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1. The words force and interaction are used interchangeably in physics.
2. A quantum effect that comes into play called the Pauli Exclusion Principle, essentially says that, depending on the characteristics of an energy state of an atom (or nucleus), only a certain maximum number of electrons (or protons and neutrons) can occupy that state, others are excluded. This means there is a limit to how tightly an atom or nucleus can be squeezed, a limit only exceeded in such astronomic bodies as neutron stars and black holes.

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THE BEGINNING OF THE WORLD
IN SCIENCE AND RELIGION:
A POSSIBILITY OF SYNTHESIS?

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Abstract: The beginning of the world seems to be a subject of investigations of contemporary sciences on the one hand, and a part of the religious truth on the other. Technical and scientific progress is conducive to constructing new models of the world and inspires modification or rejection of existing ones. The aim of the first part of this paper is to show some problems, among others methodological, theoretical and interpretational, that arise on account of current scientific theories. Certain basic features of a so-called scientific world view are pointed out. In the second part, the fundamental essence of the religious and theological truth of the creation is investigated. On the grounds of discussed issues, a possibility to achieve a kind of synthesis of both scientific and religious world views is considered in the third part. It is suggested that the general outlook on life could be a proper base for such a synthesis. However this solution proves to be unsatisfying, because of the mosaic, incoherent character of an outlook of life. The task to construct a more cohesive view of the world remains open. In the paper, a few lines for further investigation are drawn.

Key words: Big Bang, creation, faith, outlook on life, science, theology, world view.

I. INTRODUCTION

If we had wanted to pose the question of the beginning of the world some tens of years ago, we would have expected the answer either from theology or from philosophy. Only those two realms of human knowledge dealt with such ambitious problems. What the separate character of science consisted in, was — among others — that the greatest questions were not considered to be scientific ones. The aim of science was much more unpretentious, when scientists asked why an apple falls from the tree or what way parental characteristics are being inherited by progeny. Questions like what is the universe or how did it originate could not even come to scientific minds.

In early years of the XX century, the scientific world was shaken by some unexpected discoveries, which brought about a so-called revolution in physics. Among well known traits of this revolution was the fact, that scientists began to question the universe as a whole. That was when scientific cosmology appeared. Albert Einstein, after having formulated the equations of General Theory of Relativity, tried to apply his theory to the whole cosmos. This fundamental change in the very understanding of the aims and range of science enables us to pose the question of the beginning of the world in a wider context than solely theology or philosophy.

What science can say today about the world as a whole is expressed in the language of cosmological models. It is said that the best of them is the Big Bang model, known also as the Standard Model, which is widely confirmed by observations. Common view of the Big Bang says that several billion years ago, the universe began to expand from a state called the initial singularity. Here we come to the point, where science seems to meet the religious truth of The Beginning. But such a simple statement may satisfy only a journalist looking for sensation. Trying to look at the problem in some depth, we have to ask what the truths are which are to be met and on what grounds such a meeting can take place.

II. THE SCIENTIFIC VIEW OF THE WORLD

1. Science about the Beginning?

The reconstruction of the Standard Model is not the aim of the paper. The model is well known and its presentation can be found elsewhere (see e.g. Weinberg 1977, Novikov 1995, 152-181). Let us look instead at some of its important features, in order to see what kind of the picture of the world emerges from modern science.

A. Methodological problems.

1. The laws of science deal with practically a countless number of objects. Ohm's law, for example, refers not only to one conductor with electric current, but is applied to every such a conductor. In other words, science, when formulating its laws, deals with many events or objects of the same kind, whereas cosmology tries to establish laws governing the evolution of the whole universe, the universe, which by definition, is the only one, unique subject of cosmological investigation. It shows, that the methodological status of cosmology is quite different from the status of other sciences.

2. To enable any cosmological research one has to assume that the laws of physics are the same everywhere, in the nearest, as well as in

the farthest parts of the cosmos. In fact, if it was not the case, the science itself would be impossible. In an extreme case, one could not be sure that the outcome of an experiment in one laboratory will be the same as in the next door laboratory. This assumption is therefore basic for all scientific researches, but becomes especially important for cosmology, where we just cannot have a look at the remote region of the universe to check what the laws of physics look like there.

B. The problem of experimental confirmation. When looking at the evolution of the universe going back in time, we reach the point when unification of fundamental forces should take place. Firstly, electromagnetic and weak forces become the one interaction. The theory describing this unification has been expressed by S. Weinberg and A. Salam. It was also experimentally confirmed, therefore can be considered as well-established physical theory. The next step is so-called grand unification. It is supposed that strong interaction should join the former pair and unite with them. The problem is that it seems we have no chance to confirm the theory of grand unification, since energy required for such a process is far beyond possibilities of our laboratories.¹ Therefore this process of unification is only a supposed one, and the theory describing it is not, strictly speaking, a theory but a hypothesis.

C. Theoretical problems. When we look at the past of the universe on the basis of the Standard Model we reach the point (so-called 'Planck's era', when the cosmic clock would read $t = 10^{-44}$ s), where nothing can be said about events that were taking place before, if that before has any sense at all. We do not have a theory which would describe physical processes taking place under such extreme conditions (density: 10^{93} g/cm³, temperature: 10^{33} K). It is supposed that to overcome this problem, we should have the theory of quantum gravity. It means a theory which would join somehow two discordant theories, i.e. the general theory of relativity and the theory of quantum mechanics. Many attempts has been made to formulate such a theory, but none of them is considered to be successful. What is more, whilst some physicists say that those attempts lead in a good direction and we will have the desired theory in a few years time, the others maintain that we have not even made the smallest step towards the solution as yet. The latter call this situation crisis in physics, which has lasted for the last few tens of years, since both great theories were formulated.

Let us note what follows, science does not say a word about initial singularity (if it ever existed). The Big Bang model is based on various physical theories that are either discordant with each other (general theory of relativity and quantum mechanics) or they have not been empirically

confirmed as yet (different theories of grand unification). Some important theoretical problems have not been solved yet either (various kinds of so-called theory of supergravity). It leads to the conclusion that the view of the world which appears from the theory of the Big Bang is an incompatible mosaic and all our present knowledge of the universe does not reach the very moment of the Big Bang. Therefore, the common view of the world, which as many think, appears from the Standard Model is in fact wrong when maintaining that the world has originated at the moment of the Big Bang. Such a conclusion does not follow from the current scientific theories.

D. Idealisations. The construction of cosmological models is always based on various assumptions of an idealisational character. One of these assumptions is so-called cosmological principle.² One of its forms says that the space of the universe is homogeneous (there are no distinguished points in it) and isotropic (there are no distinguished directions). In other words, the universe looks the same from every point of space. Observations on a large scale seem to confirm homogeneity and isotropy of the universe, but on the other hand, it is obvious that the universe, as seen locally is not homogeneous nor isotropic.

Similar assumptions differ from one model to the other (there are for example anisotropic models). They just enable cosmologists to construct their models or at least make such a construction easier. So far as these models are confirmed by confrontation with observations, they can be taken as describing the real world with good approximation. What I want to stress here is the mere fact that every cosmological model has to have the assumptions of this kind.

E. Interpretational problems. There are two basic observational tests, which are considered to confirm the Standard Model. These are background radiation and red shift in the spectrum of remote cosmic objects. Indeed, both phenomena are predicted by the model: red shift, due to Doppler effect, is a consequence of the receding of galaxies, while background radiation is the remains of the early stages of cosmic evolution. However, beside these explanations of the phenomena in question, there may also be others.

The interpretation of red-shift in terms of Doppler effect is generally met with scepticism. For example, certain objects which seem to be close to each other have a different red-shift (Davies 1995, 152-154). Also recent estimates of the age of the universe (Pierce & others 1994) that are based on the classic interpretation of red-shift are less than the age of some stars. It could be that the oldest stars are not really as old as they appear, but as the astronomer M. Pierce says: "there is no evidence that

there is a problem with our estimates of stellar ages" (quoted in: Begley 1994). Such difficulties make some scientists look for other explanations of red-shift and background radiation. The former would occur, for example, if the light from remote objects passed on its way through strong gravitational fields (so-called gravitational red-shift). The latter, in turn, may be a product of hypothetical astronomical objects that existed in quite recent epochs (Jaroszynski 1993, 217). Similar attempts raise more questions than they answer. That is why they are being rejected (cf. Novikov 1995, 127-129). The whole point is however, that although the explanations provided by the Standard Model are the best ones, they are not the only possibility.

It must be stressed, that what was said above does not mean shaking conquests of science. The Standard Model is rightly said to be one of the greatest achievements of scientists of the second part of our century.³ The point was to show some characteristic features of the scientific view of the world. Various premises, methodological and others, that one has to assume when constructing the model of the universe, as well as theoretical and interpretational problems mentioned above force us to admit, that the picture of the world which is painted by science is surely not a composition of a realist-painter. If so, we must face the question: Does science satisfy our cognitive aspirations? Does it really provide us with the picture of the world'?

2. The aim of science

Ancient philosophers distinguished two ideals of knowledge:

scire propter scire - to know to know,
and
scire propter uti - to know to use.

Which one of them is being realised by contemporary science? When it comes to its achievements, one often indicates the great technological and civilisational progress that could be made thanks to scientific discoveries. Many devices and facilities that make our life easier or just possible exist thanks to science. Humans reign over the surrounding world better and better. Science makes our species *homo sapiens sapiens* the fittest of all species, giving us undeniable primacy in the struggle for survival (cf. Dunbar 1995, 47-56; 96). Is science anything more? The answer to this question is vital if we want to build our picture of the world on scientific theories. Let us note that certain features of this picture are of different importance, depending on which of the two ideals of knowledge is realised by science. If we want to act efficiently in the world, the problems like assumptions of theories or interpretation of experiments and obser-

vations can be considered as insignificant. But if we want to really *know*, to ask questions like what is the world or what is it like, it seems that the problems pointed out become more serious.

III. RELIGIOUS VIEW OF THE WORLD

1. The picture of the world and faith

A. Is the picture of the world the object of faith? One of the best known theologians of our times, K. Rahner says that faith is an answer to the revelation of God. This revelation is not just information on the intellectual sphere, but it is a call to devote in love the rest of life to the Revealing (Rahner & Vorgrimler 1963, 131-132). Faith is an answer that a man gives to a personal God. It is a dialogue between persons. Therefore, the object of faith is not a truth, nor any picture of the world in particular, but God himself.

B. Does faith suppose a picture of the world? The picture of the world has been changing, often drastically, for centuries. However, a member of an ancient nomadic tribe, whose world was restricted by the distance he could wander during his life-time, as well as a modern scientist looking at the most remote corners of the universe, both believed and believe in the same God. They pursue their personal dialogue with Him, independently from historic background and any language the world speaks in a given moment of history. Therefore faith does not suppose any picture of the world.

C. Does faith imply a picture of the world? Faith certainly implies a method that should be used to achieve this picture. It results in an admission that a picture obtained by using senses alone is incomplete and very much simplified. It forces one to admit that something exists, what no one ever saw or heard, what no one ever thought could happen (1 Cor 2:9). Something that we cannot touch by our mind or senses. But no particular picture of the world is implied by faith.

As we can see, faith has no bearing on the picture of the world. What about theology then? Does it provide such a picture?

2. The picture of the world and theology

Theology is a systematic attempt to understand and explain the revealed truth. Theology always seeks but never reaches the final answers

or definite beliefs (cf. theology in O'Collins & Farrugia 1991). It leads to the conclusion that if there is any picture of the world in theology, it is — similarly as in science — incomplete and non-ultimate. What is more, if the object of theology is the revealed truth, one may ask what the essence of this truth is. J. Ratzinger, commenting on human needs to know what is on the other side of life wrote that the Bible has not been written to satisfy our curiosity. Reading it, we will not find out what is going on in the heaven, but how to get in there (Ratzinger 1978, 135). Therefore, the fundamental essence of revealed truth, which theology deals with, is the truth of loving God who saves mankind. It seems that the Revelation does not include any message about the world itself. On the other hand however, one may note, that the part of revelation is also the truth of the creation of the world. It raises an important question: What is the essence of this theological truth?

A. The act of creation in the history of the world. Let us look at the history of the world for the moment, where the act of creation should be placed. Such an attempt, although certainly tempting, will always lead to misunderstandings. The analysis of the history of the universe should be left to the sciences. God is not a hypothesis to fill up gaps in our knowledge. Where science is inadequate at present, there is reason to intensify scientific efforts, to propose brave new ideas, one of which will eventually prove to be accurate. It is certainly not a place where one may meet God.

B. God as the cause of the World. May we at least say that God is the cause of the world? Let us note that suggesting such a statement we would enter the field of philosophy, since the notion of cause is of philosophical character. But is that an essence of the truth of creation? K. Rahner and H. Vorgrimler express the idea of creation of the world as follows: "The world continues utterly and completely at each moment to be dependent on God (...) This relation between God and the world cannot be classed under a general notion of causality" (Rahner & Vorgrimler 1963, 325). From this point of view we must say that God is not the cause of the world.

C. God at the beginning of the world. One may say rightly, that God was at the beginning of the world. Here the beginning is not the first moment in a series of successive numerous and comparable moments, but the principle of the whole, which only enables its history (Rahner & Vorgrimler 1963, 20). Such a notion of beginning goes beyond the framework of sciences and philosophical notion of cause alike.

IV. CONCLUSIONS: A POSSIBILITY OF A SYNTHESIS?

If science can yield a picture of the world and if theology affords such a picture, both those visions have at least one thing in common: both are of hypothetical character, and what follows, relative and changeable. Being aware of this uncertainty and of those ifs, we may ask whether an attempt to obtain a kind of an overall view of the problem of the beginning of the world is possible. Where to find a supposed common ground for such a view?

1. Theology? Theology cannot play this role. History, with the example of Galileo, gives us the most convincing proofs of this.

2. Science? It cannot be science, because religious truths, regarding its essence, are beyond the reach of scientific method — beyond the frontiers of empirical reality, and God is not a useful hypothesis to fill up gaps in our knowledge.

The theory of separate character of the different planes of knowledge may be unsatisfying. Although there are many kinds of knowledge, an individual who asks the questions is one who naturally defends himself from cognitive schizophrenia. The need to construct a coherent view of the world cannot however cross out the results of reflection upon the kinds of knowledge that have been achieved in contemporary philosophy. What is left then?

3. General outlook on life. It seems that the proper base for meeting different elements of the picture of the world is an outlook on life. It is a set of convictions that everybody builds for his personal use. The characteristic feature of it is that it can be founded on different elements, not logically connected with each other, that come from many different sources. This mosaic character of the outlook on life, its immanent incoherence, does not preclude however rationality. When constructing a rational outlook on life, it is vital to remember the following:

a) to beware of a conviction that all valuable knowledge can be achieved in one way only, e.g. empirical.

b) do not be under the misapprehension that all kinds of knowledge are equal (common knowledge equal to science, science equal to mysticism, etc.).

c) each proposition, conviction which is to be taken as a part of an outlook on life, has to be accepted together with the objective estimation of its credibility. Not every proposition is of the same value, and none of them is an absolute truth.

Such a solution would not satisfy everybody, because of that independence of particular elements of outlook on life. Is there any other way?

4. The task to construct a cohesive view of the world is open. Here, only a few lines for further investigation can be drawn.

a) The character of the picture of the world that could be achieved in science on the one hand and in theology on the other, if it can be done at all, should be carefully considered. The main question is what the characteristic features of these pictures are (some of them have been pointed out above) and whether or not they are comparable.

b) All considerations at the point of contact between science and theology have to assume that God does not trifle with us. It means that a statement like: "The world was created fifteen minutes ago" cannot be rejected on the ground of empirical evidence. God could have created the world together with all fossils, red-shift, background radiation and so on. In such a case, practising science would be a nonsensical game. Therefore, similar statements have to be either rejected *a priori*, or a theological proof should be found that such a state of affairs is impossible.

c) The long-lasting controversy between adherents and advocates of the eternity of the world and its beginning will not be solved. It can be only re-formulated. The question of eternity or beginning of matter may be replaced by the question of eternity or beginning of the laws of nature. (cf. Hawking 1993, 132-133). Such a question will still be posed by philosophers, theologians and everybody who rationally builds his outlook on life.

NOTES

1. See comments on the subject in a paper by J. Horgan (Horgan 1994). The decay of a proton would be also an indirect confirmation of grand unification. Such a process, however, has not been reported as yet.
2. The epistemological status of this principle is not clear. It seems that the cosmological principle may be taken either as a methodological assumption or as idealisation of observations. In both cases however, it is a kind of more or less theoretical assumption.
3. Not everybody would share this point of view. J. Maddox maintains, that the Big Bang model does not meet Popperian requirements for scientific theory: In Popperian terms, it would be excellent if the Big Bang could be made precise enough to falsify (Maddox 1994, 13).

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THE FINAL ANTHROPIC COSMOLOGY
AS SEEN BY
TRANSCENDENTAL PHILOSOPHY:
ITS UNDERLYING
THEOLOGY AND ETHICAL CONTRADICTION

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This article is addressed to scientists, philosophers and theologians and develops a philosophical criticism of the block of ideas of F. Tipler called "physics of eternity", "omega point theory" or "theory of Evolving God" (Tipler 1988, 1989, 1994), which emerged in the scientific media as a transcendent expansion of the Final Anthropic Principle (Final AP = FAP) (Barrow Tipler, 1986). We will call the whole block of these ideas Final Anthropic Cosmology (FAC). In comparison with some recent critical reviews of these ideas (see for example Stoeger, Ellis 1995), we will direct our criticism towards two special philosophical flaws of the FAC.

The Final Anthropic Cosmology offers an eschatological scenario for life to exist forever in the universe. This scientific utopia presupposes, in fact, a strategy of exploration of cosmic space and an attitude to the physical stuff of the universe which leads to the "cosmological crisis" (Nesteruk 1993, 1994a). But this cosmological crisis reflects, from our point of view, a misuse of scientific thought which is expressed in two philosophical mistakes: (1) the epistemological mistake of treating a theoretical notion of the ultimate future end of the universe in terms of experiential physics; (2) a scientific abuse and theological misinterpretation of the idea of human life and its values.