Is the Biggest Paradigm Shift in the History of Science at Hand?

Eit Gaastra
Groningen, The Netherlands
E-mail: eitgaastra@freeler.nl

According to a growing number of scientists cosmology is at the end of an era. This era started 100 years ago with the publication of Albert Einstein's special theory of relativity and came to its height in the 1920s when the theory of relativity was used to develop the big bang model. However, at this moment there is a crisis within cosmology. More and more scientists openly doubt the big bang. There are alternatives for the theory of relativity as well as for the big bang model, but so far most scientists are scared to pass over Einstein.

1 Introduction

The big bang model rests on three pillars [1]. This trinity is the cosmology of the twentieth century.

The first pillar is the Theory of General Relativity. In 1905 Einstein came with his Theory of Special Relativity which describes the behaviour of light and in 1916 he published a theory about gravity, the Theory of General Relativity. In publications in 1922 and 1924 the Russian mathematician Alexander Friedmann used the formulae of the General Theory of Relativity to prove that the universe was dynamic: either it expanded or it shrunk. In 1927 it was the Belgian priest and astronomer-cosmologist Georges Lemaître, using the cosmological equations of Friedmann, who suggested for the first time that the universe once could have sprung from a point of very high-density, the *primaeval atom*. Another link in the realization of the big bang model was the Dutch astronomer-cosmologist Willem de Sitter, who suggested in 1917, together with Einstein, the de-Sitter-universe, which was based on the formulae of the General Theory of Relativity. The de-Sitter-universe has no mass, but has the feature that mass particles that form in it will accelerate away from each other.

The second pillar on which the big bang model rests is the stretching of light in an expanding universe. In the 1920s Edwin Hubble discovered that certain dots in the night sky are not stars but galaxies instead. From 1924 on he measured the distances of the galaxies and in 1929 he announced that the wavelength of light of galaxies is shifted towards a longer wavelength. The further away the galaxy the more "stretched" the light. At the time this stretching of light was explained with the big bang model of Lemaître. The universe could have sprung from a point of very high-density mass and ever since the universe would expand as a balloon. Because of the expansion of the universe space in the universe would stretch and in that case light would stretch along with space. The stretching of light of faraway galaxies is still explained this way, although a lot of astronomers customarily to refer to this stretching as if it is caused by the recessional velocity of galaxies in the big bang universe.

The third pillar was discovered in 1965. In 1948 a group of cosmologists calculated that in the case of a big bang certain radiation still had to be left over from a period shortly after the big bang. In 1965 such radiation was measured. This radiation (of 3 Kelvin) is now known as the cosmic background radiation and since 1965 it is seen as the big proof of the big bang model.

2 Alternatives for the theory of relativity

Einstein unfolded his special theory of relativity in an article in 1905, in which he states that the velocity of light is always constant relative to an observer. But the apparent constancy of the velocity of light can be explained differently.

Gravitons or other not yet detected particles may act as the medium that is needed by light to propagate itself. This is somewhat comparable to air molecules that are needed as a medium by sound to propagate itself. A theory that calls a medium into existence to explain the propagation of light is called an aether theory. Aether theories created a furore in the nineteenth century, but fell into oblivion after 1905, because of the rise of the theory of relativity. However, the last decennium the aether concept is making a come back and is getting more and more advocates, among whom is the Italian professor of physics Selleri [2]. (Also more advocates because despite the announcements by Michelson and Morley about the "null result", their famous interferometer 1887 experiment actually may have detected both absolute motion and the breakdown of Newtonian physics [3].)

Albert Einstein's theory of General Relativity of 1916 describes the movement of light and matter with the curvature of space-time more accurately than Isaac Newton's universal law of gravitation from the seventeenth century. There are alternatives, both for the Theory of General Relativity and Newtonian gravity. The physics professors Assis [4] and

Ghosh [5] look at inertia and gravity as forces that are caused by all the matter in the universe. This is called the extended Mach principle, after Ernst Mach who suggested in the nineteenth century that the inertia of any body is caused by its interaction with the rest of the universe.

There is also the so-called pushing gravity concept, a gravity model with gravitons going in and out of matter and by doing so pushing objects towards each other (on a macro-scale, for instance a teacup that falls to the ground or stars that are pushed towards each other; on a subatomic level things are different). Pushing gravity too is an alternative for both the Theory of General Relativity and Newtonian gravity. The pushing gravity concept was first suggested by Nicolas Fatio de Duillier in the seventeenth century [6].

An aether theory, the extended Mach principle as well as pushing gravity, takes the line that smaller particles (like gravitons) that we cannot yet detect do exist. The three theories can stand alone, but can be combined as well. The pushing gravity concept for instance, can be used as an explanation for the extended Mach principle.

In a bizarre way individual photons and individual atoms seem to interfere with themselves in the famous two-slit experiment in Quantum Mechanics. An aether theory can explain the baffling interference in a very simple way [7, 8]. That is why, with an aether theory, Quantum Mechanics may also be unsettled. Next to that the intriguing black holes, sprung from the mathematics of the theory of relativity, may vanish by embracing the pushing gravity concept. (Besides, black holes may not be predicted by General Relativity [9, 10].)

3 Alternatives for the big bang

Fritz Zwicky suggested in 1929 that photons may lose energy while travelling through space, but so far his idea has always been overshadowed by the big bang explanation with stretching space. Zwicky's explanation is known as the tired light concept and it is used by alternative thinking scientists as part of a model that looks at the universe as infinite in time and space. In a tired light theory photons lose energy by interaction with gravitons or other small particles. The tired light model can be combined with an aether theory, the extended Mach principle and pushing gravity.

Next to alternatives for the theory of relativity and the stretching of light, scientists have found alternatives for the third pillar of current conventional cosmology, the cosmic background radiation discovered in 1965. That a cosmic background radiation can originate as a result of the equilibrium temperature of the universe was already suggested by many scientists in the half century preceding 1948, the year in which cosmologists predicted the cosmic background radiation of the big bang universe [11]. In a space and time infinite universe many old cooled down remnants (amongst which are dust and asteroids) of planets and stars may exist between the stars, between galaxies and between clusters of galaxies. Such remnants will eventually reach the very cold temperature (3 Kelvin) of the universe and send out radiation that corresponds with that temperature. Other examples of alternatives that can explain an equilibrium temperature are direct energy exchange between photons or indirect energy exchange between photons via gravitons or other small particles. A growing number of scientists looks at the cosmic background radiation as a result of the equilibrium temperature of a universe infinite in space and time.

In the sixteenth century Thomass Digges was the first scientist to advance a universe filled with an infinite number of stars. In the last decennium more and more scientists have taken the line of an infinite universe filled with an infinite number of galaxies. (Also because, despite all beliefs to the contrary, General Relativity may not predict an expanding universe; the Friedmann models and the Einstein-de Sitter model may be invalid [12].)

4 Clusters of galaxies at large distances?

If there was no big bang, and if we live in an infinite universe, then distances of faraway galaxies are much larger than presently thought. A few years back big bang cosmologists concluded that the big bang ought to have taken place 13.7 billion years ago. Therefore within the big bang model objects are always less than 13.7 years old. Big bang astronomers observe certain galaxies with enormous shifts of the wavelength of light and therefore think these objects sent out their light very long ago, for instance 13 billion years. With the tired light model in an infinite universe objects with such large shifts of the wavelength of light will be at distances of more than 70 billion light-years. The galaxies, which big bang astronomers now think they observe at these large distances, may therefore be clusters of galaxies in reality.

In the 1920s Edwin Hubble inaugurated a new era by finding that certain dots in the night sky are not stars, but galaxies instead. Only then did scientists realize that certain objects are at much larger distances than accepted at the time. Within the years to come new telescopes will deliver sharper images of faraway objects which are now addressed as galaxies. The big bang model already has difficulty explaining galaxies in the very early universe, because in the big bang formed, loose matter, needs time to aggregate into stars and galaxies. If it turns out that not only galaxies but also big clusters of galaxies exist in the very early universe the big bang model will probably go down. In that case there will be a lot of change within cosmology, and also the theory of relativity will then be highly questioned. With the festivities of 100 years of relativity we may have come close to the end of a scientific era.

5 Knowledge and power

If the big bang model goes down then of course the first question is: What will replace it? If the here named alternatives break through then also another question rises: Why did the alternatives need so much time to break through?

A good theory needing a lot of time to break through has happened before. In the third century BC the Greek philosopher and scientist Aristarchus published a book in which he proposed that the Earth rotates daily and revolves annually about the Sun. Eighteen hundred years later Copernicus was aware of the proposition by Aristarchus. Aristarchus and Copernicus were the heroes of the Copernican Revolution that followed after the publication of Copernicus' book *Revolutions of the Celestial Spheres* in 1543 [1]. The power of the Sun-centred model was its simplicity compared to the epicycles of the Earth-centred model.

It took a long time, after the publication of Copernicus' greatest work, before the Earth-centred model was left *en masse* for the Sun-centred model. One of the reasons for this was that, for a long time, the Earth-centred model described the movement of planets more accurately than the Sun-centred model of Copernicus. Formulae of wrong models stay dominant when alternatives are not sufficiently developed. The gravity formulae of the theory of relativity and the law of universal gravitation by Newton don't explain how gravity works, but they can be used to calculate with. The pushing gravity model explains, in a very simple way, how gravity works, but when it comes to formulae the concept is, as was the model of Copernicus four centuries ago, still in its infancy. The same applies for aether theories, the extended Mach principle, the tired light model and the equilibrium temperature of the universe as an explanation for the cosmic background radiation. The power of the aforementioned alternatives is that they form, in a very simple way, a coherent whole within an infinite universe model.

Another reason for the late definitive capitulation of the Sun-centred model was that the new model endangered the position of authority held by the Catholic Church. Four centuries ago scientific knowledge was dictated by the Catholic Church. Those who wanted to make a career as a scientist, or just wanted to stay alive as a human, were forced to canonize the Earth-centred model.

Right now established science institutes dictate knowledge when it comes to the fields of physics, cosmology and astronomy. Physics professors Assis (Brazil) and Ghosh (India) independently developed the same alternative for the theory of relativity. Both have published their work, but within the established science institutes they don't find an audience. Professor of physics, the late Paul Marmet (Canada), attached questions to the fundamental laws of nature (like the theory of relativity) and had to leave the science institute where he did his research. Right now students learn to canonize the big bang and the theory of relativity. At this moment career-fear is the big obstacle when it comes to progress in physics, cosmology and astronomy.

6 Are time and space properties of our reason?

Isaac Newton (1642–1726) thought that there was something like "absolute space" and "absolute time" and two centuries later Albert Einstein (1879–1955) melted these two together in the "space-time" concept. Newton and Einstein argued that space and time do exist physically, and ever since conventional scientists think that way too. However, it has been argued for centuries by scientists and philosophers (often scientists and philosophers at the same time) that space and time are not physically existing entities. Examples of such alternative thinkers are the Frenchman Rene Descartes (1596–1650), the Dutchman Christiaan Huygens (1629–1695), the German Gottfried Leibniz (1646–1716), the Irishman George Berkeley (1685–1753), the East-Prussian Immanuel Kant (1724–1804) and the already mentioned Austrian, Ernst Mach (1838–1916).

Our current natural sciences have their origin in Newton's laws and formulae. Many physicists, cosmologists and astronomers dismiss philosophy because they think it is misty. They feel safe with the basics and mathematics of the current conventional standard theories. Still, though mathematics is needed to do good predictions, sooner or later the whole bastion falls apart if mathematics is based upon wrong principles. Thinking about basic principles needs philosophy. Centuries ago it was the generalists, with philosophy and all the natural sciences in their package, who advocated that space and time were properties of our reason in the first place and not properties of the world. The theory of relativity has time as the fourth dimension. If time does not exist then the theory of relativity can be dismissed, and also the string theory, which has run wild with the mathematics of the theory of relativity and works with eleven dimensions.

Processes in an atomic clock slow down when the clock moves fast, and often this is seen as evidence for the existence of time. But in the case of an aether, processes in fast moving atomic clocks slow down because more aether slows down the processes in the clock. Our brains use time to compare the movement of mass with the movement of other mass. For instance the rotation of our Earth (24 hours or one day) and the orbit of our Earth around the Sun (365 days or one year). That is all; it does not mean that time really exists. If time does not exist physically then the whole scientific bastion as we have known it since Newton and, especially, as we have known it the last 100 years, falls apart.

7 Revolution by computer?

One can draw a parallel between what is happening now and what happened four centuries ago. Before Copernicus entered the scene, the Catholic Church had passed on more or less definitely settled knowledge for more than thousand years. However, where knowledge did not change much with respect to its contents, a strong development took place with respect to the passing on and propagation of the knowledge. In the early Middle Ages convents arose, in the twelfth century came the cathedral-schools and around 1200 the first universities were founded. In the course of centuries these universities gained an ever more independent position with respect to the church, which finally made the church lose its position of authority with respect to science.

Next to that in the late Middle Ages the church lost its monopoly with respect to knowledge, faster, because of the invention of the art of printing. From that moment on more people could master knowledge themselves and could have their own thoughts about it and propagate those thoughts by printing and distributing their own books.

The third development, at the end of the Middle Ages, that would help the Copernican Revolution, was the invention of the telescope, which brought new possibilities for astronomy.

A few decennia ago the computer was developed. It brought the internet, which split itself from science and obtained its own independent position. The internet brings knowledge to a lot of people all over the world. Now people can publish their ideas with respect to physics, cosmology and astronomy, independently of the universities and established periodicals. The universities lose more and more their monopoly as guardians of science, and the same goes for the periodicals that serve as their extension piece. Before the internet alternative thinking scientists were unknown isolated islands who could not publish their ideas and did not know of each other's existence. Now there are web pages which form a vibrating net of interacting alternative models, a net that grows every day. Next to that it is thanks to the computer that very strong telescopes have been put into use these last decennia, and that ever stronger and better telescopes are on their way. Perhaps the science historians of the future will conclude that it was the computer that brought the Second Copernican Revolution.

8 Conclusions

Established conventional physicists and cosmologists behave as the church at the time of Galileo. Not by threatening with the death penalty, but simply by sniffing at alternative ideas. This will change as soon as the concerning noses smell funding money instead of career-fear. In our current society money and careers are the central issues where it comes to our necessities of life. Like four centuries ago the worries about the necessities of life are the driving forces behind the impasse. Still, just as at the time of Copernicus and Galileo: under the surface of the current standard theories the revolution may be going on at full speed. In June 2005 dissidents argued at the first ever crisis in cosmology conference in Monção, Portugal [13] that the big bang theory fails to explain certain observations. The biggest revolution in the history of science may be at hand.

References

1. Harrison E. R. Cosmology: the science of the universe. Cambridge University Press, Cambridge, 2000.
2. Selleri F. Lezioni di relativita' da Einstein all' etere di Lorentz. Progedit, Bari, 2003.
3. Cahill R. T. The Michelson and Morley 1887 experiment and the discovery of absolute motion. *Progress in Physics*, 2005, v. 3, 25–29.
4. Assis A. K. T. Relational Mechanics. Apeiron, Montreal, 1999.
5. Ghosh A. Origin of Inertia. Apeiron, Montreal, 2000.
6. Van Lunteren F. *Pushing Gravity*, ed. by M. R. Edwards, 2002, 41.
7. Edwards M. R. *Pushing Gravity*, ed. by M. R. Edwards, 2002, 137.
8. Buonomano V. *Pushing Gravity*, ed. by M. R. Edwards, 2002, 303.
9. Crothers S. J. On the general solution to Einstein's vacuum field and its implications for relativistic degeneracy. *Progress in Physics*, 2005, v. 1, 68–73.
10. Crothers S. J. On the ramifications of the Schwarzschild space-time metric. *Progress in Physics*, 2005, v. 1, 74–80.
11. Assis A. K. T. and Neves M. C. D. History of the 2.7 K temperature prior to Penzias and Wilson. *Apeiron*, 1995, v. 2, 79–84.
12. Crothers S. J. On the general solution of Einstein's vacuum field for the point-mass when $\lambda \neq 0$ and its implications for relativistic cosmology. *Progress in Physics*, 2005, v. 3, 7–18.
13. Ratcliffe H. The first crisis in cosmology conference. *Progress in Physics*, 2005, v. 3, 19–24.