculpture accordingly.

THE EARTH SEEN FROM THE MOON

Maarten Vanden Eynde
The Earth Seen from the Moon, 2005
 (23 x 20 x 20cm)

The Earth seen from the Moon (2005) is a work made for an exhibition of the same name curated by Marco Altavilla in the Couraz Marco Galassi in Pescara, Italy. A 3D map of the moon was copied on a dental blue plastic. The map was held in the LD pouckpapers. The dents corresponded with seas and craters. The planet was placed in a confined space, and started spinning around when a button was pushed. You had to look at the helmet through a telescope.

Andreas Gursky
Kamiokande, 2007

In 2016 the deepest research station will become operational. The Deep Underground Science and Engineering Laboratory (DUSEL) is a major project under consideration by the National Science Foundation. DUSEL will be a series of large laboratories, caverns, and classrooms for the study of extremely rare nuclear processes, like neutrino scattering and dark matter interactions that can only be studied in the absence of cosmic rays.

The terrain on the visible side comes in two basic types: the heavily cratered, light-colored highlands, and the darker, less cratered maria (seas).

How the Moon was formed is uncertain, but it has existed as a separate body for about 4,500 million years. In its early days it was hot and molten. A crust formed as it cooled, but it was heavily cratered by the numerous, the largest and oldest craters are more basins. These were then filled with dark basaltic lava. Significant volcanic activity was ceased in less than 2,000 million years ago.

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PAPER MOON

Paul Ramirez Jones
Paper Moon (I Create an I Spoke), 2007

DARK MATTERS

(Photo: DUSEL)

The Advanced Thin Ionization Calorimeter (ATIC) is a balloon-borne instrument flying in the stratosphere over Antarctica to measure the energy and composition of cosmic rays. ATIC was launched from McMurdo Station for the first time in December 2000 and has since completed three successful flights out of four.

DARK MATTER MACHO

In general relativity, matter (mass) curves spacetime, and the path of a light ray will be deflected by strong gravitational fields. Lensing is analogous with the deflection of light by an optical lens. Lensing has been used to detect any kind of matter (mass), including dark matter, specifically MACHOs (massive compact halo objects). Although MACHOs, being dark matter, cannot be observed directly, if they pass in front of a nearby star, they can cause the star to appear brighter for days or weeks. This effect has been observed but evidence of dark matter remains inconclusive.

[Based on a text by Joanne Cohen]

Maarten Vanden Eynde

3D map of the universe's dark matter
 (Photo: NASA, ESA and R. Massey)

Gravitational lensing caused by dark matter (Photo: NASA)

SAN FERNANDO GALAXY

Piero Golia
San Fernando Galaxy, 2006

Photo: 30x40 inches
 Night vision of San Fernando Valley, California, USA

DEAD MATTER

Death Star (from Star Wars)

The Death Star is a fictional moon-sized space station and superweapon appearing in the Star Wars movies and Expanded Universe.

Impression of a neutron star with a powerful magnetic field, called a Magnetar (Photo: NASA)

Neutron stars are the cold remains of massive stars that exploded as supernovas. They tend to have masses similar to the sun, but are barely 25 km in diameter. Their extreme density makes neutron stars exceptionally good at capturing WIMPs (Weakly Interacting Massive Particles), another hypothetical dark matter candidate.

Physicists in search of WIMPs have placed detectors deep underground in mines, and are waiting for a dark matter particle to hit them, as yet to no avail. According to up to 100 times smaller than the systems such as the weather, that are highly sensitive to initial conditions, popularly referred to as the butterfly effect.

Chaos is not random, but it is, in an occult, hidden, or implicit order. Chaos is a major influence exerted by the microcosm on the macrocosm.

Creation came out of chaos, is surrounded by chaos and will end in chaos.

[Anonymous]

DARK ENERGY

Even weirder than dark matter – the invisible stuff constituting most of the mass of the universe – is dark energy, a mysterious force pushing the universe apart at an ever-ratider rate. Dark energy has been around since the beginning of the history of the universe. "Nine billion years ago, dark energy was already winning its repulsive influence on the expansion of the universe. The gravitational pull of the matter and the dark matter could not resist the force of gravity. But as the universe expanded, the force of gravity weakened. The net force grew out of balance, and the universe began accelerating."

Fortunately, a pioneering space mission called the Wilkinson Microwave Anisotropy Probe (WMAP) clarified this muddle. By measuring the first acoustic peaks of the overall temperature of the universe. The answer is decidedly stranger. Dark energy makes up 73 percent of the universe, dark matter another 23 percent. Atomic matter – everything around us and everything astronomers have ever seen – accounts for just 4 percent.

Physicists imagine that the Hubble Space Telescope's high-end camera against those from the Wilkinson Microwave Anisotropy Probe – a satellite that maps the heat signature of the early universe – and his observations of the expansion of the universe with unprecedented accuracy and depth. "It's as if you mark the height of a child against a doornote to measure growth over time," Wilkin says. "While the Hubble data suggest it is quite likely that the universe is accelerating, it is not clear whether the expansion erks props it." For reasons as yet unknown, the anti-gravitational effects of dark energy are greater now than they were in the distant past, and are growing by the minute. The Hubble data suggest it is quite likely that the universe is accelerating, it is not clear whether the expansion erks props it.

To return to the question that has puzzled thinkers since Newton's day, is the future preordained? Or are there an infinite number of futures? One way of looking at the quantum world suggests that not only are there an infinite number of futures, but they are realised in an infinite number of universes.

Photons and electrons sometimes behave as waves and sometimes as particles, but never both at the same time. So far, the argument for interference between one universe and another applies only to events occurring at the quantum level.

But the idea of parallel universes provides a possible resolution to the "grandfather paradox" that might otherwise cause problems for time travellers. If we travel back in time and change history, we launch ourselves into a new future in a parallel universe – but we have no effect on the present of the universe in which we now live. Scientists of the future may well pursue a new form of futuristic technology based on quantum effects. Such applications could include quantum teleportation, in which a quantum particle can be teleported from one point in space to another; and quantum computation, where calculations can be carried out which would take many years on a conventional computer. Although we now know how to measure time very accurately, have we come any nearer to answering the basic question "What is time?"

Neil Johnson is a Physics lecturer at Oxford University where he heads his own research group.

(Photo: NASA)

A few exotic particles have been suggested as dark matter ingredients, the Kaluza-Klein particle, the Axion and the Neutralino. The most wanted particle however that might account for the missing matter is the Higgs boson, also known as the "God-particle". The existence of the particle is postulated as a means of resolving inconsistencies in current theoretical physics, and attempts are being made to confirm the existence of the particle by experiments using the Large Hadron Collider (LHC) at CERN and the Tevatron at Fermilab.

The Higgs boson is the only Standard Model particle that has not been observed and is thought to be the mediator of mass. Experimental detection of the Higgs boson would help explain the origin of mass in the universe.

Both deep underground and high in the sky scientists are attempting to measure the mysterious dark matter particles.

The Cryogenic Dark Matter Search (CDMS) detectors at the Sudau Mine in the state of Minnesota, use very cold germanium and silicon crystals. The crystals are shielded about the size of a basketball, are cooled to about 50 millikelvin, and are coated with a layer of aluminium and tungsten.

(Photo: NASA)

One of the hockey puck-sized detectors used in the CDMS experiment.

In SNOlab, a Canadian underground physics laboratory at a depth of 2 km in Sudbury, Ontario, scientists are conducting two experimental programs, LEAP-1 and PICASSO, in order to find the missing matter.

At the Kamioka Observatory, Institute for Cosmic Ray Research, a neutrino physics laboratory located underground in the Mozumi Mine near Hida in Gifu Prefecture, Japan, several studies are being carried out to find a WIMP. The Kamioka detector is a cylindrical tank containing 3,000 tons of pure water, with about 1,000 photomultiplier tubes (PMTs) of 50 cm wide attached to the inner surface.

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Maarten Vanden Eynde

VCG | V

UNUSUAL COSMOLOGY

OF

GENETICALLY

Table 1. Number of exotic spheres, N, in each dimension D from 1 to 20.

D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
N	1	1	1	7	1	1	28	2	8	6	992	3	2	16236	2	16	16	7523264	24	

Now, you will notice numbers in Table 1 that in every dimension from 1 to 20, the number of exotic spheres is known – except in dimension 4, the dimension of spacetime in which we live. This number is the famous "Smooth Poincaré Conjecture in Dimension 4", which is still an open problem. In fact, dimension 4 is truly unique in the context of exotic smoothness.

- In every other finite dimension, exotic manifolds (high dimensional surfaces) can have only finite numbers of distinct exotic smooth structures. In dimension 4, every known exotic manifold has infinite number of exotic smooth structures.
- In every other dimension, the N-dimensional Euclidean space, R^N, is given by the set of all coordinates {x₁, x₂, ... x_N}, where x₁, x₂, ... x_N are real numbers. In dimension 4, R⁴ has an uncountable number of smooth structures.

One cannot help but see that dimension 4 is truly unique in a way which we are still grasping to understand. These facts about exotic smoothness in dimension 4 were only discovered in the 1980's.

As strange as the ideas of invisible dark matter/energy and exotic smoothness seem to us today, one day in the near future, we will understand what they are and how to manipulate matter, energy, and spacetime with these new concepts. Consider Einstein's equation E = MC² and the vast consequences it brought to the world, we cannot but sit up and pay attention when something so fundamental as our knowledge of the nature of matter has been put into doubt! What we think we know best, our material world, is now but a mere shadow of a vast universe we have absolutely no knowledge of. And we can't even see it! It goes right through us, like phantoms and ghosts. We will turn our attention to the three key aspects in which these concepts touch our lives.

Dark matter cannot be directly observed since they reflect no light thus is completely dark. Hence the only way to detect it at the present is to infer its existence from the way it affects the motion of nearby ordinary matter which we can see. This is how it was discovered. While studying the Coma galaxy cluster in 1933, Fritz Zwicky first noticed that the motion of the cluster indicated there were missing mass in order to account for the faster velocities of the galaxies observed. He coined the term "Dark Matter" for this missing mass. It was not taken seriously at first until in the 1960's Vera Rubin, using more sensitive instruments, was able to measure the velocities of stars in a galaxy with great precision. She expected stars at a distance further from the center of the galaxy would move slower according to Keplerian orbital theory. To her great surprise, she found all the stars in the galaxy have nearly the same velocities even for stars at the edge of the galaxy where they should move much more slowly. The current accepted theory is that this could only be explained by the existence of dark matter.

When we speak of dark matter and dark energy, there really are two distinct phenomena here. While dark matter is invisible matter in the universe, dark energy is a type of repulsive force causing an



1TW02-1



1TW02-2



1TW02-3



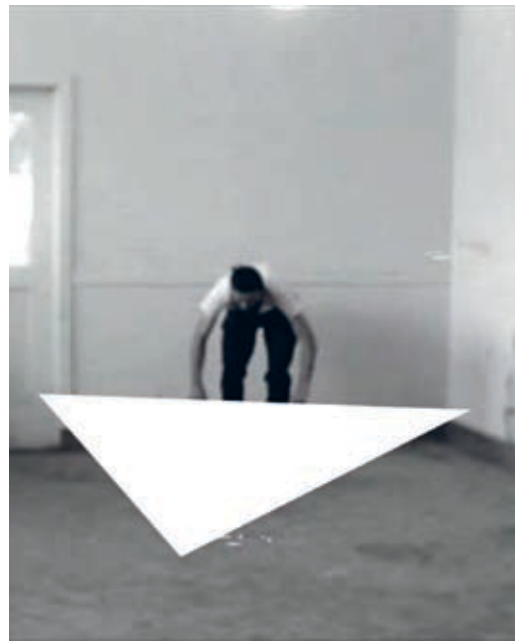
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1DAM-1



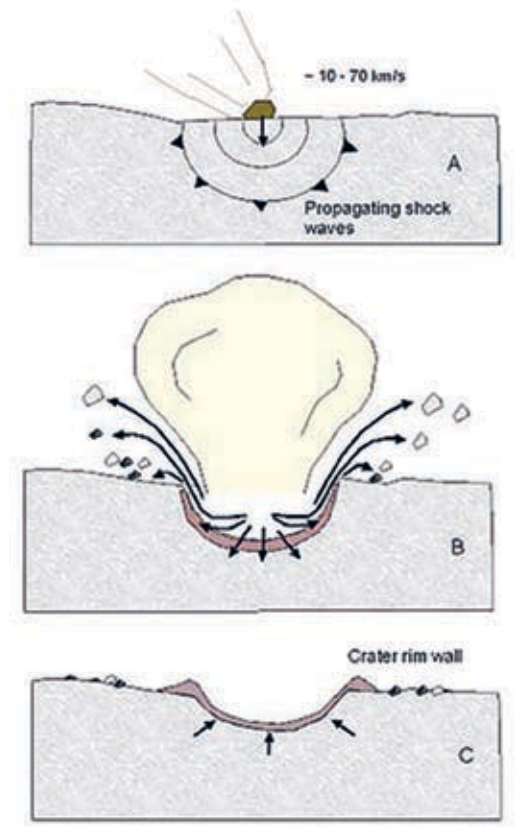
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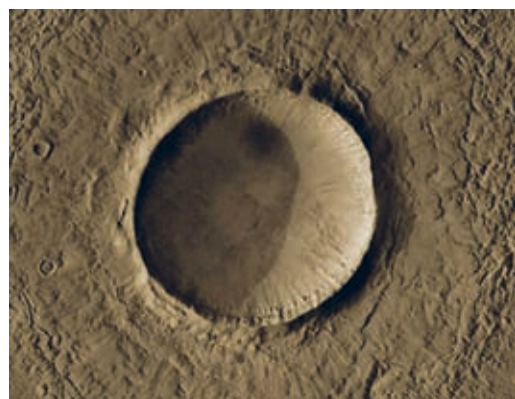
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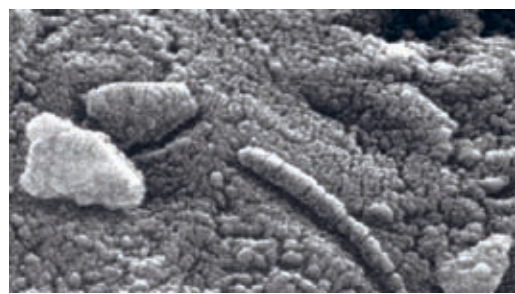
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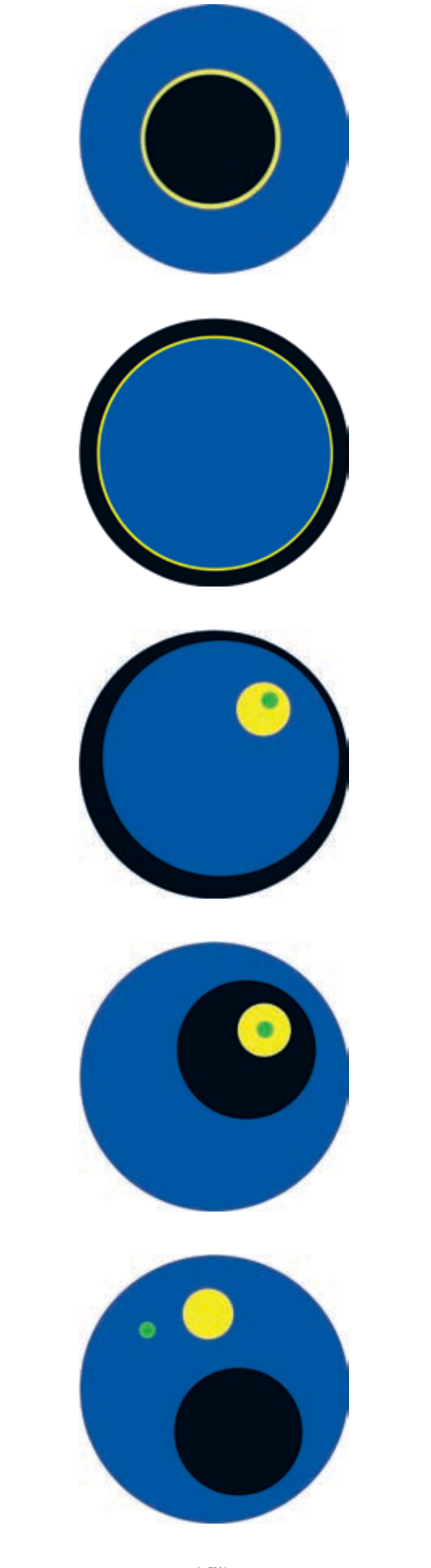
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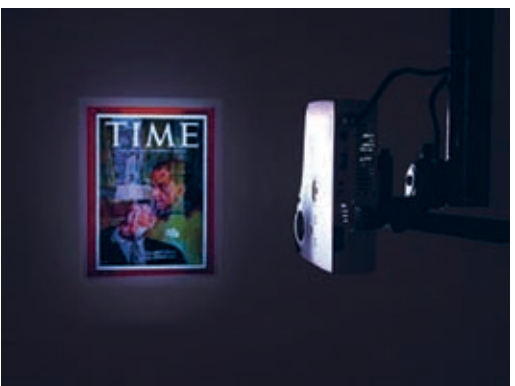
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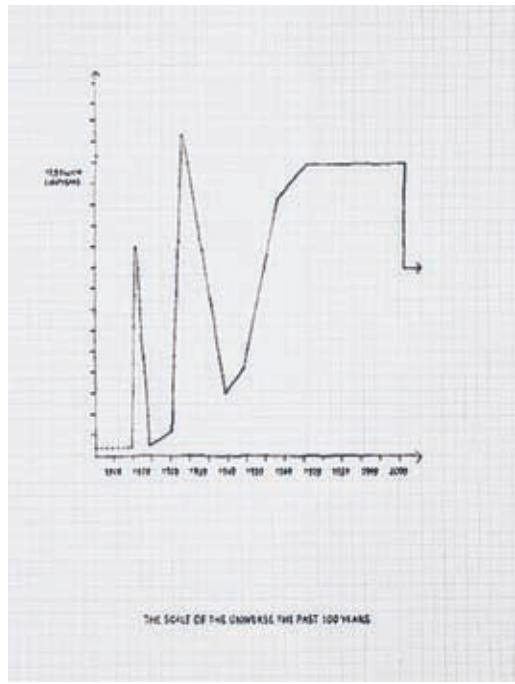
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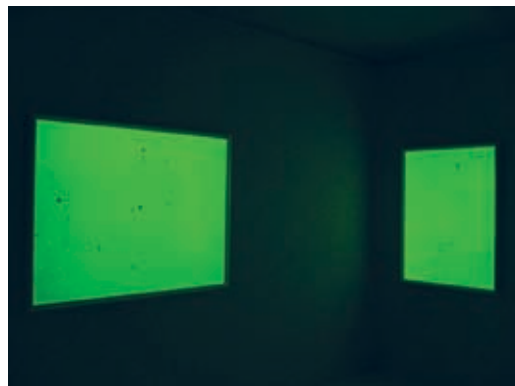
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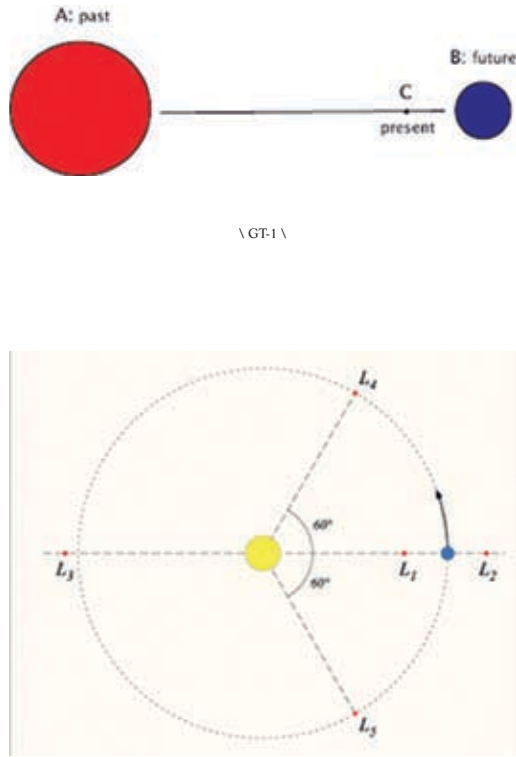
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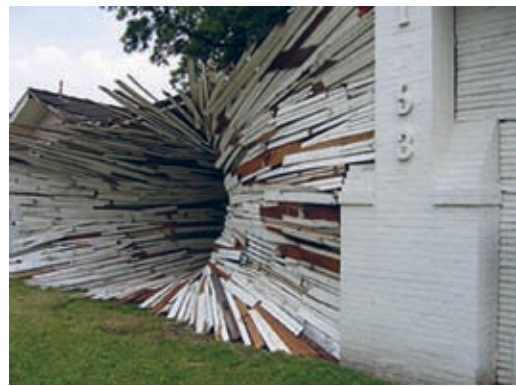
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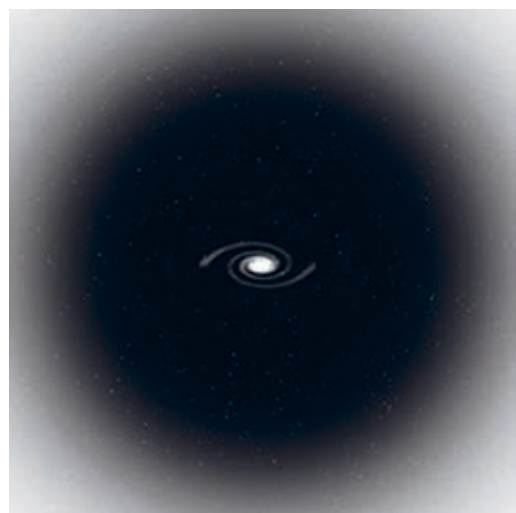
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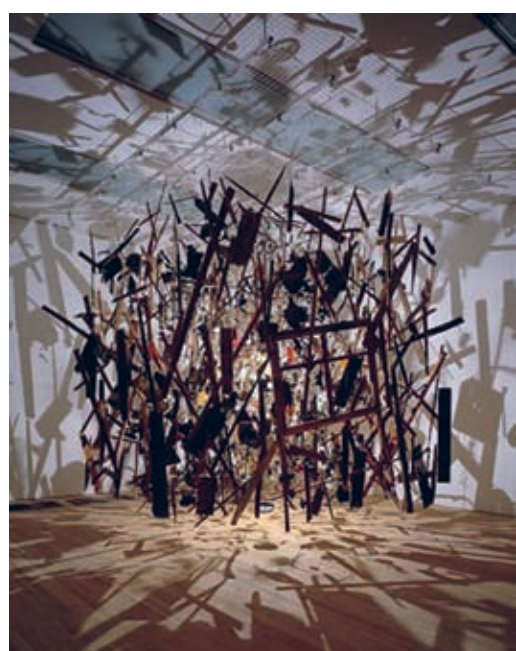
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1BIB-2



1DMM-1



1DMM-5



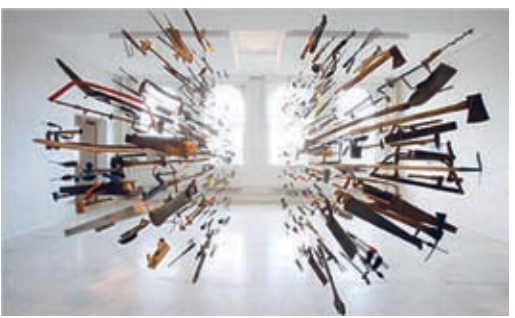
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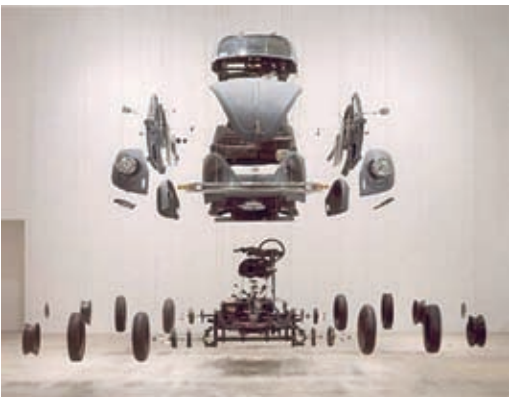
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1BIB-2



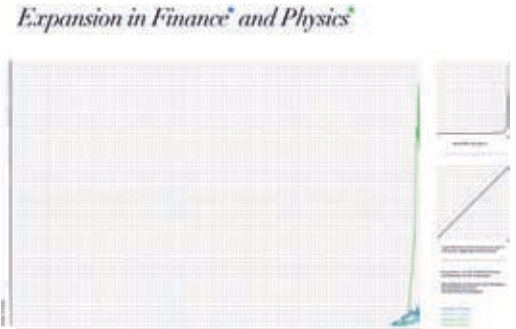
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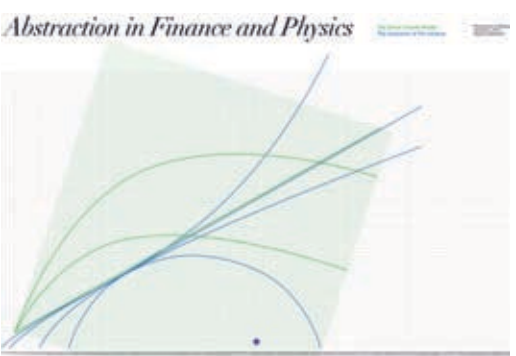
1CD-2



1CT-1



1EP-1



1EP-2



1EP-3



1GP-1



1GP-2



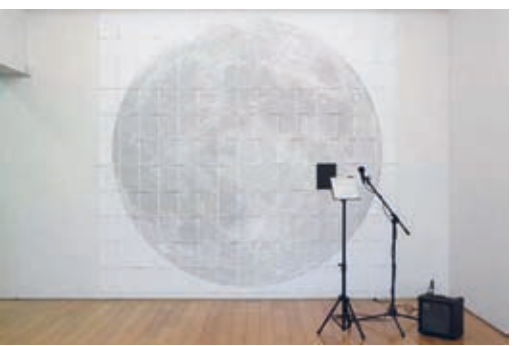
1EA-1



1DMM-2



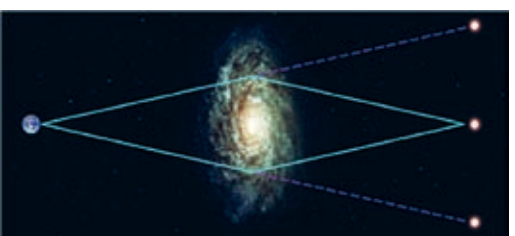
1EM-1



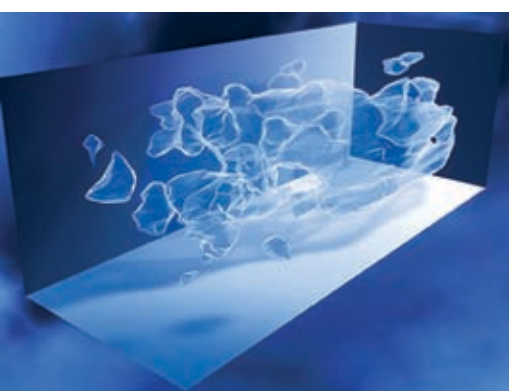
1PM-1



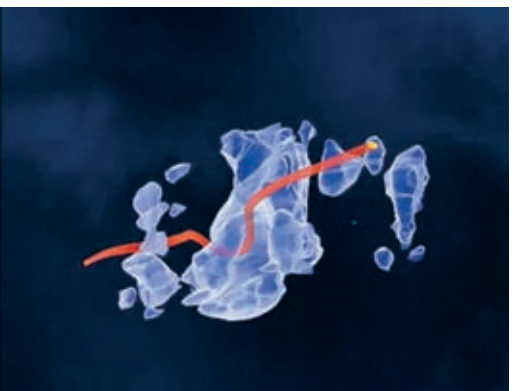
1DAM-1



1DMM-3



1DMM-4



1DMM-5



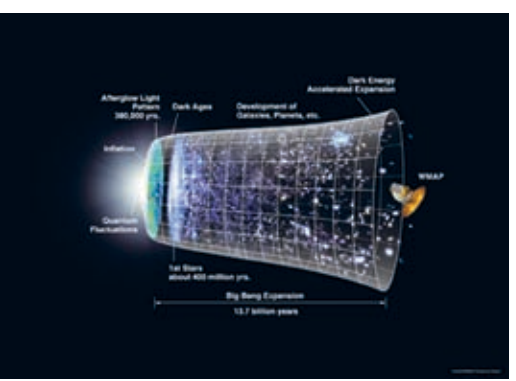
1SIL-1



1DMM-1



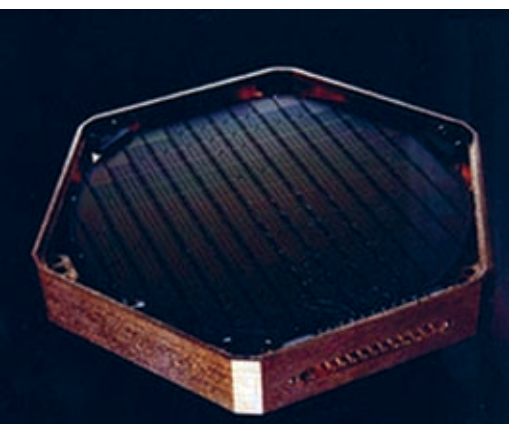
1DMM-2



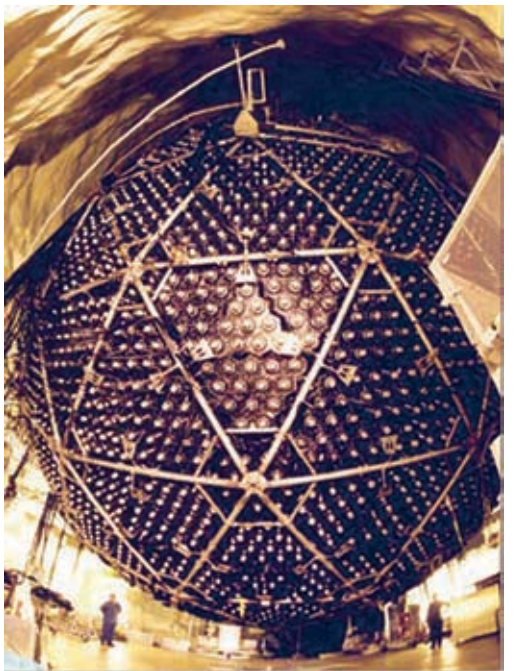
1DE-1



1DMM-4



1DMM-5



1DMM-6



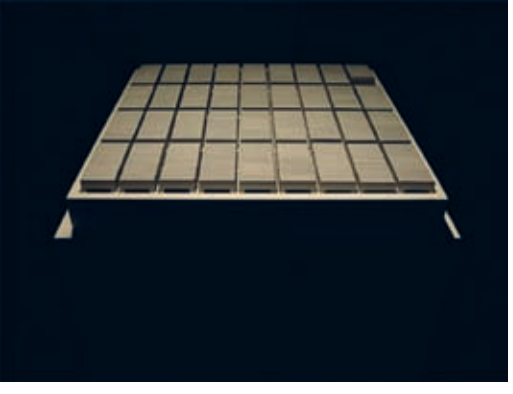
1DMM-7



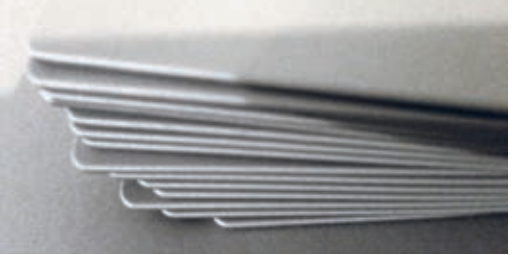
1DMM-1



1DMM-2



1DMM-3



1DMM-4



1DMM-5



1DMM-6



1DMM-7



1DMM-8