Part III: Universe spatial four-dimensional

With a time without observers space-time doesn't exist and is the universe since the Big Bang spatial four-dimensional.

Henk Lahuis
henk.lahuis@home.nl
1-7-2020
Wubbo Ockels (Dutch astronaut)

‘Our image of the world is the tool with which we think.’
Prologue

The picture of the century is the first picture of a black hole. I have included this picture on the front page of this document and on my websites www.objectivet ime.space and www.objectievetijd.nl.

A book that I can recommend to everyone is the book ‘Trespassing on Einstein’s Lawn: A Father, a Daughter, the Meaning of Nothing, and the Beginning of Everything’ by Amanda Gefter, published in 2014. This book inspired me to look for my own questions, to which natural science currently has no answers.

When international astronomers from the Event Horizon Telescope presented the first picture of a black hole on April 10\textsuperscript{th}, 2019 and showed that this black hole in diameter is four times the size of our solar system and has 6.4 billion times the mass of our sun, I was pleasantly surprised.

In my five year quest I had come up with the concept of objective time. A theory in which Einstein’s theory about ‘stagnant time’ turned out to be right and wrong at the same time. This allowed me to explain why a black hole contains no singularity. The size and mass of the photographed black hole is the proof that my theory about objective time is correct.

The well-known Dutch science journalist and publicist in the field of astronomy, Govert Schilling - an autodidact in the field of astronomy - calls me an ‘amateur scientist’. As an amateur scientist in the field of theoretical natural science, I have also been able to obtain the necessary autodidactic knowledge from the internet - with its immense amount of knowledge. In addition, I have an urban development education, in which I am blessed with a strong spatial insight and the ability to see things in a broad perspective.

In preparing this document, my special thanks go to my brother Bert, who regrettable passed away on March 30, 2017. He encouraged me to continue along the chosen path, and my daughter Miranda, who created and managed my websites and often acted as a philosophical sounding board.

Henk Lahuis
# Table of contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prologue</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Summary</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Chapter 1</td>
<td>Thermodynamic dissipation responsible for the formation of a spatial four-dimensional universe</td>
<td>6</td>
</tr>
<tr>
<td>Chapter 2</td>
<td>How to image a spatial four-dimensional curved universe</td>
<td>9</td>
</tr>
<tr>
<td>Chapter 3</td>
<td>Why does it seem as if the universe has a size that is exactly as big as the distance a photon has travelled from the Big Bang to pass us at this moment?</td>
<td>13</td>
</tr>
<tr>
<td>Chapter 4</td>
<td>Thermodynamic dissipation and the formation of Calabri-Yau spaces responsible for the properties of matter and particles</td>
<td>16</td>
</tr>
<tr>
<td>Chapter 5</td>
<td>Thermodynamic dissipation and Ockham's razor</td>
<td>17</td>
</tr>
<tr>
<td>Glossary</td>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>
Summary

A consequence of describing the laws of nature without observers (see part I: Time without observers) is that going faster than the speed of light at cosmic inflation, described by Alan Guth in 1981, is no longer a problem. Cosmic inflation is the theory whereby immediately after the Big Bang the universe went through a phase of exponential expansion for $10^{-35}$ seconds. During this time interval the universe would have become between $10^{30}$ and $10^{100}$ times bigger. The reason for this would be a vacuum energy with negative pressure.

The standard model of our universe is a curved, spherically closed universe without boundaries. This Friedmann-Lemaître-Robertson-Walker model (FLRW model) was developed independently by the aforementioned authors in the 1920s and 1930s. It describes a singularly coherent, homogeneous, isotropic expanding or shrinking universe.

Spacetime is seen as the four dimensions of the universe. Three dimensions of space and one dimension of time. This fourth dimension of time is made geometric by multiplying time by the speed of light.

As document I Time without observers shows, spacetime does not exist. Current science, however, still starts from spacetime, with gravity curving the universe spatially.

Stephen Hawking indicated that cosmic inflation works with the fully unified four-dimensional space-time. We know that space-time has also lost its right to exist (see part I: Time without observers). That is why I came to the idea that cosmic inflation is based on a really spatial four-dimensional Big Bang instead of a four-dimensional spacetime. I also prove this, by comparing the shape of the universe after the Big Bang with the shape of a supernova. The shape of the universe after the Big Bang meets the cosmological principle, the shape of a supernova does not.

The cosmological principle is the assumption that the universe is isotropic and homogeneous on a large scale. Isotropic means that the universe looks the same to an observer in every direction. This was proven in 1965 with the discovery of the Cosmic Microwave Background Radiation. Homogeneous means that the universe looks the same for all observers, no matter where they are. That means that every large area in the universe has the same properties on average, such as matter density and expansion velocity.

The difference in the shape of the universe after the Big Bang and the shape of a supernova has only one explanation. A supernova explodes in an existing space. At the Big Bang, the concentration of quark-gluon plasma had no existing space to explode. Outside the concentration of quark-gluon plasma, there was no space. There was no totally empty space that stretched to infinity, there was 'really nothing at all' outside the quark-gluon plasma.

If the Big Bang had developed in an existing three-dimensional universe, there is no reason to assume that it would have developed differently from a supernova. But of course the Big Bang is much bigger. Yet the shape of the universe after the Big Bang complies with the cosmological principle.

If there really was nothing outside the concentration of quark-gluon plasma, it means that this quark-gluon plasma had to be in a curved space in order to be in a 'really nothing'; a 'something in nothing'.
The alternative that the Big Bang was not in a curved space would mean that the Big Bang would have to have created an infinite universe. That is strange. With us a Big Bang happens and up to an infinitely large distance suddenly a three-dimensional space is created. So that is not possible. Of course it is possible that before the Big Bang there was already a totally empty three-dimensional space, which stretched into infinity. Then, however, our Big Bang must look like a supernova again in a then existing three-dimensional space. And she does not.

An unlimited universe without a border only complies with the cosmological principle if the Big Bang has been spatially curved. Curved means that 'every' point in the universe expands as the centre of the universe. Whichever point you start from in the universe, you will always return there in the long run from the opposite direction, if you would have the time as an observer.

The universe has developed curved from 'any' point in the universe as the center of the universe. Therefore, it only seems that far away stars move away from each other at a faster speed than light. In reality, it is only the space in between that grows. Current science already starts from this idea. Basically it is about the fact that a 'something' must be curved in order to exist in 'nothing'.

The tendency of science to put everything into mathematical formulas has led us to think that nature knows concepts such as "infinite" and "nothing." Fundamentally, "something" and "nothing" are not two entities. Something (our universe) is an entity. Nothing doesn’t exists and can therefore not be an entity. To be able to exist independently, the universe must therefore be unlimited and the Big Bang must have taken place from every point in the universe as the center.

Thermodynamic dissipation can be responsible for the formation of a spatial four-dimensional universe. It may also be the cause of the formation of Calabri-Yau spaces responsible for the properties of matter and particles.

The standard model of the universe is therefore nothing more or less than a universe that is essentially a four-dimensional universe from the Big Bang. Not a universe that is curved by gravity, but a four-dimensional universe because it is essentially four-dimensional. Just like a line is two-dimensional and a sphere is three-dimensional. The fact that we as observers do not notice that our universe as a whole is spatially four-dimensional is only due to the gigantic size of the universe.
Chapter 1  Thermodynamic dissipation responsible for the formation of a spatial four-dimensional universe

In this chapter I will show that the Big Bang 1 was not originated from the four dimensions spacetime (three dimensions of space supplemented with one dimension of time), but from more spatial dimensions (length, height, width and curvature).

The basis of the Big Bang lies in the cosmological principle. The concept cosmological principle was introduced in 1935 by Arthur Milne 2 (1896 - 1950). The cosmological principle is an important starting point of the theory of the Big Bang. The cosmological principle only applies to the universe on a large scale. For example, the environment of our earth is far from homogeneous or isotropic because there are higher mass concentrations at the places of the planets than in between. Also, the distribution of galaxies is not homogeneous or isotropic. However, when one looks at the Cosmic Microwave Background Radiation, which follows the structure of the universe on a large scale, one notices that it is largely isotropic and homogeneous.

The proof for the cosmological principle was provided in 1965 by the more or less by chance discovered Cosmic Microwave Background Radiation 3 by Arno Penzias and Robert Wilson, which indicates that the universe is about 13.8 billion years old.

The fact that the structure of the universe is isotropic and homogeneous on a large scale can only be explained if the universe is curved on a large scale in such a way that you always return in a straight line from any point in the universe. In other words: every point in the universe is the center of the universe (so we are not unique in it).

It is not true that the cosmic inflation 4 of Alan Guth allows the universe grow explosively from one point after the Big Bang. From the beginning, the Big Bang makes the universe grow explosively from every center. Every Great Wall (see chapter 3) remains at the same point from the Big Bang (in broad lines) onwards (so stands still).

To explain why the Big Bang meets the cosmological principle we have to compare the design of the Big Bang with the design of a supernova.

We don't have a picture of the Big Bang. We only see the Cosmic Microwave Background Radiation as proof of her event. Of course we do have pictures of supernovas. One of these explosions was the supernova SN 1987 A observed in the Great Magellanic Cloud on February 24, 1987.

---


This image clearly shows that a supernova is not isotropic and homogeneous. Why does the shape of the universe at the Big Bang comply with the cosmological principle and a supernova does not?

What matters is whether there was an infinite three-dimensional space before the Big Bang or whether there really was 'nothing' at all.

The difference in form between Big Bang and supernova can only have one explanation. A supernova explodes in an existing space. At the Big Bang, the concentration of quark-gluon plasma had no existing space to explode. Outside the concentration of quark-gluon plasma, there was no space. There was no totally empty space that stretched to infinity, there was 'really nothing at all' outside the quark-gluon plasma.

If the Big Bang would have developed in an existing three-dimensional universe, there is no reason to assume that it would have developed differently than a supernova. But of course the Big Bang is much bigger. Nevertheless, as a result of the Big Bang, the universe complies with the cosmological principle.

If there really was nothing outside the concentration of quark-gluon plasma, it means that it had to be in a curved space in order to be in a 'really nothing'; a 'something in nothingness'.

The alternative that the Big Bang was not in a curved space would mean that the Big Bang should have created an infinite universe. That is strange. With us a Big Bang happens and up to an infinitely large distance suddenly a three-dimensional space is created. So that is not possible. Of course it could be that before the Big Bang there was already a totally empty three-dimensional space, which stretched into infinity. However, then our Big Bang in a then existing three-dimensional space should look like a supernova again. And she does not.

An unlimited universe (it has no border) that meets the cosmological principle can only exist if the Big Bang has been spatially curved. Curved means that 'every' point in the universe expands as the center of the universe. Whichever point you start from in the universe, in the long run you always return from the opposite direction (if you would have time as an observer).
Because the universe developed curved from 'any' point in the universe as the center of the universe, it only seems that the stars move away from each other at a faster speed than light, in reality it is only the gap that grows. By the way, current science already starts from this idea. Basically, the point is that a 'something' must be curved in order to exist in 'nothing'.

The tendency of science to put everything into mathematical formulas has led us to think that nature knows concepts such as "infinite" and "nothing." Fundamentally, "something" and "nothing" are not two entities. Something (our universe) is an entity. Nothing doesn't exist and can therefore not be an entity. To be able to exist independently, the universe must therefore be unlimited and the Big Bang must have taken place from every point in the universe as the center.

In the Friedmann-Lemaître-Robertson-Walker model (FLRW model), a curved (spherical) universe, the universe is considered to be without boundary, in which case the term 'compact universe' describes a universe that is a closed variety. The Friedmann-Lemaître-Robertson-Walker-metrics is an exact solution of Einstein equations of the General Theory Relativity; it describes a single coherent, homogeneous, isotropic expanding or shrinking universe.

In 1988 Stephen Hawking wrote in his book 'A Brief History of Time' \(^5\) that in the young universe there wouldn't have been enough time in the hot Big Bang model to allow the heat to flow from one area to another. Time would have been stretched at the Big Bang to make this possible. We see that without observers time at the Big Bang cannot have been stretched at all. Under an objective time, cosmic inflation (Alan Guth, 1981) can also take place at a much faster speed than the speed of light without time being stretched.

So the cosmological principle indicates that we are not unique in our perception that we live in the center of the universe. The spatial four-dimensional shape of the universe indicates that the dissipation of heat could have taken place in a very different way, namely not from one center from the universe, but from every point as the center in the universe.

The 'Thermodynamic dissipation theory for the origin of life' \(^6\) published by Jeremy England in 2013 assumes that in nature arbitrary groups of molecules can organize themselves to absorb and dissipate the heat of the environment more efficiently. Nature would be able to arrange molecules in such a way that they disperse energy more efficiently. This would be the mechanism that controls evolution.

Such a mechanism as the more efficient dissipation of energy could also be responsible for the Big Bang taking place four-dimensionally, similar to England's theory. The efficient dissipation of heat by doing this from 'any' point in the universe as the center of the universe. A Thermodynamic dissipation of energy from the Big Bang

As we saw earlier, the direction of time is determined by causality. How events take place can be determined bij gravity, by the second principal law of thermodynamics and by thermodynamic dissipation.

---

\(^5\) Hawking, S.W.: “A Brief History of Time”. In het Nederlands verschenen als Het Heelal, uitgeverij Bert Bakker, 1988

Chapter 2  How to imagen a spatial four-dimensional curved universe

As Hawking wrote in chapter 2 of his book 'A Brief History of Time', it is impossible to imagine a spatial four-dimensional space. That we cannot look four-dimensionally is factually correct. However, we can indeed attempt to imagine a spatially four-dimensional (curved) space.

To evoke an image of what our universe might look like, Aleksandr Friedmann (1888 - 1925) has taken into consideration a balloon with all kinds of dots (galaxies) scattered on the surface of the balloon, see image below. He drew our three-dimensional universe as a two-dimensional world like Edwin A. Abbott's Flatland on the surface of the balloon and indicated that the curvature of the universe was like the curvature of the balloon. Friedmann omitted the third geographical dimension for convenience (in reality, of course, it is still there and has nothing to do with the inside or outside of the balloon). As a result, we can now imagine that every point of the universe can be seen as the center of the universe. By drawing a line of our galaxy over the balloon, we return to our galaxy at some point. By not drawing one line from our galaxy but drawing lines in all directions, we pass all galaxies in the universe (remember that this is only valid in Friedmann's two-dimensional world). The expansion or contraction of this universe takes place by 'blowing up' or 'exhausting air' the balloon. A perfect model in itself, unfortunately only suitable for two-dimensional worlds like Flatland.

The model of the universe by Aleksandr Friedmann
From geometry it is possible to work with more dimensions. In a one-dimensional world (a line), we can only point all points on the line as the center if we give the line an extra dimension and bend it into a circle. In a two-dimensional world we can change all points on our paper to the center by turning this paper into a sphere (see Friedmann's balloon on the previous page). If we want to raise all points to the centre of a three-dimensional world, we will have to introduce a new model.

To describe the four-dimensional model of the universe I simplify the universe to the shape of two circles that together form an 'eight'. Where the two circles touch each other our galaxy is situated on the black dot. This is the point where our galaxy was at the moment of the Big Bang, but also at the moment where it still is today (13.8 billion years later).

The whole universe is shaped by turning the eight in all possible directions, so not only 360° left and right, but also 360° up and down, etc.). With this we build a 'figure' with all the stars present. Imaginary then arises a sphere, filled with all galaxies in the universe, where our galaxy (black dot) is in the middle and all blue dots represent the most distant galaxies. We call this figure the 'universe'. Similar to a globe, which contains our galaxy in the middle, the most distant galaxies lie on the surface of the globe and in between all other galaxies in the universe are located.

As said, our galaxy is (almost) stationary (still at the same place in the universe as 13.8 billion years ago). The light of the Big Bang took 13.8 billion years to reach us. In the model we simplified via the two orbits of the eight, in reality from all possible directions.

This universe is a (spherical) unlimited universe, because we can only look along the lines of the eight in the universe. Whichever way we look, we can never look outside the 'eight'. If we now leave all the stars and think away all the circles, we see a sphere filled with all the stars in the universe.

So far I think it is still easy to understand.
However, when we consider that each galaxy is in the center of the universe (on its own black dot), it becomes a lot more complicated to imagine a four-dimensional world. Then we must imagine that each star is on its own black dot at the same time. That is only possible if the universe is curved four-dimensionally. So each star seems to move relative to other stars to the black dot via the lines of the circles. The circles keep their size (they don't get bigger or smaller), so from every point in the universe the universe seems to be 13.8 billion lightyears big.

To be able to understand that somewhat, I suggest to first take note of a tessaract (a four-dimensional hypercube, see image below). A tessaract is like a cube, but then not made up of three dimensions, but with four dimensions. All angles between the line segments are always straight relative to each other.

![A projection of a tessaract in a three dimensional space](https://commons.wikimedia.org/wiki/File:8-cell-simple.gif)

On the website [www.objectivetime.space](http://www.objectivetime.space) a moving 3D projection of a tessaract is included, in a simple rotation around the plane that divides the figure from front left to rear right and from top to bottom. Although it is a moving tessaract, it remains a projection in a three-dimensional space. To get some idea how every point in our globe (from the middle of the globe to the surface of the globe) can be the center of the earth at the same time, this moving image of a tessaract may help to represent a four-dimensional universe.

To follow this a little bit more I go back to Friedmann's balloon. Flatlanders can only look two-dimensionally and therefore only see one circle around the balloon. In their thoughts they may be able to imagine that by rotating the circle from the center where they are at that moment 360° they can see all the stars in the universe. Where flatlanders can only see the (two-dimensional) circle, we humans see all the circles at the same time on Friedmann's balloon (actually only one side of the balloon, but three-dimensional). When we rotate Friedmann's balloon we don't see any difference in shape either! For example, four-dimensional viewers see no difference in shape when rotating the four-dimensional universe (four-dimensional viewers see a three-dimensional sphere from all sides at once, which we cannot do).

---

So the universe is essentially spatial four-dimensional. For the universe, spatial four-dimensional is just as normal as the spatial three-dimensional world we observe. Yet both are exactly the same. We observe a three-dimensional world within a four-dimensional universe. That is only because the universe is so terribly large, that we cannot perceive this curvature.

In his book 'Brief Answers to the Big Questions', published postmortem in 2018, Stephen Hawking writes in chapter 2 the following question: "Why is space three-dimensional? Why not four-dimensional? He himself gives the answer to this question in the text below.

"In three dimensions, planets can continue to orbit around stars in a stable orbit. This is a consequence of Robert Hook’s discovery in 1665 that gravity is inversely proportional to the square of the distance, on which Isaac Newton embroidered. Think of the attraction between two bodies at a certain distance from each other. When the distance is doubled, the force becomes a fourth. If the distance is tripled, then the force must be divided by nine, if the distance is quadrupled, then the force is divided by sixteen and so on. This leads to stable orbits of planets. Now think of a space with four dimensions. Then the attraction would obey a law that says that gravity is proportional to the third power of distance. If the distance between two bodies is doubled, the attraction must be divided by eight, tripling by twenty-seven, quadrupling by sixty-four. If the force were not inversely proportional to the square of the distance, but the third, this would prevent the orbit of the planets around their sun from being stable. They would either fall on their sun or escape and disappear into the cold and darkness."

The tendency of science to summarize everything in mathematical formulas is very easily misused to kill a four-dimensional universe. If, according to Hawking, one dimension is added to space, then all powers in formulas must also be increased by one. However, this is not correct.

As I described above, on the scale of our visible universe, the straight line to a distant galaxy is not one line (within a three-dimensional universe) but consists of several lines from the point of departure and point of arrival, all with the same curvature (a four-dimensional universe). This four-dimensional universe does not substantially change the observed gravity between two objects. The gravity in a four-dimensional universe remains inversely proportional to the square of the distance.

In chapter 10 of his post-mortem book 'Brief Answers to the Big Questions' Hawking writes the following: "There should be something very special about the limit values of our universe and what is more special than that there is no limit at all". Here I would like to thank Stephen Hawking for his thought that there might indeed be a universe without a boundary, which must be a four-dimensional universe.
Chapter 3  
Why does it seem as if the universe has a size that is exactly as big as the distance a photon has travelled from the Big Bang to pass us at this moment?

In 2013, the European space telescope Planck set the age of the universe at 13.82 billion years. In the remainder of this chapter I assume for convenience that it took 13.8 billion years from the Big Bang for the light to reach us (this is not quite correct because there was no light at the beginning). However, what we do not know is the size of the universe.

However, it is far too coincidental that on the one hand we would be right in the center of the universe and on the other hand the universe has exactly the right size to pass a photon from the beginning (Big Bang) right now. But when we reason from the cosmological principle and the four-dimensional Big Bang, it is not at all coincidental.

To be able to interpret the map of the Cosmic Microwave Background Radiation better, we first show a map of the surface of our globe below, in which the three-dimensional surface of the globe is shown on a two-dimensional map (in this case we look from the outside in, in the case of the map of the Cosmic Microwave Background Radiation we look from the inside out).

The next page shows a picture of the Cosmic Microwave Background Radiation 379,000 years after the Big Bang. Based on the temperature of the Cosmic Microwave Background Radiation, the age of the universe has been calculated. Small temperature deviations indicate that on a small scale the universe is not isotropic and homogeneous.
The most detailed image of the Cosmic Microwave Background Radiation – the heat radiation that was broadcast just after the Big Bang – published by the Planck satellite of the European Space Agency (ESA) on March 21, 2013.

As described in chapter 2, I simplified the universe to the shape of an eight (two circles with orbits to a center, see picture below). The black dot in this is our galaxy in the center of the universe at the moment of the big bang and the moment as it is now (13.8 billion years later).

What if we don't see the furthest point of the old universe (the blue dots), but only look halfway through the universe (the red dots).

At this moment (after 13.8 billion years), the universe could be so big that the blue dots are 13.8 billion lightyears away. It is also possible that the red points are 13.8 billion lightyears away or that the green points are 13.8 billion lightyears away. We only know that the universe is 13.8 billion years old after the beginning of the light, but we do not yet know exactly how big the universe is. We do not know which part of the universe we see (a blue peel, a red peel or a green peel).
We know that our galaxy is part of the Local Group, a cluster of about 30 to 40 galaxies spread over a diameter of 10 million light years. Together with other clusters, our cluster forms a Local Supercluster, which contains more than 10,000 galaxies and has a diameter of 250 million light years. Our Local Supercluster is part of the Great Wall, discovered in 1989, a series of numerous superclusters. The Great Wall is 500 million light years long, 300 million light years wide and only 15 million light years thick. It is the third largest structure known in the universe. The largest known structure is the Great Wall of Sloan, discovered in 2003, which is almost 1 billion light years away and has a length of 1.37 billion light years. It is assumed that the universe is a web of such 'walls'. Between the walls there are large voids in which there are almost no galaxies. This can be compared to a honeycomb structure. The largest void found so far is the one discovered in 1981 of Boötes, with a diameter of almost 250 million light years, which contains only about 60 galaxies.
Chapter 4  Thermodynamic dissipation and the formation of Calabri-Yau spaces responsible for the properties of matter and particles.

Ed Witten's Membran Theory (M-theory) leads us to a universe with seven extra dimensions of space. The equations of this theory (with the five string theories behind it) determine the different forms that these extra space dimensions can take, better known as Calabri-Yau-spaces. Examples have been found of Calabri-Yau-spaces which give rise to vibrational patterns which roughly correspond with the three families of elementary particles and their masses and the four forces of nature with corresponding force particles and masses. With this an explanation of the properties of the known matter- and force-particles has been obtained. In the first moments of the universe these properties, which today are only mathematically accessible, would actually have been expressed. However, it does not yet say why these Calabri-Yau spaces were created.

As described in chapter 2, the ‘Thermodynamic Dissipation Theory' assumes that the efficient dissipation of heat drives evolution. This same mechanism could be responsible for a four-dimensional universe from the beginning, in which each point of the universe is the centre of heat dissipation. A step further in this line of thought can explain why there are seven extra space dimensions in addition to the four large space dimensions in the universe. Here, too, the need to efficiently distribute energy after the creation of the four large space dimensions may have led to the creation of specific Calabri-Yau spaces that are responsible for the properties of matter and particles.
Chapter 5  Thermodynamic dissipation and Ockham's razor

The 14th century English philosopher William of Ockham said: "the simplest explanation must be assumed to be the correct one", a statement now known as "Ockham's razor". What did Ockham's razor say again when asked whether the sun revolved around the earth or the earth around the sun? The movements in our solar system can be explained mathematically with the assumption that the earth is in the middle. However, this results in much more complicated formulas than assuming that the sun is in the middle. The second explanation must therefore be accepted as true.

What does thermodynamic dissipation teach us?

- a form of our closed sphere formation universe that is essentially spatial four-dimensional
- a Big Bang from every point of the universe as the center of the universe.
- seven additional spatial dimensions specifically responsible for the properties of matter and particles.
- a possible mechanism that controls evolution.

With Ockham's razor, a spatial four-dimensional universe must be assumed to be true, as well as a thermodynamic dissipation that may be responsible for the creation of matter and particles and the control of evolution.
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>absolute time</td>
<td>Newton’s (classical Theory of Gravity) and Maxwell’s (Theory of Electromagnetism) assumed that time is constant (unchanging or absolute) in the universe.</td>
</tr>
<tr>
<td>Big Bang</td>
<td>Georges Lemaître in 1931 had created from General Theory of Relativity that the universe long ago was packed sat. There was one very small, terribly hot sphere of quark-gluon plasma. The term ‘Big Bang’ was used by Fred Hoyle in 1950 as a derogatory designation for its aversion to the theory of Lemaître. Hoyle himself was in favor of the competitive but now left behind steady state model. After the Big Bang the universe underwent exponential expansion (Cosmic inflation). When cooling down first small structures formed such as protons and neutrons, later on larger structures like stars and Galaxies.</td>
</tr>
<tr>
<td>black hole</td>
<td>A region of the astronomical space where the gravity is so strong that even light cannot escape.</td>
</tr>
<tr>
<td>causality</td>
<td>Causality (or the law of cause and effect) is the theory that events occur as a result of certain events that preceded it.</td>
</tr>
<tr>
<td>classical mechanics</td>
<td>From the beginning of the 20th century the classical mechanics turned out to be no longer sufficient to all observations. Basic extension turned out to be needed with the General Theory of Relativity and quantum mechanics. Classical mechanics applies only when there is speeds that are small compared to the speed of light, when gravity is not abnormally strong and when the behavior of matter at atomic scale is negligible. In everyday life, the classical mechanics though function sufficient.</td>
</tr>
<tr>
<td>Cosmic Inflation</td>
<td>In 1981 Alan Guth described the idea in which the universe in a short period of time after the Big Bang underwent an exponential expansion. During the tiny time interval of $10^{-35}$ second would the universe between $10^{30}$ and $10^{100}$ times as large.</td>
</tr>
<tr>
<td>Cosmic Microwave Background Radiation</td>
<td>Leftover radiation from the Big Bang, composed of photons whose frequencies by the expansion of the universe is stretched to the microwave area, with a frequency corresponding to the frequency of a 2.7 kelvin heated empty space.</td>
</tr>
<tr>
<td>cosmological principle</td>
<td>The cosmological principle described in 1935 by Arthur Milne is the assumption in Cosmology that the universe on a large scale is isotropic and homogeneous.</td>
</tr>
<tr>
<td>Cosmology</td>
<td>Cosmology is the science that studies the global structure and evolution of the universe.</td>
</tr>
<tr>
<td><strong>dark energy</strong></td>
<td>Cosmologists assume that the universe consists of 69% dark energy, 26% dark matter and only 5% visible matter. It is possible that dark energy is nothing but the energy of the Higgs field, in which the Higgs field has an opposite effect to gravity.</td>
</tr>
<tr>
<td><strong>diffeomorphic transformation</strong></td>
<td>This is a method to mismatched to reconcile points of view by introducing a force, such as gravity. <em>If you want to fit a curve on a straight line, just bend your paper.</em> This is the main tool of the General Theory of Relativity.</td>
</tr>
<tr>
<td><strong>electron</strong></td>
<td>The electron is a negatively charged elementary particle with spin $\frac{1}{2}$ (so it has mass), that can be bound (for example, in an Atom) or move freely in space. Moving free electrons moving through the electric and magnetic fields create free space. The electron has like a photon (massless particle) also golf properties and is subject to the same duality of waves and particles as photons.</td>
</tr>
<tr>
<td><strong>electromagnetic radiation</strong></td>
<td>The whole area of electromagnetic waves (radiation) runs from the very long (low frequency) radio waves, via infrared radiation, visible light, ultraviolet radiation up to and including the very short-wave (high frequency) X-ray and gamma radiation. All types of electromagnetic radiation (and therefore also visible light) have a velocity of 299,792,458 m/s in the vacuum (almost 300,000 kilometers per second).</td>
</tr>
<tr>
<td><strong>entity</strong></td>
<td>An entity is something that existed. The term stresses of the capacity that it is there. Time is a fine example of both an objective and subjective entity. Objective in the form of a ‘sequence of events’, Subjective in the form of an ‘observation of the sequence of events’.</td>
</tr>
<tr>
<td><strong>entropy</strong></td>
<td>Entropy is an important concept in thermodynamics (part of physics that studies the interactions between large collections of particles on a macroscopic level). It is at the most fundamental level a measure of the disorder in a system, or rather the probability, as the number of possible molecular configurations of a macroscopic State (in terms of macroscopic quantities pressure, temperature, etc.) divided by the total number of possible molecular configurations. A State in which macroscopic quantities as pressure and temperature are unevenly distributed over a volume generally has much less realization possibilities than one with an even distribution. The unequal distribution of macroscopic quantities in an isolated system (with a fixed volume, without that energy can go in or out) tends so on statistical grounds for flattening that uneven.</td>
</tr>
<tr>
<td><strong>equivalence principle</strong></td>
<td>In 1907, Einstein devised the principle of equivalence: whoever drops a ball on earth or in an accelerated rocket outside gravitational fields sees no difference. The heavy mass on earth behaves just like the slow mass in the accelerated missile without gravity.</td>
</tr>
<tr>
<td><strong>Ether</strong></td>
<td>A medium from which, to approximately 1900, was assumed that electromagnetic waves traveled within. The whole area of electromagnetic waves (radiation) runs from the very long (low frequency) radio waves, infrared radiation, visible light, ultraviolet radiation to the very short-wave (high frequency) x-ray and gamma radiation.</td>
</tr>
<tr>
<td><strong>evolution</strong></td>
<td>Charles Darwin's theory of evolution from 1859 is the theory for the evolution of life on Earth. It describes how a species can evolve: hereditary genes of an animal are transferred to the child from that animal; if an animal has a specific property whereby that can survive better than any other child, that animal has more likely to give birth to that child and so also those good features to that child.</td>
</tr>
<tr>
<td><strong>FLRW-model</strong></td>
<td>The Friedmann-Lemaître-Robertson-Walker model (FLRW model) describes a singularly coherent, homogeneous, isotropic expanding or shrinking universe, so far based on the gravity present in the universe. This model is sometimes called the 'standard model' of modern cosmology, although such a description is also associated with the further developed Lambda-CDM model.</td>
</tr>
<tr>
<td><strong>Galaxy</strong></td>
<td>A Galaxy is a large collection of billions of stars held together by its own gravity is in a globular cluster. We suspect there are is a large black hole in each center of a Galaxy. Our own Galaxy (with 100 billion stars, of which our Sun is one) has a diameter of approximately 120,000 light years (the takes light 120,000 years from one side to the other side). In the universe there are at least 2 quadrillion galaxies (2,000,000,000,000). The total universe has therefor approximately $2 \times 10^{23}$ stars. Whether we are alone or we are the only one in the center of the universe can therefore be answered with a firm no.</td>
</tr>
<tr>
<td><strong>General covariance</strong></td>
<td>Einstein's core principle that there is no preferred way to use the space time in space and time on cutting: cut how you like, and the basic Laws of Mechanics remain unchanged. In a world with both observers in accelerated frames of reference (General Theory of Relativity) as observers in uniform (opposite to accelerated) reference frames (Special Theory of Relativity) the General-diffeomorphic covariance transformations must be true.</td>
</tr>
<tr>
<td><strong>General Theory of Relativity</strong></td>
<td>The General Theory of Relativity was published by Einstein in 1916 and replaces and improves the Theory of Gravity by Newton. General relativity is a geometric theory (a theory that deals with determining dimensions, shapes, the relative position of figures and the properties of space), in which it is assumed that both mass as energy curves space-time and that this curvature affects the movement of free particles, including light.</td>
</tr>
<tr>
<td>homogeneous</td>
<td>Homogeneous means that the universe looks the same for all observers, no matter where they are. This means that each large area in the universe has the same average properties, such as matter density and inflationary speed.</td>
</tr>
<tr>
<td>Higgs boson</td>
<td>The carriers of the Higgs-field are called Higgs bosons. On July 4, 2012, it was announced that with the help of the Large Hadron Collider a particle was discovered whose mass corresponds to that of the Higgs boson. Simplistically, Higgs bosons are the clumps in a thick soup (the Higgs-field) through which all particles move; the more Higgs bosons stick to a particle, the more difficult it moves and the more mass the particle that moves through it has.</td>
</tr>
<tr>
<td>Higgs-field</td>
<td>The Brout-Englert-Higgs field (BEH field or Higgs-field for short) explains the existence of inertia with the addition of an extra energy field to the standard model. The Higgs-field exists to make the standard model of particle physics beating. The Higgs-field is an omnipresent energy field, from which all particles derive their mass.</td>
</tr>
<tr>
<td>invariant</td>
<td>An observation (with an observer in unidirectional rectilinear movement) is invariant when the one observation (with an observer in unidirectional rectilinear motion) measures the same speed of light (in vacuum) as the other perception. A characteristic is invariant if it does not change from one frame of reference to another.</td>
</tr>
<tr>
<td>isotropic</td>
<td>Isotropic means that the universe looks the same in any direction for an observer. The isotropy of the universe can be seen in the Cosmic Microwave Background Radiation which produces the same temperature in all directions with only very minor abnormalities.</td>
</tr>
<tr>
<td>kinetic energy</td>
<td>A moving object has kinetic energy.</td>
</tr>
<tr>
<td>Length contraction</td>
<td>When two objects are moving relative to each other, they see each other in terms of length shorter than they would do in a stationary position. This phenomenon is observable at very high speeds, which approach the speed of light. It is called length contraction or lorenzcontraction and is a property of the Lorentz transformation. It also occurs at low speeds but is not measurable.</td>
</tr>
<tr>
<td>light</td>
<td>The three variables that describe light (consisting of photons) are light intensity (or amplitude), color (either frequency or wavelength) and the polarization, or the direction of the vibration which is always perpendicular to the propagation direction. The photon is actually an information carrier of past events.</td>
</tr>
<tr>
<td><strong>Light-year</strong></td>
<td>A light-year is the distance light travels in one year. Completed this is 9.5 trillion kilometers (9,500,000,000,000 km). The nearest star Proxima Centauri has distance of 4.3 light-years. The light has traveled more than four years from the star to the Earth. The nearest galaxy in addition to our Galaxy is the Andromeda Galaxy 2.2 million light-years away. The light we receive from that Galaxy left 2.2 million years ago. Astronomers often work with another remote size, namely parsec (abbreviated 'pc'). One parsec is equal to 3.26 light-years. Proxima Centauri is on 1.32 parsec. The Andromeda Galaxy is on 0.675 Mpc (Mega parsec, the prefix mega means million).</td>
</tr>
<tr>
<td><strong>Livable planets</strong></td>
<td>We search for exoplanets that are located in a zone around a star where life is possible as shown on Earth. The most important factor in this is the temperature to allow water, a key condition for life as we know it, not freezes or evaporates (between 0 and 100°C). The degree of quality of life is expressed in ESI (Earth Simmilar Index).</td>
</tr>
<tr>
<td><strong>Lorentz transformation</strong></td>
<td>The Lorentz transformation, named after its discoverer, the Dutch physicist Hendrik Antoon Lorentz, forms the basis of the Special Theory of Relativity. This theory was posited to remove the contradictions between the theories of electromagnetism and classical mechanics. Specifically, if an object that has a length $L_0$ when standing still moves with a speed $v$ relative to an observer, it seems that object than just a length $L$, $L=L_0\sqrt{1-V^2/C^2} = L_0/\gamma$ with $\gamma$ being the Lorentzfactor.</td>
</tr>
<tr>
<td><strong>Nuclear fusion</strong></td>
<td>For many years the fission of heavy atomic nuclei (for example uranium) energy released in nuclear power plants used for electricity generation. Nuclear fusion is the fusion of the nuclei of different atoms, with a different, heavier nucleus is formed. When atoms of light elements such as hydrogen, fuse together a part of the mass is converted into energy. Nuclear power stations that work with nuclear fusion will probably only become operational in 2050.</td>
</tr>
<tr>
<td><strong>objective</strong></td>
<td>An objective entity is an entity whose existence and nature does not depend on whether someone is aware. The universe is a fine example of an objective entity. Objective means it is independent from the view of people, When there is no interpretation needed.</td>
</tr>
<tr>
<td><strong>photon</strong></td>
<td>Photons (massless particles) are a form of electromagnetic radiation. Depending on the measuring setup radiation (a form of energy) will occur as waves or like a stream of massless particles, photons.</td>
</tr>
</tbody>
</table>
**quark**

Quarks are the elementary particles (a particle that is not split in other particles). There are six types of quarks, known as flavors. *Up and down* for everyday normal matter (also called Hadronic matter). *Charm and strange* in particles and photons with high energy that reach us from deep space. *Top and bottom* are only formed under extreme conditions, such as in particle accelerators and in the Big Bang. They have a lot more energy (are heavier) than *up and down*. For every quark there is an antiparticle, an antiquark with opposite charge.

**quark-gluon plasma**

In the twentieth century showed that the atomic nucleus is made out of smaller particles: the positively charged protons and electrically neutral neutrons. These are held together by the strong force in the core, also called nuclear force. Protons and neutrons were found in particles, which we call quarks, quarks also subject to the strong force. Each proton and neutron contains three quarks. In addition, protons and neutrons 'glue particles' hold together the quarks. These so-called gluons are to be seen as the carrier particles of the strong force. In addition, they form a significant portion of the mass of the protons and neutrons. An extremely high temperature and density creates a quark-gluon plasma. It is thought that in the first 20 to 30 microseconds after the Big Bang there was a quark-gluon plasma.

**Relativistic formula**

Classical mechanics are converted with relativistic formulas into formulas that in accordance with the Special Theory of Relativity fit speeds towards the speed of light.

**relative time**

Einstein coined in his Special Theory of Relativity that time was not absolute, but relative. In his Special Theory of Relativity time is different for two different observers and is therefore 'relative'.

**Singularity**

A place where the space curvature is infinite and the laws of General Theory of Relativity, along with all notions of space and time, lose their meaning.

**space-time**

Space-time (in 1908 postulated by Minkowski, not by Einstein) is in physical theories described as three dimensions of space dimensions (length, height and width) combined with a single dimension of time to one four-dimensional entity called space-time. By multiplying the time with the speed of light we can describe any random place in the universe in four interchangeable vectors, all expressed in units of meters.
| **Special Theory of Relativity** | In 1905 Einstein devised in its Special Theory of Relativity that space and time depend on each other. The speed of light would be an incorrigible limit (there is nothing faster than light). The Special Theory of Relativity says that your time will stand still soon as you reach the speed of light. A speed according to the Special Theory of Relativity you will never achieve. |
| **speed of light** | The whole area of electromagnetic waves (radiation) runs from the very long (low frequency) radio waves, infrared radiation, visible light, ultraviolet radiation to the very short-wave (high frequency) x-ray and gamma radiation. All types of electromagnetic radiation (and thus visible light) have in the vacuum a speed of 299,792,458 m/s (almost 300,000 kilometers per second). According to one of Maxwell's equations, the speed of light waves in vacuum is determined by the inverse of multiplying electric permittivity of vacuum and magnetic permeability of vacuum (both natural constants). The speed of light in vacuum is therefore also a natural constant. Electrical permittivity is a physical quantity that describes how an electric field influences and is influenced by a medium. Magnetic permeability indicates the extent to which a material polarizes magnetically, so focuses on the magnetic field and thus amplifies it. The speed of electromagnetic radiation is expressed with the term 'c' from the Latin 'CELERITAS'. The same 'c' in the famous formula \( E=mc^2 \). |
| **steady state model** | The steady state theory is a model of the universe proposed that the universe always was and always will continue to expand (the steady state model). This theory is drawn up in 1948 as a counterpart to the Big Bang Theory from dissatisfaction with the fact that this theory had a beginning (a 'moment of creation'). |
| **String Theory** | A theory that states that all different kinds of elementary particles are based on one-dimensional vibrating energy wires, but that does not necessarily use supersymmetry (in which the laws remain unchanged when particles with a healing spin - force particles - are exchanged with particles with a half spin - matter particles). Sometimes also used as a shortened spelling for super-symmetry theory, the theory in which the elementary components are one-dimensional loops (closed strings) or loose pieces (open strings) of vibrating energy, and which merges the general theory of relativity and quantum mechanics. |
Schwarzschild-radius

The Schwarzschild-radius (named after Karl Schwarzschild, who has figured out the effect in 1916) is the border radius of a round object (usually a black hole) from where the escape velocity is equal to the speed of light. This limit is an event horizon, since the outsider no more can acquire information about what is happening within this boundary. If an object goes past the event horizon it can no longer escape the gravitational field behind. The Schwarzschild-radius is directly proportional to the mass of the object.

subjective

Subjective means the personal view of an individual.

Supernova SN 1987 A

On February 24, 1987, the brightest supernova was observed in recent history, located on the edge of the Tarantula Nebula in the Great Magellanic Cloud. A galaxy with a diameter of 14,000 light years and a satellite system of our galaxy. It was also the first supernova known for its star to explode. A star charted in 1970 by the Romanian-American astronomer Nicholas Sanduleak, known as GSC 09162-00821. The star is also called Sanduleak's star. A blue-white super giant with a diameter 40 times that of our sun, at a distance of about 168,000 light-years. So in fact the star exploded some 168,000 years ago, even before Homo Sapiens made his appearance on earth. The image in chapter 7 is an artist-impression based on observations of low-frequency radio waves from ALMA, the largest radio telescope in the world, visible light through the Hubble Space Telescope and high-frequency X-rays from NASA's Chandra X-ray Observatory. These observations revealed for the first time a three-dimensional image of the distribution of the expelled material. In the middle is the central, expanding debris cloud, the remnant of the violent star explosion. The origin of the two curious rings is still a mystery.

tessaract

A tessaract is a four-dimensional object, a hypercube.

Thermodynamic dissipation theory for the origin of life

The in 2014 by Jeremy England published theory that assumes in nature arbitrary groups can organize themselves to molecules to absorb and dissipate the heat from the environment more efficiently. Nature would be able to arrange molecules to distribute energy more efficiently. This would be the mechanism behind evolution.

vector

In mathematics, a vector is an element of a vector space and hence a non-specific understanding. Vector spaces are generalizations of our ordinary three dimensional space, in which three points proposed by their coordinates x, y and z. Such points, understood as arrows from the origin to the point (x, y, z) were the first one to call vector. Such an arrow in the geometry and physics a greatness for both size and direction, such as displacement, velocity, acceleration, force and such. Only the zero vector has no direction.
| **Warp-technology** | The warp technology is a fictional technology from the TV series Star Trek to move a spacecraft with greater speed than the speed of light. The principle on which this drive should work is the contraction (to warp, distort) the space before you in front of you, so that the actual travelled distance travelled becomes smaller and you have an effective displacement that is faster than the speed of light without violating the Special Theory of Relativity. |