The origin of the world from science and religion perspectives

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Motto: «The teleology of the Universe is directed toward the production of Beauty. Thus any system of things which in any wide sense is beautiful is to that extent justified in its existence». (A.N. Whitehead)

ABSTRACT

The issue of the origin of the world was one of the most controversial chapters in the dispute between science and religion, for it was reduced until recently to the confrontation between two theories: creationism and evolutionism, the latter claiming the scientific nature. But whether it's creationism or evolutionism, both theories disregard the presence and continuous work of God in creation. In terms of philosophical and religious point of view, creationists are rather deist because they consider God being transcendentally isolated, while evolutionists lean more towards pantheism, believing that the world exists from eternity. Unlike science, the theonomist cosmology of the Eastern Church does not launch into speculation about the origin and movement of the world, but starts from a divine gift, i.e. from biblical narration, which she does not ignore even when engaging a dialogue with the theories of scientific cosmology. The arguments of Orthodox Christian theology proof that the quantum universe was created "out of nothing" and that it's kept in existence only by God's relationship with creation through Jesus Christ and the Holy Spirit. In relation to itself, the universe is reduced to nothing, because God is in Himself, while any other created thing is dependent upon Him, into an indissoluble connection with Him. From the perspective of quantum physics, the genesis of the universe involves the image of a void space, serving as a stage for the material world.

Keywords: origin; world; science; Big-Bang; 'creatio ex nihilo'; God hypothesis; cosmology; inflationary universe; quantum theory;

INTRODUCTION

For over three centuries, mankind is experiencing a real fight, that made inlaid trace to the gene of *homo sapiens*, often resulting in a split at the level of thinking. This is the so-called conflict between science and religion or between the positivist-scientific and the religious (especially Christian) paradigm, regarding the origin and nature of the universe and of man. The very beginning of this dichotomy is identified with the Enlightenment (18th century - the famous Aufklärung) and the French Encyclopaedism, even if its germs are to be found in the anthropocentric vision of the Renaissance.

This attitude, which maintained for a long time the representatives of the two paradigms of thinking on schizoid positions, has its peak in the nineteenth century, who witnessed the emergence of evolutionary theories (Lamarckian and Darwinian ones) or of

Pierre-Simon Laplace' cosmology ("The Celestial Mechanics"), and in the twentieth century, which brought with it the radicalized secularization of communist regimes (who used the theoretical framework of dialectical and historical materialism). The two "camps" have long been in irreconcilable-antagonistic positions, very few bridges spanning between them.[1]

The two fields of knowledge – the immanent one or of science and the transcendent one or of religion – radically differ from each other in epistemological planes. In other words, the methods for knowing the realities of the material world are totally different from those for the spiritual world and cannot be transferred from one domain to another. This is an essential and evaded, unfortunately too often by some representatives of both areas. For *scientific knowledge* is based on both observation and measurement of objects and phenomena of the material world and on the experiment. And because observation and experiment are possible only in the material world, it follows that the scientist' obligation is restricted exclusively to the material world, eliminating from its objectives and hypotheses any spiritual entity, adopting a methodological reductionism, subject to the principle of objectivity.[2] In turn, *religious knowledge* relies heavily on the Revelation. Not being able to observe, measure, and experience in transcendence, man must get satisfaction with what God reveals to him only. As Revelation recognizes the material world along with its components and laws, *homo religiosus* can, without any doubts, engage in scientific research or philosophical reflection.[3]

The Judeo-Christian experience affirms emphatically the enfleshment of the divine and, since God is the source of the meaning of all things, that meaning too becomes incarnate. Some see in this religious belief the foundations of modern science. A rigorous attempt to observe the universe in a systematic way and to analyze those observations by rational processes, principally using mathematics, will be rewarded with understanding because the rational structure is there in the universe to be discovered by human ingenuity. Since God has come among human beings in his Son, humans can discover the meaning of the universe, or at least it is worth the struggle to do so, by living intelligently in the universe. Religious experience thus provides the inspiration for scientific investigation.[4]

I. ORTHODOX CHRISTIAN ISSUES IN SCIENCE AND RELIGION

Historically, Orthodox Christianity dates back to the ancient Church, which was established by the apostles, powerful bishops, and seven Ecumenical Councils (from Nicea in 325 to Constantinople in 727). Orthodox Christianity considers itself as the "right" belief

[1] PhD. Alexandru-Corneliu ARION, „Cosmologia creştină şi modelul ştiinţific al originii universului" (Christian Cosmology and the Scientific Model of the Origin of the Universe), in *Mărturie comună. Credinţă şi ştiinţă în dialog* („Common testimony. Faith and science in dialogue"), Year III, no. 1(3), 2007, Bibliotheca, Târgovişte, 2007, p. 177.

[2] The spiritual world is not denied, it is only excluded, cut off with Ockham's "razor". This is the exact meaning of Simon Laplace's famous statement: "Sire, I do not need the hypothesis of God." The inability to exploit a domain does not, however, imply denying of this area.

[3] It is obvious that it rejects the scientist reductionism as *ontological* and it only supports the *methodological* one and therefore rejects the exclusive material world existence and accepts the existence of "supernatural" phenomena. Cf. Constantin BĂLĂCEANU-STOLNICI, "Religie şi ştiinţă, complementaritate, nu antagonism" ("Religion and science, complementarity, not antagonism'), in Basarab NICOLESCU and Magda STAVINSCHI (eds.), *Science and Religion. Antagonism or complementarity?*, XXI: Eonul Dogmatic, Bucharest, 2002, p. 76.

[4] William A. WALLACE, *The Modeling of Nature: Philosophy of Science and Philosophy of Nature in Synthesis*, Washington, D.C.: Catholic University of America Press, 1996; Michael J. BUCKLEY, *At the Origins of Modern Atheism*, New Haven, Conn.: Yale University Press, 1987; Mary B. HESSE, *Models and Analogies in Science.* Notre Dame, Ind.: University of Notre Dame Press, 1966.

and "right glory," whose Church guards and teaches the true belief about God and represents the Church of Christ on Earth.

Orthodox theology has a positive attitude towards the natural world as a good creation of a good God. Nature is never worshiped; it is God-creator who is worshiped through creation. The Fathers of the Church loved nature, but were never captured by the imagery of nature, which could prevent them from having a spiritual life in God. Thus nature was never considered an end in itself; its meaning and purpose can only be revealed in the perspective of Christ who, through the incarnation, recapitulated nature.[5] The Fathers saw nature in the perspective of the hierarchy of the orders of creation, which proceeds from the natural law established by God. This "platonic" approach to nature could not provide any methodology of its investigation.[6]

The attitude to nature was speculative; it was interpreted in terms of laws that govern nature, but not their particular outcomes, which are displayed in a variety of phenomena. Nature, however, was never excluded from the general view of communion with God, so that the theology of the Greek Fathers was cosmic in its essence. St. Maximus the Confessor (580-662) articulated that it is through communion with the Logos (Word) of God in Scriptures, through contemplation of the underlying principles of creation in nature, and in sacramental communion with Christ in Church that the fullness of communion can be achieved. Nature itself as the medium through which and by which communion with God can be established is seen as sacrament. Human being as microcosm and mediator participates in the cosmic Eucharist, which aims to renew and redeem the material world. Science then is treated as a tool to articulate the world in terms of its relationship with God.[7]

The Greek Fathers asserted that scientific knowledge is incomplete in itself and must be supported by wider views of reality, which are accessible through faith. Knowledge and the sciences thus have their foundation in faith. Carried out through the centuries this attitude to science did not change, excluding any open conflicts between science and theology.[8]

There is a perception among leading modern Orthodox theologians that science cannot be excluded from the theological vision of God and creation. The task of Orthodox theology is to reconcile the cosmic vision of the Fathers with the vision that grows out of the results of natural science. The split between science and religion can be overcome on the grounds of their reinstatement to communion with God. Scientific work can be interpreted as "para-eucharistic" work (See John Zizioulas)[9]. Scientific progress must be taken into account only in the context of the progress of human spirit and the deepening of human experience of the reality of the divine, which cannot be reduced to a physical or chemical level (Dumitru Staniloae).[10] New conceptual tools for mediation between religion and science must be developed. The most important and urgent problems in the science-religion dialogue are not

[5] V. VUCANOVICH, *Science and Faith: Order in the Universe and Cosmic Evolution Motivate Belief in God.* Minneapolis, Minn.: Light and Life Press, 1995, pp. 146 sq.
[6] Alexei V. NESTERUK, "Christianity, Orthodox, issues in science and religion", in J. Wentzel Vrede VAN HUYSSTEEN (editor in chief), *Encyclopedia of Science and Religion*, Macmillan Reference, Thomson Gale,USA, 2003, p. 130.
[7] Paulos Mar. GREGORIOS, *The Human Presence: Ecological Spirituality and the Age of the Spirit*, New York: Amity House, 1987, p. 79.
[8] That with one exception – the seventy years of "scientific atheism" in Soviet Russia.
[9] John ZIZIOULAS, *Being as Communion: Studies in Personhood and the Church.* Crestwood, New York: St. Vladimir's Seminary Press, 1997.
[10] Dumitru STĂNILOAE, *Theology and the Church.* Crestwood, New York: St. Vladimir's Seminary Press, 1980, p. 198.

cosmological (e.g., creation of the universe) or philosophical (e.g., the meaning of evolution), but ecological and bioethical.

The Orthodox Church understands the modern ecological crisis either in terms of the misuse of science or utopian reliance on the power of progress. The Church consequently treats the crisis as essentially anthropological and spiritual. The message of the Church is to be cautious with scientific discoveries and technologies because they are handled by spiritually disorientated human beings, who have lost their roots in the divine. The loss of vision of the unity of the whole creation and human priestly responsibility for nature leads to abuse and degradation of the natural world, which threatens the very existence of humankind.[11]

The Orthodox Church is deeply concerned with the possible moral and social implications of the fast advance of biology and medical science in terms of control and regulation of human life. For Orthodox Christians, life is the gift of God, who creates and preserves human personality.[12] When biology and medicine interfere with human existence on the natural level, and threaten human integrity and personality, Orthodox theology opposes this on moral and social grounds[13]. For example, the official position of the Church, expressed by the Council of Bishops of the Russian Church in 2001, with respect to cloning human beings is strongly negative on *social grounds* (the "printing" of people with specified parameters can appear welcome to adherents of totalitarian ideologies), as well as on *personal grounds* (a clone can feel like an independent person, but it is only a "copy" of someone who lives or lived before). However, the cloning of isolated cells and tissues does not threaten the personality and can be helpful in medical practice.[14]

Given Orthodoxy's attitude toward discursive knowledge, it is not surprising that it has generally been at peace with the findings of natural science, medicine, and technology. The Orthodoxy has considered scientific endeavors as undertaken on an ontological plane quite different from that of theology. Because science and theology involve different orders of knowledge and being, the first, creation, and the second, the transcendent Creator, the methods and ends of science and theology are distinct. In that Orthodoxy has seen scientific knowledge and theology as radically distinct rather than conflicting, there is a long tradition of Orthodox theologians employing science without any commitment to the theological truth of the science. An early example of using science in concert with theological discourse is the *Hexaemeron* of St. Basil the Great (c. 330–79), a commentary on the six days of Creation. Although St. Basil accepts "spontaneous generation" as a scientific truth, subsequent theologians have not been concerned by the fact that this view seems to conflict with God's role as the Creator.[15]

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[11] It is in the context of love for nature, inner vigilance and chastity towards nature, and self-restraint in the consumption of natural resources that scientific activity can acquire some "Eucharistic" features and nature can become reinstated to its sacramental status. Cf. Alexei V. NESTERUK, "Patristic theology and the natural sciences", *Sourozh: a Journal of orthodox life and thought* 84, 2001, (part 1), p. 23.

[12] See, inter alia, the work of renowned American theologian John BRECK, *The Sacred Gift of Life: Orthodox Christianity and Bioethics.* Crestwood, New York: St. Vladimir's Seminary Press, 1998. `

[13] Kallistos WARE, *Through the Creation to the Creator*, London: Friends of the Centre, 1997.

[14] Genetic engineering is admissible with the consent of the patient in the case of some hereditary diseases, but the genetic therapy of germ cells is considered dangerous because it involves a change of the genome in the line of generations, which can lead to mutations and can destabilize the balance between the human community and the environment. Cf. Constantine CAVARNOS, *Biological Evolutionism*, Etna, Calif.: Center for Traditionalist Orthodox Studies, 1994, p. 291.

[15] More recently, one finds in the work of Nicodemus of the Holy Mountain (c. 1749–1809) the incorporation of the science of his day regarding the human heart. The subsequent disconfirmation of the scientific accounts

In spite of the recognition that science and theology have a very different character, applied science has played a positive role within Orthodox cultures, particularly within a philanthropic context. The Byzantine Empire maintained, for example, a sophisticated level of medical practice. Perhaps the greatest contribution of Orthodoxy to medicine was the birth of the hospital in the fourth century.[16] From the third-century saint and mathematician Catherine the Wise, to the various saint-physicians who practiced without charging for their services (the holy and unmercenary physicians), to "scientist saints" of the twentieth century, the Orthodox Church has often (but not always) regarded science and technology as non-threatening undertakings.[17] A more recent example is that of the Russian Orthodox priest and mathematician Pavel A. Florensky (1882–c. 1946), who made a number of contributions to science and technology before he was put to death under Stalin.[18]

When conflicts have arisen between Orthodox theology and science, they have generally involved what, from an Orthodox theological perspective, should be considered a category mistake: confusing concerns about created being vs. Uncreated Being. When such conflict has occurred, it has usually, in retrospect, been attributed in Orthodoxy to the introduction of Western theological perspectives that disregard the Orthodox principle of a gulf between nature and God. Over the past two centuries, there has been a particular reaction within Orthodoxy against such confusions in favor of the earlier patristic and monastic understanding of theology as an experience of God and a recognition that no analogy exists between the Being of God and the being of nature. A climate has been created that favors the pursuit of science, technology, and medicine independently of theology.[19]

In the modern age, the Orthodox community has objected to scientists attempting to speak authoritatively *qua* scientists on theological and metaphysical matters. This kind of category mistake has been understood within Orthodoxy to result in both the dehumanization of man and the desanctification of nature. Finally, as with the use of medicine for abortion, so, too, particular uses of science and technology have been brought into question in the Orthodox tradition when they have set human life and interests at jeopardy.[20]

Unlike the Orthodox tradition, the relation between science and religion in *Roman-Catholic Church* presents different traits due to a peculiar context. Although there are many others, the sources for deriving the most recent view from Roman Catholicism concerning

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that Nicodemus borrowed for purposes of illustrating theological concerns has engendered no embarrassment among Orthodox churchmen. Cf. Allyne L. SMITH Jr., H. Tristram ENGELHARDT Jr., Edward W. HUGHES, and John HENRY, "Orthodoxy", in Gary B. FERNGREN (general editor), *The history of Science and Religion in the Western Tradition: an Encyclopedia*, Garland Publishing, Inc., A member of the Taylor & Francis Group, New York & London, 2000, p. 309.

[16] It has been argued that, unlike hospices in the West, which existed primarily to give comfort and care to the ill and dying, Byzantine *xenones* were "medical centers controlled by trained physicians and designed to cure the sick" See Timothy S. MILLER, *The Birth of the Hospital in the Byzantine Empire*, 1985, Reprint Baltimore: Johns Hopkins University Press, 1997, p. xxviii.

[17] Stanley S. HARAKAS, *Health and Medicine in the Eastern Orthodox Tradition: Faith, Liturgy, and Wholeness*, New York: Crossroad, 1990, pp. 235-236.

[18] Similarly, the great physiological psychologist Iva Pavlov (1849-1936), who was educated at a religious seminary, never lost his interest in the Orthodox faith. Cf. Loren R. GRAHAM, *Science in Russia and the Soviet Union: A Short History*, Cambridge: Cambridge University Press, 1993.

[19] Christos YANNARAS, *Elements of Faith: An Introduction to Orthodox Theology.* Edinburgh: T. and T. Clark, 1991, p. 124.

[20] Alexandre KALOMIROS, "The Eternal Will: Some Thoughts Concerning Scriptural and Patristic Understanding of the Creation of Man and the World", *Christian Activist* 11 (Fall/Winter 1997; Aidan KAVANAGH, *On Liturgical Theology*, New York: Pueblo, 1984.

the relationship of science and faith are essentially three messages of John Paul II[21]. The public has emphasized the statements made by the Pope concerning the Copernican-Ptolemaic controversy of the seventeenth century. In his statements concerning Galileo the Pope essentially does two things: He admits that there was wrong on the part of the Church and apologizes for it, and he calls for a serene, studious, new investigation of the history of that time. However, there are matters that are much more forward-looking and of much more significance than a reinvestigation of the Galileo case.

Especially in the 1988 message, given on the occasion of the tricentennial of Newton's *Principia Mathematica*, Pope John Paul II clearly states that science cannot be used in a simplistic way as a rational basis for religious belief[22], nor can it be judged to be by its nature atheistic or opposed to belief in God.

> "Christianity possesses the source of its justification within itself and does not expect science to constitute its primary apologetic. Science must bear witness to its own worth. While each can and should support the other as distinct dimensions of a common human culture, neither ought to assume that it forms a necessary premise for the other."[23]

The newest element in this view from Rome is the expressed uncertainty as to where the dialogue between science and faith will lead. Whereas the awakening of the Church to modern science during the papacy of Pius XII resulted in a too facile an appropriation of scientific results to bolster religious beliefs, Pope John II expresses the extreme caution of the Church in defining its partnership in the dialogue: "Exactly what form that (the dialogue) will take must be left to the future"[24]

2. 'CREATIO EX NIHILO': THE DEVELOPMENT OF THE DOCTRINE

2.1. Approaches of contemporary science and Christian tradition dialogue

Contemporary science is historically rooted in the so-called modernity, which has been responsible for dualisms – such as the opposition between faith and reason – which have provided the grounds for excluding the divine and transcendent. Modernity is responsible for the claim that truth is based on universal reason, which tells us what reality is like. In this historical setting, theology is forced to follow the rules of modernity in its dialogue with science, not its own intrinsic logic of the communion with God. These rules effectively dictate that theology enter the dialogue on faith and reason along the lines of the adopted secular standards of scientific truth or normative rationality, assuming a particular notion of the knowing subject, which is sharply opposed to the premodern theological way of asserting truth through the existential events of the incarnate hypostatic lives of humanity inherent in the divine image. Seen theologically, the secular standards of stating the truth have subjective aspirations in the sense that they themselves are based on certain ill-articulated myths and beliefs, so they can state objective values and divine transcendence only precariously.[25]

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[21] Two of them given in 1979 and 1986 to the Pontifical Academy of Sciences, and the third in 1988 to the Vatican Observatory.

[22] George COYNE, "Christianity, Roman catholic, issues in science and religion", in J. Wentzel Vrede VAN HUYSSTEEN (editor in chief), *Encyclopedia of Science and Religion*, p. 143.

[23] Quoted in Robert John RUSSELL; William R. STOEGER and George V. COYNE (eds.), *Physics, Philosophy, and Theology: A Common Quest for Understanding*, Notre Dame, Ind.: University of Notre Dame Press, 1988, p. 9.

[24] Robert RUSSELL; William STOEGER and George V. COYNE (eds.), *Physics, Philosophy, and Theology*, p.7.

[25] The dialogue between science and theology, as it takes place in the West, manifests a simple truth that theology, as its counterpart, has to adapt to the implied liberal forms of thought, thus deviating from its

The natural employment of phenomenology within a theological discourse confirms an intrinsic truth: that theology, as a mode of thinking, is critical thinking. The sphere of operation of this critical thinking is in all realms where the Church (ecclesial humanity) meets the historical and cultural reality. Theology creatively and critically thinks of any emerging historical problem or theme, while remaining in the immutable state of the spiritual life of the Church, because this life is experience of God – that is, of eternity. In the words of Father Dumitru Stăniloae:

> "The very existence of the Church is an effect, continually renewed, of the action of the Holy Spirit in creating communion"; "The door of the infinite riches of the personal or interpersonal divine being has opened up before the reflections of Orthodox theology, and with it the prospects of an endless progress of the human spirit within the divine"[26]

This is the context where the Church uses the notion of tradition. Since theology operates in the conditions of faith, it acts as a critical form of thought in that situation when a faithful has to react to a problem arising in the world at large. Here, since theology as a spiritual and intellectual activity is rooted in the experience of the Church (that is, that of eternity), it always functions from above mass-religious consciousness, as well as "secular" consciousness, which claims its freedom from any faith commitments.[27]

The scope and place of the critical function of theology are determined by other discourses, for example by the science-religion dialogue with its demands to deal with some particular issues such as, for example, the question of the origin of the universe in *cosmology* or the origin of life in *biology*. In this sense, theology can never be defined and positioned by secular reason and thus it does not accept the idea of a complete autonomy of that sphere of the worldly reality which is asserted through rational understanding. One must not forget that the Theology we are talking about assumes its ecclesial setting, that is, its inseparability from the experience of God through liturgy and mystical communion. This entails that by being critical with respect to various forms of thought Theology represents the voice of the Church.[28] That's why any kind of "accommodation" of the Church to whatever secular thinking means to remain critical to all scientific claims for monopoly of truth, that is, to remain a "meta-discourse".[29]

Therefore, an important integral part of the contemporary science (that of quantum physics), regarding the *origin of cosmos*, namely, the theory of Big Bang was very seriously taken by Christian theology in a critical fashion. The issue of the origin of the world was one of the most controversial chapters in the dispute between science and religion, for it was

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apostolic and patristic understanding as experience of God in communion. Cf. Alexei V. NESTERUK, "*Eastern Orthodox Theological Commitment in the Modern Science-Religion Debate*", in Eric WEISLOGEL, Guest Editor, *Transdisciplinarity in Science and Religion*, No. 4/2008, *Science and Religion* Series, coordinated by Basarab Nicolescu and Magda Stavinschi, Curtea Veche Publishing House, Bucharest, 2008, p. 227

[26] Dumitru STĂNILOAE, *Theology and the Church*, p. 218.

[27] The unceasing task of theology is to provide a constant and constructive critique of these modes of consciousness. PHILARET (Metropolitan of Minsk and Slutsk), *The Way of the Life-Asserting Love*, Kiev, Duh I Litera, 2004, p. 29, apud Alexei V. NESTERUK, "*Eastern Orthodox Theological Commitment in the Modern Science-Religion Debate*", p. 234.

[28] This makes Christian theology flexible to any scientific developments without being assimilated by them. According to V. Lossky, Christian theology "is able to accommodate itself very easily to any scientific theory of the universe, provided that this does not attempt to go beyond its own boundaries and begins impertinently to deny things which are outside its own field of vision". Vladimir LOSSKY, *Mystical Theology of the Eastern Church*, London, James Clarke & Co. Ltd, 1957, p. 106.

[29] For details: Alexei V. NESTERUK, "*Eastern Orthodox Theological Commitment in the Modern Science-Religion Debate*", pp. 229 sqq.

reduced until recently to the confrontation between two theories: *creationism* and *evolutionism*, the latter claiming the scientific nature. If the followers of the former, the creationists, believe that the universe was created by God *ex nihilo* ("out of nothing") and reject the idea of any progressive movement of the world, placing so much emphasis on the original perfection of the world to the extent that the world then enters the descending curve of a process of gradual degradation[30], in contrast, evolutionists reject the idea of the original perfection of the world and claim that the universe is the result of a natural evolution that ends with the appearance of man. In the name of this theory, one speaks of an ascending evolution of the world, which is not the result of God's intervention, but an effect of chance or natural selection.[31]

In the last decades, however, it's becoming increasing the talk about a *scientific creationism*, as well as a *Christian evolutionism*, that does not ignore the creative work of God. Taking the example of the latter, it is noted, on the one hand, the theistic shade promoted by its followers, by affirming the directly creation of the world by God "ex nihilo", though, on the other hand, it understands the evolution as a result of God's indirect intervention in creation, through the seminal reasons or the second causes, which functions deterministically in the universe and autonomously to their Creator.[32] But whether it's creationism or evolutionism, both theories disregard the presence and continuous work of God in creation.[33]

2.2. God and the doctrine of creation (ex nihilo)

Christianity expanded from its origins in Palestine to engage with the intellectual world of late classical antiquity. Within this world, a number of ideas had become firmly established as virtually self-evidently correct. Although a degree of diversity on the issue can be discerned, the Hellenistic world of the first few centuries of the Christian era was convinced that the universe was eternal. An especially important issue concerns the doctrine of the origin of the universe found in Plato's *Timaeus*, which was especially influential in shaping Christian thinking on the issue.[34] In this work, Plato is concerned to deal with a number of questions of perennial philosophical importance. What is the nature of the world? In what way did it come into being? And what may be known of its author or creator? Plato's answer is that the world which is perceptible to the senses is fundamentally an image (εικον) or likeness of an eternal pattern or model (παρδειγμα). Despite all the weaknesses of the

[30] See, inter alia, Dr. Henry M. MORRIS (ed.), *Creaţionismul ştiinţific* (*Scientific creationism*), transl. by Dr. Iosif Ţon, Societatea Misionară Română, 1992, p. 10.
[31] Henry M. MORRIS, *Scientific creationism*, pp. 9 sq.
[32] Cf. Blessed AUGUSTINE, *De Genesi ad litteram liber imperfectus.*, PL 34, col. 338: "Just as in the seed is to be found invisibly, everything that the tree will be made up with, so the world had contained all that was to be manifested later, not only heaven and the sun, but also other beings that God created in potency, as if in a cause of them". Apud Dumitru POPESCU, „Crearea lumii din perspectiva Sfintei Scripturi şi a ştiinţei contemporane. Reconcilierea între ştiinţă şi credinţă la început de mileniu" ('Creating the world from the perspective of Sacred Scriptures and contemporary science. Reconciliation between science and faith at the beginning of the millennium'), in: *Ştiinţă şi teologie. Preliminarii pentru dialog* (*Science and theology. Preliminaries for dialogue*), XXI: Eonul Dogmatic, Bucharest, 2001, p. 107.
[33] Cf. Assist. Prof. Alexandru-Corneliu ARION, „Creaţionism, evoluţionism şi creaţie continuă" ("Creationism, Evolution and continuous creation"), in: *Creaţie şi evoluţie,* Lucrările simpozionului (*Creation and Evolution*, Symposium Works), May, 30th, 2002), Bioedit, Ploieşti, 2003, pp. 48-69.
[34] Michael LANDMANN, *Urspriingsbild und Schbpfertat: zumplatonisch-biblischen Gesprach*, Munich: Nymphenburger Verlagshandlung, 1966; Jaroslav PELIKAN, *What has Athens to do with Jerusalem? Timaeus and Genesis in Counterpoint*, Ann Arbor, MI: University of Michigan Press, 1997.

human ability to perceive things, at least some knowledge of this eternal pattern is possible, on the basis of reasoned reflection on the visible order. For Plato, the world *(*κοσμος*)* has been fashioned from existing material by a Demiurge (*Timaeus* 29d-30c). While the world was created according to the requirements of reason and necessity, the Demiurge was nevertheless restricted by the material from which he was obliged to construct the world.[35]

The Christian doctrine of creation *ex nihilo* can be regarded as, in part, a reaction against the Greek teaching of the eternity of the world.[36] In part, the doctrine can also be seen as an attempt to retain a more biblical perspective on the issue of the origins of the world. However, there was still debate within early Christian circles over what that biblical teaching actually was.[37]

The doctrine of creation was not an issue to which Christian theologians of the patristic era would have given much attention, had not controversy forced the issue upon them. In general terms, most early Christian writers – such as Theophilus of Antioch, Origen and Diodore of Tarsus – developed critiques of the classic Greek idea of the eternity of the world, without necessarily developing a focused alternative.[38]

The doctrine of creation *ex nihilo* may be regarded as gaining the ascendancy from the end of the second century onwards. From that point onwards, it became the received doctrine within the Church.[39] A radical *dualism* between God and creation was thus eliminated, in favor of the view that the *truth*, *goodness* and *beauty* of God (platonic triad) could be discerned within the natural order, in consequence of that order having been established by God.[40]

The debate over the doctrine of creation became of increasing importance in Western Europe during the twelfth and thirteenth centuries, especially as the intellectual heritage of

[35] Some interpreted this *Dialogue* to teach that the world had been created at a *specific point in* time; others that the ordered world might have a definite point of origin, but that the matter from which it was fashioned was eternal. By the second century, however, there was growing sympathy within Platonist circles for the doctrine of the eternity of the world. Cf. Alister E. MCGRATH, *A scientific Theology. Volume I: Nature*, William B. Eerdmans Publishing Company Grand Rapids, Michigan, T&T Clark Ltd, 2001, pp. 159-160.

[36] See Gethard MAY, *Creatio Ex Nihilo: The Doctrine of 'Creation out of Nothing' in Early Christian Thought.* Edinburgh: T&T Clark, 1995.

[37] Some scholars have suggested that some such notion can be seen in Jewish theological texts dating from the Maccabean period, when Jewish thought was brought into contact with Hellenistic ideas. The critical text is 2 Maccabees 7:28, which the Vulgate renders into Latin as '*ex nihilo fecit ilia Deus*'. However, the evidence for this suggestion is weak and Jewish thought of this period is still best thought of in terms of God working with existent matter. It is indeed debatable whether Judaism developed a doctrine of creation *ex nihilo* at this stage, or even later. Georg Shmuttermayr, '"Schopfung aus dem Nichts" in 2. Makk. 7:28? Zum Verhaltnis von Position und Bedeutung', *Biblische Zeitschrift*, 17, 1973, pp. 203-228, apud Alister E. MCGRATH, *A scientific Theology*, p. 160.

[38] Henry A. WOLFSON, 'Patristic Arguments against the Eternity of the World', in *Harvard Theological Review* 59/1966, pp. 351-367.

[39] Cf. Tarsicius van BAVEL, 'The Creator and the Integrity of Creation in the Fathers of the Church', in *Augustinian Studies* 21/1990, pp. 1-33. The importance of the decisive rejection of Gnosticism by the early Church for the development of the natural sciences has been explored by Thomas F. Torrance, who argues that the affirmation of the fundamental goodness of creation "established the reality of the empirical, contingent world, and thus destroyed the age-old Hellenistic and Oriental assumption that the real is reached only by transcending the contingent". Thomas F. TORRANCE, *Reality and Scientific Theology: Theology and Science at the Frontiers of Knowledge*, Edinburgh: Scottish Academic Press, 1985, p. 6.

[40] For example, Origen argued that it was God's creation of the world which structured the natural order in such a manner that it could be comprehended by the human mind, by conferring upon that order an intrinsic rationality and order which derived from and reflected the divine nature itself. Cf. Alister E. McGrath, *A scientific Theology*, p. 163.

the Islamic philosopher *Avicenna* (980-1037) was debated. For Avicenna, the concept of creation implies origination. To say that a thing is created means that "it receives its existence from another".[41] Yet although this at first sight might seem similar to Christian ways of thinking about the matter, a closer examination reveals some fundamental points of distinction. In effect, Avicenna adopts an *emanationist* understanding of creation, in which "creation" is understood as the establishment of an ontological relationship between entities, rather than having any necessary reference to temporality. The universe is to be understood as eternal; within that universe, certain relationships are established within the order of being.[42]

In 1277, Etienne Tempier, bishop of Paris, condemned a series of Aristotelian propositions, including the teaching that the world was eternal. The result of these measures was to enforce adherence to the doctrine of *creatio ex nihilo*. While there is some doubt as to the precise position adopted by Albert the Great *(c.*1200-1280)[43], both Bonaventure and Thomas Aquinas offered rigorous defenses of the doctrine. From this point onwards, the doctrine may be regarded as definitive for Christian orthodoxy.

The doctrine of creation *ex nihilo* makes a number of significant assertions, which we shall consider in more detail presently. Among them, we may notice the following:

> 1. The doctrine of creation *ex nihilo* is primarily concerned with ontological origin, rather than with temporal beginnings. The doctrine is not primarily concerned – if, indeed, it is concerned at all – with issues of chronology or dating; the specific issue concerns the ontological dependence of the cosmos upon its creator.
> 2. The doctrine affirms that God, in creating the universe, was not constrained by the limitations of the already existing stuff from which that universe was to be fashioned, but was free to bring into existence a universe in which the divine will was recognizably embodied and enacted.[44]

3. THE SCIENTIFIC VIEW ON COSMOLOGY: BIG BANG THEORY

As we already stressed out, the relationship between science and religion was often portrayed as one of warfare. Thus, by the time these two domains of knowledge were viewed so much antagonistic, in a classic of 19th century like *A History of the Warfare of Science with Theology in Christendom* (1896), Andrew White, co-founder of Cornell University, details many of the beliefs once sanctioned by religion that science has shown to be false, such as the belief that the earth is flat, that the earth is the center of the universe, or that the universe is only 6,000 years old. So it is an event of some note when a scientific theory seems to support a religious view, and that is just what the Big Bang seems to do. According to that theory, the universe came into existence about 15 billion years ago in an explosion of

[41] See AVICENNA, *La métaphysique du Shifa,* trans. Georges Anawati, 2 vols, Paris: Vrin, 1978, vol. 2, pp. 83-84; Remus RUS, *Istoria filosofiei islamice* (*History of Islamic Philosophy*), Enciclopedică, Bucharest, 1994, pp. 127-166. A distinction is drawn between essence and existence, allowing Avicenna to affirm the contingency of the created order, within a context largely shaped by the categories of Greek metaphysics. Avicenna can be held to have "fused the Aristotelian metaphysics of self-sufficiency with the monotheistic metaphysics of contingency". See: Lenn E. GOODMAN, *Avicenna*, London: Routledge, 1992, p. 63.

[42] Lenn E. GOODMAN, *Avicenna*, p. 74. It was not merely Christian writers of the period who felt uneasy about this approach. Islamic writers – such as al-Ghazālī (1058-1111) – argued that it was inconsistent with the Qu'ran, and demanded that Avicenna be declared an infidel. And yet the concept of eternal creation continued to gain acceptance within philosophical circles. See Barry S. KOGAN, *Averroes and the Metaphysics of* Causation, Binghamton, NY: State University of New York Press, 1985.

[43] See Steven SNYDER, 'Albert the Great: Creation and the Eternity of the World', in R. James LONG (ed.), *Philosophy and the God of Abraham*, Toronto, ON: Pontifical Institute of Biblical Studies, 1991, pp. 191-202.

[44] See Alister E. MCGRATH, *A scientific Theology*, pp. 166 sq.

unimaginable power. The Judeo-Christian tradition has always taught that the universe came into existence at some time in the past. It now seems that science endorses that view.[45]

Some physicists, among them Stephen Hawking, have hailed the Big Bang theory as "the discovery of the century, if not of all time." But if the universe began with a big bang, what caused it? Its cause would seem to be something outside our universe. Could that something be God? As astrophysicist Allan Sandage puts it, "The Big Bang is best understood as a miracle triggered by some transcendent power."[46] The question before us, then, is whether God provides the best explanation of the Big Bang. That why, the great German philosopher Martin Heidegger once wrote, unarguably, that the essence of humanity is in the form of a question. And no question is more fundamental than that of our origin.[47]

3.1. The Universe – neither eternal nor static

The ancient Greek philosopher Aristotle, for example, argues that matter can be neither created nor destroyed, while Hindus believe that the universe goes through an endless and beginningless cycle of creation and destruction. There is much to recommend the view that the universe has always existed, for it seems to be the only view that is consistent with the principle "From nothing nothing comes" ("*ex nihilo nihil fit*"). Since the universe is the totality of all that exists, if it came into being, it must have come into being from nothing. But you can't get something from nothing. So the universe must have always existed.[48]

When Einstein formulated his theory of gravity in 1915, he too had to deal with the problem of the effect of gravity on the large-scale structure of the universe. To uphold his view that the universe is unchanging, he originally postulated an infinite universe. In 1917, however, he proposed a finite or "closed" model of the universe and added a term to his equations known as the "cosmological constant," which served to keep the force of gravity in check. This allowed him to maintain his view of a static universe but at the price of making his theory more complex.[49]

In the 1920s, the Russian meteorologist Alexander Friedmann and the Belgian priest and cosmologist Georges Henri Lemaître demonstrated that Einstein's original 1915 equations – the ones without the cosmological constant – predicted that the universe was expanding. Tracing the expansion backward in time, Lemaître concluded that at some point in the past, all of the matter in the universe must have been concentrated in a single primeval atom of inconceivable density. American astronomer Vesto Slipher was the first to observe the expansion of the universe.[50] Lemaître and Slipher independently shared their results with

[45] Theodore SCHICK Jr., 'God and the Big Bang', in Arri EISEN and Gary LADERMAN (eds.), *Science, religion, and society: an encyclopedia of history, culture, and controversy*, Volume One, Foreword by the Dalai Lama, M.E. Sharpe, Armonk, New York, London, England, 2007, p. 370.

[46] Alan SANDAGE, Quoted in "Science Finds God", *Newsweek*, July 20, 1998, 46. Likewise, physicist Hugh Ross goes even farther and identifies that transcendent power with the God of the Bible.

[47] See Marcelo GLEISER, 'Creation and Origins of the Universe', in Arri EISEN and Gary LADERMAN, *Science, religion, and society*, p. 311.

[48] Most scientists of the modern era followed Aristotle in believing that the universe was eternal and unchanging on a global scale. Newton realized, however, that his law of gravity – which maintains that every object in the universe attracts every other – seemed to imply that everything in the universe would be drawn together into one massive object.

[49] Albert EINSTEIN, "The Einstein-DeSitter-Weyl-Klein Debate", in *The Collected Papers of Albert Einstein*, Vol. 8, *The Berlin Years: Correspondence, 1914–1918*, ed. Robert Schulmann, A.J. Knox, Michel Jansen, and Jozsef Illy, pp. 351-57. Princeton, NJ: Princeton University Press, 1998.

[50] At the Lowell Observatory in Flagstaff, Arizona, he detected dozens of galaxies rushing away from each other.

Einstein, but Einstein did not accept them. So wedded was he to the notion of a static universe, he was convinced there must be a mistake in their calculations.

In 1929, however, Edwin Hubble demonstrated conclusively that it was Einstein who was mistaken. His observations at the Mt. Wilson observatory outside Pasadena, California, showed that hundreds of galaxies were receding from one another. Still unconvinced, Einstein made a number of trips to Pasadena during the 1930s to look through Hubble's telescope. Only after he had seen Hubble's evidence with his own eyes did he consider it likely that the universe was not static. He was later to say that the introduction of the cosmological constant into his equations was the biggest mistake of his life.[51]

Einstein was not the only physicist who abhorred the thought of the universe springing into existence from a giant explosion. Fred Hoyle, in his turn, thought that an explosion was an undignified way for a universe to begin, something like a party girl jumping out of a cake.[52] To explain the expansion, he formulated what came to be known as the *Steady State* theory. According to this theory, matter is constantly forming in empty space, thus driving the expansion and keeping the average density of the universe constant. Advocates of the Big Bang, such as George Gamow, hypothesized that all of the elements of the universe were created in the first few minutes after the Big Bang. Hoyle proposed that they were created as a result of fusion reactions inside stars or as the result of supernova explosions. Hoyle's theory turned out to be the correct one.

In 1965, however, Arno Penzias and Robert Wilson discovered the "fossil evidence" that Hoyle had sought. While attempting to refurbish a large radio antenna in New Jersey, they found a background noise that they couldn't eliminate. That background noise turned out to be the residual radiation left over from the Big Bang. You can observe that background radiation by tuning your television to an unused channel; scientists estimate that between 1 to 10 percent of the dots on the screen are caused by photons left over from the Big Bang.[53]

Further investigation has confirmed other predictions made by the Big Bang theory. For example, in order for stars and galaxies to form, the Big Bang could not have been totally homogenous. This lumpiness should show up in a variation of the temperature of the background radiation. In 1989, the Cosmic Background Explorer (COBE) satellite was launched to study the background radiation. It found the predicted variation in temperature. When George Smoot, head of the COBE research team, announced the results, he remarked to a reporter, "If you're religious, it's like looking at God." Why? Because something must have caused the Big Bang, and for many people, God seems the most likely candidate.[54]

3.2. Inflationary universe theory

Closely and intrinsically related with the Big Bang, the *Inflationary Universe Theory* (*IUT*) proposes a brief period of extremely rapid accelerating expansion in the very early

[51] Theodore SCHICK Jr., 'God and the Big Bang', p. 371.
[52] In a BBC interview, he referred to this explosion as "the big bang." Given Hubble's evidence, Hoyle couldn't deny that the universe is expanding. But he could deny that the universe began with the Big Bang, because there was, in his words, no "fossil evidence" for it, no telltale signs.
[53] See Alan GUTH, *The Inflationary Universe: The Quest for a New Theory of Cosmic Origins*, Reading, MA: Addison-Wesley, 1997, p. 176.
[54] The scientific evidence for the Big Bang has been used to refurbish one of the oldest arguments for the existence of God: the first cause or cosmological argument. In its current guise, it goes like this: 1.Whatever begins to exist has a cause. 2. The universe began to exist. 3. Therefore, the universe has a cause, namely God. See Theodore SCHICK Jr., 'God and the Big Bang', p. 372.

universe, before the radiation dominated era called the *hot big bang*. This acceleration is believed to be driven by a quantum field (in effect, some exotic kind of matter) with a repulsive gravitational effect. This can be achieved if the pressure of the field is extremely large and negative (unlike ordinary matter, which has positive pressure).

A specific example is a *scalar field* associated with a potential energy. Such a field "rolls down" the energy surface defined by the potential, and if it is slow-rolling can act like an effective cosmological constant, driving an exponential expansion with constant acceleration. During this epoch, any matter or radiation density other than that of the scalar field is negligible; one is left with an almost constant energy density of the field, often called a *false vacuum* because it behaves like the highly energetic vacuum of quantum field theory. Inflation ends through decay of the repulsive material into a mixture of matter and radiation, this decay taking place by quantum processes similar to radioactive decay of ordinary matter. The resulting hot expanding gas provides the starting point for the hot big bang era in the early universe.[55]

This scenario provides explanations for some puzzles in cosmology: why the universe is so large, why it is so uniform, and why it is so nearly flat. Most importantly, this scenario provides an explanation for the origin of large-scale structure in the universe: Clusters of galaxies arise from seed perturbations generated by quantum fluctuations in the very early universe, amplified vastly in size by the inflationary expansion of the universe and in amplitude by gravitational instability after the decoupling of matter and radiation.[56]

Moreover, various theoretical conundrums remain, for example the problem of exactly how inflation ends, how probable it is that inflation will succeed in starting in an extremely inhomogeneous and anisotropic situation, and how successful inflation can be in smoothing out the universe if arbitrary initial conditions are allowed. Despite these theoretical problems, and the difficulties in testing the physics proposed, inflation is currently the dominant explanatory paradigm for the physics of the early universe. It has generated immense interest because it provides a major link between particle physics and cosmology, allowing cosmological observations to be used for testing theories in particle physics.[57]

3.3. The God Hypothesis

But the universe may well be eternal (endless and beginningless), despite the evidence for the Big Bang. There are not few partisans that explain the Big Bang without appealing to the supernatural. Paul Teinhardt of Princeton University and Neil Turok of Cambridge University have proposed a new oscillating theory of the universe in which the universe is brought into existence as the result of a collision between giant membranes of matter. And Stephen Hawking has proposed that although the universe is finitely old, it had

[55] Alan GUTH, *The Inflationary Universe: The Quest for a New Theory of Cosmic Origins*, p. 68.
[56] A major triumph of the theory is that the subtle variations in the cosmic background radiation it predicted have been observed from satellites and balloons. Cf. George F.R. ELLIS, 'Inflationary Universe Theory', in J. Wentzel Vrede VAN HUYSSTEEN (editor in chief), *Encyclopedia of Science and Religion*, p. 455.
[57] See, inter alia, Andrew R. LIDDLE, and David H. LYTH, *Cosmological Inflation and Large-scale Structure*, Cambridge, UK: Cambridge University Press, 2000; Andrei D. LINDE, *Particle Physics and Inflationary Cosmology*, Chur, Switzerland: Harwood Academic, 1990; J.A. PEACOCKE, *Cosmological Physics*, Cambridge, UK: Cambridge University Press, 1999.

no beginning in time because, as Augustine suggests, time came into existence with the universe.[58]

Although many scientific theories can account for the Big Bang without invoking God, one might object that the God hypothesis is just as good as they are, because there is no "fossil evidence" to help us decide among them. But fitting the evidence is not the only criteria used in deciding among competing theories.

On all of the criteria, the God hypothesis – argue many scientist of nature – fares worse than a comparable natural one. It is often claimed that God is perfectly merciful and perfectly just. But if he is perfectly merciful, he lets everyone off, and if he is perfectly just, he makes sure that everyone gets what's coming to them, which does not seem to be the case.

The God hypothesis is also usually less simple than naturalistic theories because it postulates an entity, namely God, not found in any naturalistic hypothesis. In this regard, it violates Occam's razor, a concept that tells us not to multiply entities beyond necessity.[59]

The God hypothesis also tends to be less conservative because it suggests that certain natural laws have been violated, such as the law of conservation of mass/energy. It lacks fruitfulness because it has not successfully predicted any new phenomena. The predictions that can be derived from it, for example, that its design should be perfect and that there should be no evil in the world, appear to be false. So in terms of the amount of understanding produced, the God hypothesis is not as good as a comparable scientific one.[60]

CONCLUSION

Jews, Christians and Muslims all believe that the universe is the temporal and spatial expression of an eternal meaning or purpose. In these traditions, authentic human life begins with a steady trust that something of everlasting significance is going on in the universe and that our own lives are connected to this larger drama. However, these same faith traditions are also aware that whatever purpose the universe might have can never be made completely clear to mortals. Why not? Because if there is a pervasive purpose in the universe, in order for it to give meaning to our own lives it would have to be larger and deeper than any human mind could fathom. At least, this is the teaching of all traditional theologies. Purpose, if real, would grasp us more than we could grasp it. We could encounter purpose only if we let it take hold of us and carry us away, just as we may have allowed a great symphony or poem to carry us away in its intoxicating beauty. We cannot appreciate a great work of art or allow it to have any impact on us unless we abandon the need to control it intellectually. The same would be true of cosmic purpose.

However, in the age of science can we honestly believe that the universe has any purpose? Is it credible to claim that something of everlasting importance is working itself out

[58] Andre Linde has proposed a self-reproducing theory of the universe where the budding-off process is driven by scalar fields (phenomena, such as temperature, in which each point in space can be defined by a number) rather than black holes. See Andrei D. LINDE, *Inflation and Quantum Cosmology*, New York: Academic Press, 1990, p. 258.

[59] If a phenomenon can be explained without assuming the existence of a certain entity, then that phenomenon provides no reason for believing in the existence of that entity. Cf. William Lane CRAIG and Quentin SMITH, *Theism, Atheism, and Big Bang Cosmology*, Oxford: Oxford University Press, 1995, pp. 189-190.

[60] As Plato points out in the *Cratylus*, to say that God did something is not to explain it but merely to offer an excuse for not having an explanation. PLATO, *Cratylus*, Trans. and Introd. C.D.C. Reeve, Indianapolis, IN: Hackett, 1998.

in the universe? Of all the questions in science and religion, many thinkers believe the most fundamental is whether the universe has a purpose.

Nowadays many scientifically educated people are quite certain that the universe can have no overarching purpose since science predicts that it is heading irreversibly towards a decisive and final death at some point in the future.[61]

This, of course, is not how religions, especially the Judeo-Christian traditions, see things. They have no trouble agreeing that everything physical, including our own bodily existence and the universe that sustains it, will perish.[62] But they also believe in something eternal. Not everything, in other words, is subject to non-being. In order for anything to exist at all, theologians have argued, there must be a creator, a being that is not capable of non-being. This being believers have called God. Accordingly, the purpose of the universe is to disclose the infinite divine resourcefulness that gives being to all beings. Simply by existing and witnessing to the infinite creativity of God, the totality of beings is full of purpose.[63]

From the perspective of *quantum physics*, the genesis of the universe involves the image of a void space, serving as a stage for the material world. By its physical nature, quantum vacuum, far from being a total vacuum, is an infinite and inexhaustible ocean of pulsed energy. Out of this quantum vacuum ("nothing"), it is presumed that 15 billion years ago the universe was born of a gigantic explosion, which caused expansion of matter (Big Bang). Quantum physics proves that matter can occur in vacuum provided of being injected of enough energy quantity. It is assumed that originally, before the Big Bang, an immeasurable tidal energy was transferred into initial void bringing about a primordial quantum fluctuation from which the universe came to be born. The question that remains for science is: where does this colossal amount of energy from the Big Bang origin comes from? The assertion that the quantum universe was created out of nothing (the quantum vacuum and pure information) must be understood only in the sense that creation got into existence outside God's being, since creation has not existed from eternity, as theology teaches – or before the moment of big bang, according to the theory of quantum physics. That's why scoring its paradoxical character, it is to be remembered the words of great Danish physicist Niels Bohr: "Anyone who is not shocked by quantum theory has not understood it."

However we posit ourselves, the new scientific findings that have come to light in the twentieth century require us to abdicate the certainty of knowledge that provides us our senses or our logical constructions. It is a crucial moment in the history of the human spirit and a perspective that contributes to the reconciliation between science and faith, especially with a view to the integral education, i.e. spiritual, moral, and cultural of the beginning of third millennium' man.

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[61] Physics and astronomy together claim that the entire universe, along with each one of us, is drifting slowly toward an abyss in which everything, including life, consciousness and culture, will perish utterly. The end of all things is zero. Consequently the universe must be purposeless. John HAUGHT, 'Science, God and cosmic purpose', in Peter HARRISON (ed.), *The Cambridge Companion to Science and Religion*, Cambridge University Press, 2010, p. 261.

[62] This common point with science refers to the so-called theory of Big Crunch. That If there is enough matter in the universe to create a gravitational force sufficient to bring this movement to a halt and to reverse its direction, then at some point in the remote future all matter in the universe will converge into an infinitely dense point in space, resembling a massive black hole. The end of the universe would then resemble its beginning – a singularity at which the laws of physics as we know them no longer apply. Such a universe is called a *closed universe*. See Mark WORTHING, 'Big Crunch Theory', in J. Wentzel Vrede VAN HUYSSTEEN (editor in chief), *Encyclopedia of Science and Religion*, p. 62.

[63] John HAUGHT, 'Science, God and cosmic purpose', pp. 261-262.

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