



ELEMÉR HANKISS

**QUANTUM MECHANICS
AND THE MEANING OF LIFE**

iASK WORKING PAPERS
2017

*“The chance encounter of a sewing machine
and an umbrella on the operating table”.*

The Loss of Meaning*

Living in a vast, infinite, unknown universe, human communities have ever surrounded themselves with spheres of symbols: myths and religions, knowledge and illusions, values and the seductive beauty of the arts, i.e., with a brilliant construct: civilization. Within the “bubble” of their civilization, they could find a certain degree of safety, freedom, and dignity and could cherish the hope, or the illusion, that their lives had significance and meaning.¹

For a certain period of time every civilization we know had the power to answer the everyday and the ultimate questions of human life; but after reaching their zenith, they were all doomed to decline. The “bubble” burst and people were left alone and unprotected in a chaotic or empty universe void of meaning.

There were communities that perished in the crisis, or were absorbed by another civilization. There were others that became involved in a “defiant creation of meaning”², in the construction of “a shield against terror”, in the “enterprise of building [again] a humanly meaningful world” for themselves.³

At present, there seems to be a turn in our modern age, and a threat that the “bubble” of modernity will burst. The most sensitive minds of our civilization felt the first signs of this decadence already in the second half of the 19th century, starting with Baudelaire and Nietzsche, and then, in the 20th century this experience overwhelmed some of the best minds in the West.⁴

The situation seems to be critical. Outstanding scholars and leading scientists have spoken of “the living death of modern material civilization”,⁵ “the crisis of human existence itself”,⁶ “the loss of transcendence”,⁷ “a historic crisis”,⁸ the “abyss of darkness”,⁹ a “nightmare of meaninglessness”.¹⁰ Even Bertrand Russell, one of the most rational and sober minds of the 20th century was shocked by “the loneliness of humanity amid hostile forces” in an infinite,

* Edited by Jody Jensen. Footnotes and bibliography compiled by Juozas Kasputis.

1 See for instance the ideas of Max Scheler, Ernst Cassirer, Géza Roheim, Mircea Eliade, Clifford Geertz, Ernest Becker, Eric Voegelin, Franz Borkenau, Peter Berger and others. See also Schlagel (1985), Henry (2012).

2 Becker (1973: 4-5, 7).

3 Becker (1973: 22-24).

4 Let me mention only Spengler, Sorokin, Toynbee, Freud, Kafka, Jaspers, Heidegger, Sartre, Gadamer, Musil, Russell, Monod, Kuhn, Löwith, Derrida, Foucault, Rorty, Sloterdijk, Cioran, Gide, Camus, O’Neill, Beckett, Tillich, Caputo, and others.

5 T. S. Eliot (1934: 60).

6 Jaspers (1965 [1932]: 76).

7 Camus (1971 [1951]).

8 Hobsbawm (1994: 584).

9 Monod (1971: 170).

10 Berger (1990 [1967]: 22).

frightening universe, in a “cavern of darkness” and described human life – in almost O’Neillian terms – as “a long march through the night”¹¹.

The loss of meaning, the “modern soul’s distress”¹², felt with increasing intensity also by hundreds of millions of people around the world, may become one of the most dramatic experiences, and one of the major problems to be dealt with, in the 21st century. It may grow into at least as serious a problem as the much discussed economic, ecological or security problems.¹³ It may, however, hit both the developed and developing societies in different forms.¹⁴

This means that to explore the possibilities of how to construct a new framework within which human beings will again find safety and feel that their lives have significance and meaning will and should be one of the great challenges to the social, human and natural sciences in the coming decades.¹⁵

So far so good. But what has quantum mechanics got to do with all this? It has got a lot.

Increasing Difficulties

The question is how a new framework, a new civilization might emerge, a new “bubble” may inflate, but what would it look like? How will concepts of Good and Evil, Justice and Injustice, Truth and Beauty be inflated with meaning; how will the main principles of human behaviour take shape; how will people again be able to face mutability and death; how and where will they discover the sources of the meaning in their lives?

It is difficult to answer these questions. It was not easy to answer them in the early centuries of Christianity wither, or when the age of modernity emerged, but it promises to be exceptionally difficult now when what will probably be called the “quantum universe” slowly takes shape.

Why would it be more difficult now than it was before?

In earlier ages the cosmic visions that surrounded human communities were in close and direct contact with peoples’ lives. The magic cosmos of early tribal life was full of friendly and hostile spirits, ghosts, and demons who could be more or less managed with the help of traditional rites and ceremonies.

11 Russell (1948: 56, 57, 59, 60, 61).

12 Davies (1992: 170-971).

13 In the last few decades economists have discovered the increasing importance of the “human factor”. See for instance the emergence of “social economics”, “behavioral economics”, “cultural economics”, “identity economics”, the concept of the “human capital”, “quality of life research”, etc.

14 Miyanaga (1991), Inglehart (1997, 2010), Ames et al. (1998), Beck (1999), Lee et al. (1999), Mack (2000), Hofstede (2001), Berger and Huntington (2002), Etzioni (2004), Sassen (2007), Featherstone et al. (1995), Anand et al. (2010), Diener et al. (2010).

15 A rich scholarly literature illustrates the importance of the meaning-of-life question. For a quick introduction see the following collections of essays: Sanders- Cheney (1980), Klemke (1981), Klemke-Kahn (2008). Further readings: Adler (1929, 1937, 1972, 1992), Ayer (1990), Baumeister (1991), Becker (1971), Belshaw (2005), Berger and Luckmann (1995), Britton (1969), Camus (1955), Casey (2002), Cottingham (2003), Davies (1992, 1999), Dennett (1995), Ferry (2002), Flanagan (1996), Frankl (1963), Lehmkuhl-Sasse-Wahl (2007), McGrath (2005), Reker- Chamberlain (2000), Ross (1952), Runzo-Martin (2000), Sartre (1948), Singer (1992), Sloterdijk (2009), Wong-Fry (1998), Young (2003).

- This is true also of the mythical cosmos of the Greeks and other early cultures. Plato's universe, for instance, was governed by the harmony of eternal ideas, forms, which were meaningful for thoughtful human beings even if they could not fully grasp the essence of these ideas.
- In the transcendental universe of Judaism, Christianity and Islam, humankind had a central, significant, and meaningful position.
- The Copernican revolution shattered this position of safety¹⁶, but some of the leading minds of the emerging age of modernity (philosophers and scientists) discovered a strong harmony between the cosmos and the life and destiny of human beings. Newton and Kant, for instance, were fascinated by the crystalline harmony of the motion of the stars and argued that this cosmic harmony could be translated into peoples' everyday lives. To live according to the laws of reason and virtue rendered human lives as perfect and harmonious as the motion of the celestial bodies.
- Other 18th and 19th century scholars and scientists, if they cared at all, surrounded people with an almost religious faith in the glorious progress of humankind.¹⁷
- But what happens when you have Einstein's spacetime as a new framework for human life? Where can you place humankind in its warps?¹⁸ How do you discern moral rules, or the hidden sources of the meaning for human life in a universe of $E = mc^2$?
- And the situation has become even worse with the vision of an emerging quantum universe. Human beings do not live any more under the protective dome of the starry skies. They are caught in a cosmic explosion of electrons, quarks, bosons, leptons, strings and hyper-strings. They drift in a dark, infinite universe of billions of galaxies that are expanding into the unknown and the incomprehensible. How can humans find their place, their identity and their function, the purpose and meaning of their lives in this "icy solitude", in a universe, which is "deaf to their music and indifferent to their hopes as well as their sufferings or crimes"?¹⁹ How are we to read the hidden message of mathematical, physical, and cosmological equations about the meaning of human life, if there is any message in them at all?

What can human beings and communities do in this situation?

There have been countless attempts to establish links between quantum physics and cosmology, on the one hand, and human life, on the other.²⁰ All these attempts are no more than the first timid and audacious steps on a very long road. To find humankind's place in the quantum universe, to build a meaningful human world in a universe probably devoid of meaning, is a fearsome and, at the same time, fascinating task.

16 Goethe thought that this was one of the greatest mental/spiritual shocks humankind has ever suffered.

17 It is this "bubble" that was later burst by the horrors of the 20th century.

18 Nelson (2005).

19 Monod (1971: 172-173).

20 There is an amazingly rich literature that tries to find connections and affinities between quantum mechanics and human life. For a quick introduction see Evans and Thorndike (2007), Chiao et al. (2011), Brockman (1995, 2002); dozens of additional books will be quoted below.

For everyday people an easy, but not necessarily expedient, solution is just to ignore the problem and live at the very center of the traditional, illusionary – Ptolemaic – universe. On the other hand, people can try to find their place, and meaning of their lives, within the new quantum universe. There is an amazing and feverish proliferation of blogs, YouTube posts, Facebook debates, popular conferences where participants try to find clues within quantum mechanics that would permit them to suppose that human life has a place and meaning even in the quantum universe.²¹

The Scientist's Dilemma

Scientists, scholars, philosophers, and theologians, too, had to respond to this challenge. The variety of their responses is fascinating, although all their hypotheses and theories taken together are only the first attempts at establishing links between the equations of quantum physics and the problems of human life. They are still far from building a “humanly meaningful world” within the quantum universe. However, surveying some of their efforts may help coordinate future research work in this field. In what follows, I shall briefly describe some of their strategies to bridge the gap between quantum physics and human life.

Dismissal. The meeting of quantum mechanics and the meaning of human life could seem to be a surrealist encounter for a physicist or cosmologist, like that of “a sewing machine and an umbrella on the operating table?” – at least if they had read the famous lines in the 6th Canto of *Les chants de Maldoror* (1869) of the French poet, Lautréamont. In any case, most of them have declined to deal with the question of a hypothetical contact between the realms of quantum mechanics and the meaning of human life.²²

“Science War”. There is the excuse that the so-called “Science War” (that raged in the second half of the 20th century between the natural sciences, on the one hand, and traditional philosophical interpretations of the world, on the other) turned out to be more or less futile.

Neutrality. The flag of neutrality could also be waved and claimed that being physicists and cosmologists, their only business was to discover the laws of the universe and had nothing to do with such “soft variables” as the meaning of human life. They needed to focus on their scientific work and ignore the philosophical implications of quantum mechanics.

Slipping out of the dilemma. A good example of how one can fend off the question and fill the gap between dead and living matter, sciences and human destiny, is the final, poetic rather than scientific conclusion of Dawkins’s famous book, *The God Delusion*:

21 Here are a few characteristic blog and YouTube titles: “Philosophy of Quantum Mechanics” – “Why is Quantum Mechanics Like the Trinity?” – “Quantum Physics and Eastern Religions” – “Does Quantum Physics Make it Easier to Believe in God?” – “Science and Religion: Many Worlds Hypothesis and Quantum Mechanics” – “Consciousness beyond Life” – “The Fun Way of Physical Immortality” – “Eternal Life is Like What?” – “Quantum Physics and Buddhism,” and so on.

22 From among the hundreds of scientists who reject any possibility for cooperation between the two realms, let me quote only a few outstanding names: Bertrand Russell (1929a, 1948), Jacques Monod (1971), Richard Dawkins (1994, 2006), Hawking (1998, 2002), Stenger (2007, 2009), Avise (2010a, 2010b), Hawking és Mlodinow (2010), Dennett and Plantinga (2011).

“But couldn’t it be – he asks — that God clutters up a gap that we’d be better off filling with something else? Science perhaps? Art? Human friendship? Humanum? Love of this life in the real world...?”²³

Split consciousness. If none of these strategies work, scientists can still take refuge in developing a split consciousness, being, on the one hand, a scholar investigating the universe with strict rationality and, on the other hand, being a mortal human being trying to find the meaning of life in the community, and ultimately in the universe.

The famous physicist, Hilary Putnam, is an outstanding example. In the autobiographical introduction to one of his books (2008), he admits he is made up of two distinct parts: “a religious part and a purely philosophical part, but I had not truly reconciled them. I simply kept these two parts of myself separate.”²⁴

Building Bridges

Despite the enormous difficulties, there are many physicists, cosmologists and biologists, on the one hand, and philosophers, theologians, scholars, on the other, who try to build bridges between hard sciences (eminently, quantum mechanics) and the problems of human life and destiny.²⁵ These attempts vary a great deal in their scholarly level but are full of ideas that may later be developed into genuine scientific paradigms.

Discovery, Knowledge, Eureka. The discovery of the hidden harmony of mathematical laws of the universe has been a fascinating adventure, an overwhelming experience for many scientists. It filled their lives with significance and (the illusion) of meaning.²⁶ Einstein speaks, with almost religious awe, of the “great and eternal mysteries” of the universe, the discovery of which gives one “inner freedom and safety”.²⁷ Wolfgang Pauli is convinced that nuclear physics proves the existence of a “cosmic harmony” (“Weltharmonie”).²⁸

According to Nobel Prize laureate Steven Weinberg “[t]he effort to understand the universe is one of the very few things that lifts human life a little above the level of farce, and gives it some of the grace of tragedy”.²⁹ According to another laureate, Jean Monod (1971: 180), “truth is a transcendental value, something beyond us, and thus the search for it may satisfy the profound human striving for something beyond what is already present and given.”

23 Dawkins 2006: 388. For a detailed discussion of the question see Egan 2009.

24 See also Putnam 1965, 2005.

25 See for instance Alfred N. Whitehead (1920, 1933 a and b), Theodosius Dobzhansky (1954, 1967), Freeman Dyson (1979), C. P. Snow (1969), Paul Davies (1992, 1996, 1999, 2007), Barrow et al. (2004), John C. Polkinghorne (2005, 2010), Michael J. Heller (2003), Heller-Coyne (2008), N. S. Hetherington (1993).

See also Tipler (1994), Kragh (1996), Ó’Murchú (1997), Gregersen and van Huyssteen (1998), Gould (1999), Miller (1999), Griffin (2000), Ruse (2001), Manson (2003), Gaál (2003), Kurtz (2003), Küng (2005), Campbell (2006), Fuller (2007), Scott (2009), Bowker (2009).

26 Wheeler and Ford (1998).

27 Einstein (1955).

28 Fischer (2004).

29 See Weinberg’s answer in Moorhead (1988: 155).

Throughout his famous book, *The Elegant Universe* (1999), Brian Greene's argument is strictly scientific but at the end of the book, in the last paragraph, he suddenly switches over to a few confession-like philosophical statements. He asks the question why we, humans, are here in this universe. Although this "why" refers only to the physical causes of the emergence of the universe and of human life, and not to any "purpose" or "meaning" of human life, the efforts of scientists to answer this question provides a role for the human being and "enriches the soul". In conclusion, Greene sings the "Ode to Science" and to the human mind's glorious progress ad astra.³⁰

Cosmic order. The amazing power of the human mind to discover the hidden order of the universe may fill our souls with the feeling, or illusion, that we, humans, are at home in this universe.³¹ In the same way, mathematical, physical, and cosmic laws of quantum mechanics lend themselves to a (questionable) comparison with Plato's eternal Forms or Ideas.³² This relationship may suggest that our lives are governed by the same laws as the universe. The contact is established: we are at home in this universe even if the meaning of our lives remains beyond our understanding.

Cosmic consciousness. There are significant numbers of great scientists (Pauli, Schrödinger, Heisenberg, Eddington, Jeans, Hoyle, Paul Davies, and others) who believe that there is, or may be, a "cosmic mind" behind/beyond the physical universe. They argue that only the existence of a cosmic consciousness can explain a universe ruled by the brilliance of mathematical laws. "In some sense man is a microcosm of the universe; therefore, what man is, is a clue to the universe. We are enfolded in the universe."³³ The controversy about the existence or non-existence of an "intelligent design" behind the empirical world is still going on.³⁴

Human consciousness. Consciousness may be the major link between humankind and the universe. For centuries, the character of this relationship has been one of the most discussed issues in philosophy without ever having reached a conclusion. There is a growing conviction today (though not shared by many scientists) that quantum mechanics may bring about a breakthrough in the study of this relationship and in the discovery of hitherto unknown specific laws governing the human mind.³⁵ The questions to be answered are how can we understand the outside world, and how is it possible that the mathematical equations discovered or constructed by the human mind are able to reflect the working of the universe?³⁶

There are scholars who go further and argue that with the emergence of human consciousness a new quality of major importance appeared in the universe. Paul Davies (1992: 232), for instance, concludes his book on *The Mind of God* with the following statement:

30 Greene (1999).

31 Among many other works see Wheeler (1994), Close (2011).

32 Whitehead (1920, 1933 a and b).

33 David Bohm https://www.brainyquote.com/search_results.html?q=David+Bohm.

34 See, for instance, Moreland (1994), Dawkins (1994), Dennett (1995), Brockman (2006), Stenger (2011), Hawking and Mladinow (2010).

35 Wolf (1981, 1996), Penrose (1989, 1994), Wilson (1990), Zohar and Marshall (1990), Talbot (1988), Bohm and Hiley (1993), Wheeler (1994), Wheeler and Ford (1998), Hameroff et al. (1999), Satinover (2001), Bohm (2002), Franks (2003), Lindorff and Fierz (2004), Ivancevic and Ivancevic (2008), Penrose et al. (2011), Rosenblum and Kuttner (2011), Mensky (2011), Loewenstein (2013).

36 See for instance, the famous debate between Jean-Pierre Changeux and Alain Connes (1999 [1989]).

"I cannot believe that our existence in this universe is a mere quirk of fate, an accident of history, an incidental blip in the great cosmic drama. Our involvement is too intimate. The physical species Homo may count for nothing, but the existence of mind in some organism on some planet in the universe is surely a fact of fundamental significance. Through conscious beings the universe has generated self-awareness. This can be no trivial detail, no minor by product of mindless, purposeless forces. We are truly meant to be here."

Several outstanding physicists and cosmologists (Freeman Dyson 1979, 1985, 2004, Fred Hoyle 1975, 1984, James H. Jeans 1976 [1930], Arthur S. Eddington 1928, 1929, Teilhard de Chardin 1959, Roger Penrose 1989, 1994) would argue that this is actually the case.³⁷ There are scholars who are convinced that quantum mechanics will be able to prove the cosmic importance of human consciousness. Carl Jung predicted long before them that psychology and quantum mechanics would converge in the not too far future.³⁸

John Wheeler (1994), Barrow and Tipler (1986) and several other leading physicists go even further when they state that by observing the physical processes, humans "bring the Universe into being."³⁹ If this proves to be true, human beings could really feel themselves at home in this universe,⁴⁰ although the majority of physicists and cosmologists do not really believe in this distinguished role of human mind.

Ex oriente lux. It is tempting also to relate some features of quantum physics to far eastern religious and philosophical thought, especially Buddhism.⁴¹ Book titles like "The Self-Aware Universe: How Consciousness Creates the Material World"⁴² may illustrate this type of thinking. Even the Dalai Lama's thoughts were published under the title of "The Universe in a Single Atom: The Convergence of Science and Spirituality".⁴³

Spiritualization of the universe. With the progress of particle physics, matter, as traditionally conceived, has more and more disappeared, and the universe has become more and more something like "a thought", the immaterial sparkling of mathematical laws. Physicist James H. Jeans (1976 [1932]: 137) writes:

*"The stream of knowledge is heading towards a non-mechanical reality; the Universe begins to look more like a great thought than like a great machine. Mind no longer appears to be an accidental intruder into the realm of matter... we ought rather hail it as the creator and governor of the realm of matter."*⁴⁴

37 Here we are not very far from those theologians who believed that the human soul is "a codetermining force in the universe shaping the destiny of the universe". See for instance Dietrich Bonhoeffer's or Kari Rahner's views.

38 Roth (1992), Radin (1997, 2006), Mindell (2000), Lindorff and Fierz (2004), Gieser (2005).

39 Barrow and Tipler (1986: 23). See also Goswami et al. (1993), Franks (2003), Stapp (2007), Penrose et al. (2011), Turok (2012).

40 By the way, the title of Wheeler's famous book is: At Home in the Universe (1994).

41 See, for instance Goswami (2004, 2008), Goswami et al. (1993), Walker (2000), Mindell (2000), Ricard and Thuan (2001), Chopra and Mlodinow (2012).

42 Goswami, Reed, and Goswami (1993).

43 The Dalai Lama (2005).

44 Eddington (1928) assumes that "[t]he stuff of the world is mind-stuff." Disputing Laplace's and Dawkins' mechanistic interpretation of the world, physicist-theologian John C. Polkinghorne (2005, 2010) argues that the universe is much more "cloud-like" than clock-like.

If in the future, the findings of quantum mechanics would support this view, human beings would have a safe place and a meaningful role in the universe. (Though, on the contrary, a universe of pure mathematical laws could also be a universe cold, barren and alien for a humankind in quest of significance and meaning.)

Simplicity and beauty. Einstein, Planck, Greene and several of their colleagues found peace and joy in the simplicity and beauty of the cosmic constellation of mathematical/physical laws.⁴⁵ This amazing simplicity and beauty does not mean that humankind has any significance in the universe, or that the personal human life has meaning. But, to a certain degree, it may alleviate the anxiety of people (mainly scientists) of being alone in a cold and indifferent universe devoid of any message or meaning for humankind.

God. The concept of God is a plausible link between quantum physics and human life. If quantum physics does not exclude, or even supports, the hypothesis of the existence of God, then there is a fair chance that human lives may have purpose and meaning. The traditional concept of the God of Judaism, Christianity and Islam ignores the possibility that God may have created a universe in which humans may exist but their existence is insignificant and their lives have no meaning. A great number of theologians, philosophers and even scientists have tried to show that divine acts and laws, on the one hand, and the laws of quantum mechanics, on the other, mesh smoothly and beautifully.⁴⁶ And there are even scholars who contend that quantum physics opens a better road to God than traditional religions,⁴⁷ although scientists who reject any such possibility are in the majority.⁴⁸ And there are those, who leave this question open: Phil Dowe (2005: 183) writes:

“So, from the perspective of physics, is it possible that God brings about the events that quantum mechanics deems to be the result of chance? There are two possible answers to this question – either it is possible or it is not.”

The God of the Gaps. The relationship of God with the world has been discussed for thousands of years. The question to answer is how an eternal God, and a pure spirit, can interact with a temporal and material world. Several theologians have argued that God is able to bridge the gap.⁴⁹ One of the staple answers has been that God is omnipotent and so He can suspend the causality and the natural order of things and interfere with secular processes.⁵⁰

There are scholars who assume that chance and probability may be the realm of a God, who may have created the universe by “tossing the dice,” although the majority of physicists and cosmologists strictly reject “... theories of divine tinkering in the crevices of physical uncertainty.”⁵¹

45 Heisenberg (1971), Penrose (1989), Henneaux et al. (2009), Mlodinow (2011).

46 Schindler (1986), Grenz and Olson (1992), Tipler (1994), Ross, H. (2000, 2010), Satinover (2001), Hodgson (2003), Shults et al. (2009), Lennox (2011), Stump and Pagett (2012).

47 See, for instance, Hodgson (2003).

48 Bertrand Russell, Stephen Jay Gould, Richard Dawkins, Jean Monod, Victor J. Stenger.

49 See, for example, Stump and Padgett (2012).

50 For a good introduction to this type of argument see Shults, Murphy, and Russell (2009). This collection of essays contains chapters on “Divine action in the world”, “How does God communicate with humanity”, “Creation, providence and quantum chance”, etc.

51 Campbell (2006: 266).

Hypothetically, God may bridge also other “gaps” that the modern natural sciences have not yet been able to bridge. These are, for instance, gaps between dead matter and life, the human brain and the human mind, the pre-Big-Bang vacuum, chaos, “nothingness” and the emergence of time, space, the cosmic constants, and energy, etc.

Creatio continua. The so-called “process” philosophers and theologians proposed another solution. According to Alfred Northrop Whitehead (1978 [1929]), God has two “natures”, a “primordial” one and a “consequential” one. In the same spirit, Charles Hartshorne (1984 a and b) speaks of God’s “bi-polarity”. On the “abstract pole”; there is God’s eternal self-identity, and on the “concrete pole” there is the ever-changing world. In this way, the unchanging laws of the quantum universe may interact with the changing world of humankind within God’s person.

The experimenting God. Reading Genesis (maybe reading it in the wrong way), one might gain the impression that God was uncertain during the process of Creation. He stopped each evening, and only when he saw that what He had created “was good”, did he continue the next day, as if he did not know what would result from what He had done.⁵² One of the leading process theologians, Charles Hartshorne (1967: 597), argues that in the continuous process of creation God is “groping through cosmic processes towards an uncertain self-fulfillment.” There may be a vague resemblance between this primordial uncertainty and the probabilistic processes of the quantum universe.⁵³

God beyond God. In contemporary theology, the mythical figure of a personal God has been deconstructed. In the vision of a Paul Tillich or John Caputo, God exists in the mysterious realm of the unknown, in a realm beyond human comprehension. It is a transcendental power, spirit, thought, phenomenon, a mystery, a secret. These existentialist or postmodern scholars are on the quest for a God beyond God, for a divinity beyond the comprehension of the human mind. Their radical doubt, breaking taboos and questioning the unknown, is not very far from the uncompromising investigation of the unknown by natural scientists, who, themselves also struggle with nagging doubts.

There are scholars who contend that in this sphere of doubt people from the human world of philosophy, theology and the humanities may meet with scientists from the quantum universe. Exchanging their experiences, visions, doubts, and plans might help the discovery and definition of the place of the human being in the universe and the meaning of life. It cannot be ruled out that joint efforts of looking for links between the mystery of the transcendental and the quantum universe, full of secrets, may generate important research projects.

Mythology. In contrast to the clear, transparent, “rational” world of classical physics and cosmology, the quantum universe – with its whirling particles, mysterious black holes, exploding stars, quantum fluctuations, “red giants”, “white dwarfs” – has the character, or semblance, of a mythic vision. This may relate it, in people’s minds, to the mythic visions of early civilizations in which human communities did find their place and significance. The conversations of Carl G. Jung and Wolfgang Pauli are certainly thought-provoking.⁵⁴

52 Genesis Book One, 10, 12, 18, 21, 25, 31. — 3 “And God said, Let there be light: and there was light. 4 And God saw the light, that it was good: and God divided the light from the darkness.” Etc.

53 See also Whitehead (1978), Hartshorne (1971, 1984).

54 Gieser (2005). See also Radin (1997, 2006), Lindorff and Fierz (2004).

Beyond the rational. In the same way, the fact that the behaviour of particles and waves in the sub-nuclear world (non-locality, action-at-a-distance, entanglement, etc.) seems to be beyond the comprehension of our traditional rationality, this may protect, to a certain extent, mythic and religious thinking against the traditional criticism of irrationality.⁵⁵

A probabilistic quantum universe. If probability and chance are crucial features of the quantum universe, one cannot exclude the possibility of the emergence of conditions favourable to the generation of meaningful human existence. The probability of such an emergence would certainly be much greater here than in a traditional universe of strict mechanical causality. The emergence of human life and consciousness may be a “lucky (or unlucky?) accident”.

Non-causality. The publication of Heisenberg’s uncertainty principle gave a slightly more scientific underpinning to this argument by stating that in the sub-nuclear realm causality may not work, or – interacting with the principle of probability – it does work in a different way than in the macro-world.⁵⁶

Further discussions of, and uncertainty about, the validity of the principle of causality in quantum physics has freed philosophers and theologians from the cage of the strict causal determinism of classical physics. A world of uncaused, random events may be full of hidden, yet unknown possibilities for the human being and even for the emergence of free will and a meaningful human life.⁵⁷

The Multiverse theory. Quantum cosmology may prove the existence of an undefined number of universes. This may be good, neutral or bad news for humankind.⁵⁸

Good news: Even if our own universe ultimately turns out to be void of meaning, there may, or must, be somewhere another universe, or several universes, in which life may have purpose and meaning.

Bad news: If there are several universes, we lose the illusion of our central place in the world, and of having a significant role in the universe.

Neutral news: The multiverse theory is a strictly scientific cosmological theory, which has nothing whatsoever to do with humankind, let alone with the meaning of human life.

Theory of everything. There are philosophers who argue that a possible Theory of Everything must reconcile, unify, comprise not only the laws of the theory of general relativity, the theory of gravity, and the laws of quantum mechanics but also those of the realm of human (or cosmic) consciousness, i.e., an ultimate equation which the human mind can understand and handle. This would make an extremely strong link between the quantum universe and the human mind, even if it did not mean that individual human lives have meaning.

55 See, for instance, Redhead (1987), Talbot (1988), Penrose (1994), Franks (2003), Radin (1997, 2006), Lindorff and Fierz (2004).

56 See, for instance, Lindorff and Fierz (2004).

57 Eddington (1928, 1929), Zohar and Marshall (1990), Maudlin (2011), Chiao et al. (2011), Rosenblum and Kuttner (2011), Stump and Padgett (2012).

58 Out of the rich literature see, for instance: Wolf (1988), Davies (1996), Lewis (1986), Deutsch (1997), Harrison (2003), Tegmark (2004), Kaku (2005), Stapp (2007), Carr (2007), Hawking and Mlodinow (2010), Rosenblum and Kuttner (2011).

Reductio ad infinitum. Physicists started in the macro world, bored down to the world of atoms, descended to the particles within the atom, electrons, protons, neutrons, quarks, gluons, leptons, the strings and superstrings, and recently they have arrived in the vicinity of the Higgs particle, called the “God particle”, or “Goddam particle” as León Lederman and Dick Teresi (2006 [1993]: 22) have called it. But, beyond the Higgs field, there still looms the (perhaps infinite) realm of the unknown. Would it be absurd to assume that in this realm of the faraway unknown, quantum physics and philosophy may meet as parallels meet in the infinite?

The ontological question. Quantum mechanics may have scope and limits. Even if an “ultimate theory” entirely explained the workings of the universe, everything that has ever happened and may happen in the future (if the concept of future is at all relevant in a quantum universe), would it also answer the question of why this universe “exists”? Would it explain what “Being” and “Non-Being” mean? Would it answer the question “why” the universe emerged from Nothing, or from an unknown Something? And would it answer the age-old question of “why is there something rather than nothing?”⁵⁹

These unanswered questions open a realm where quantum physics, philosophy and even theology might meet as equals.⁶⁰

The Program

It is not only sufficient food, safe shelter, and clean water with which the global system cannot supply several billions of people around the world. Significant roles, which would fill people’s lives with purpose and meaning are also in dramatic short supply.

What we know at present about the emerging quantum universe is not very promising. As a matter of fact, in this respect it makes it even more difficult for people to find their place, their role, their identity in a world that has become more and more incomprehensible. The loss of their traditional fixed points of orientation, the growing uncertainty of their lives in an infinite and incomprehensible universe, may drain their intellectual and emotional energies and brake the dynamism of human communities. People who feel that their lives are pointless and meaningless would, and will, be less able to respond to the challenges of the 21st century.

To explore the possibilities of how an emerging new civilization might generate significant roles and meaningful lives for people may become one of the primary tasks of the social, human and natural sciences in the coming decades, if they are able and willing to cooperate.

As we have seen in this paper, there have been important attempts in this field. Scientists like Whitehead, Jeans, Hoyle, Pauli, Penrose, Davies and others made serious efforts to establish (possible and impossible) links between the quantum universe and humankind, and, in some cases, even the meaning of human life. Their attempts have been the first important steps to decode the hidden message a quantum universe may have for humankind. But in spite of all

59 Krauss (2012).

60 See, for instance Whitehead (1920, 1933 a and b), Greene (1999), Heisenberg (1971, 2007), Dyson (1979), Hoyle (1984), Bohr (1987), Laurikainen (1988), Davies (1992), Bohm and Hiley (1993), Wheeler (1994), Dennett (1995), Bitbol (1996), Feynman (1998, 1999), Hawking and Penrose (1996), Hawking (1998, 2002), Barbour (2000), Barrow (2000); Gould (1999), Harrison (2003), Epperson (2004), Lindorff and Fierz (2004), Fischer (2004), Gieser (2005), Lederman and Teresi (2006), Barad (2007), Hawking and Mlodinow (2010), Maudlin (2011).

these efforts, the quantum universe is still far from becoming a protective framework within which human beings can feel at home in the world, enjoying relative safety and feeling their lives have significance and meaning.

This is a major social and human problem. Why? Because losing purpose and meaning, one loses also one of the main motivating forces in one's life. Adding up millions of meaningless lives, whole societies might lose their momentum and, as a consequence, seriously underperform, let alone the fact that the meaninglessness of one's life may, and already has become a major source of mental suffering.

There are many economic, social, and cultural causes behind the decreasing ability of traditional western civilization to create a cosmic home for its citizens. The advance of quantum mechanics is only one among them but, nevertheless, it would be a grave mistake not to pay increasing attention to its potential role in this field.

The problem is that scholars outside the natural sciences do not really understand what quantum mechanics tells them about the secrets of the universe. The only way to solve this dilemma would be a close and systematic cooperation between physicists, cosmologists, philosophers, theologians, cultural anthropologists, psychologists, historians of ideas, artists, and others. Closing a smouldering "science war", a genuine dialogue should be started in which participants try to understand one another's language and way of thinking.⁶¹

Only such common efforts have any chance of interpreting the quantum cosmos also as a symbolic framework within which human beings can find relative safety and feel that their lives have significance and meaning.

61 There are philosophers and scientists (Russell, Weinberg, Monod and many others) who do not believe in the relevance of such a dialogue. They do not believe that human life has a "meaning" in the traditional sense of the word. They are convinced that the universe "does not speak"! (Rorty), it has no message whatsoever for humankind; but, however, they admit that the existence of humankind may have a certain significance, because – as far we know – it is only the human mind that is able to discover and understand the laws governing the universe.

References

- Adler, A. (1929). *The Science of Living*. New York: Greenberg.
- Adler, A. (1937 [1931]). *What Life Should Mean to You*. New York: Blue Ribbon Books.
- Adler, A. (1972 [1916]). *The Neurotic Constitution: Outlines of a comparative individualistic psychology and psychotherapy*. New York: Books for Libraries Press.
- Adler, A. (1992 [1927]). *Understanding Human Nature*. London: Oneworld Publications.
- Anand S., Segal P., and Stiglitz J. E., eds. (2010). *Debates on the Measurement of Global Poverty*. Oxford and New York: Oxford University Press.
- Ames, R. T., Kasulis, T. P., Dissanayake, W., eds. (1998). *Self as Image: In Asian theory and practice*. Albany, NY: State University of New York Press.
- Avise, J. C. (2010). *Inside the Human Genome: A case for non-intelligent design*. Oxford, New York: Oxford University Press.
- Avise, J. C. (2010). Footprints of Nonsentient Design Inside the Human Genome. *Proceedings-National Academy of Sciences USA*, 107, SUPP/2, May 11.
- Ayer, A. J. (1990). *The Meaning of Life and Other Essays*. London: Weidenfeld and Nicolson.
- Barad, K. M. (2007). *Meeting the Universe Halfway: Quantum physics and the entanglement of matter and meaning*. Durham: Duke University Press.
- Barbour, I. G. (2000). *When Science Meets Religion*. London: Society for Promoting Christian Knowledge.
- Barrow, J. D., Tipler, F. J. (1986). *The Anthropic Cosmological Principle*. Oxford: Clarendon Press.
- Barrow, J. D. (2000). *The Book of Nothing: Vacuums, voids, and the latest ideas about the origins of the universe*. New York: Pantheon Books.
- Barrow, J. D., Davies, P. C. W., Harper, C. L., eds. (2004). *Science and Ultimate Reality: Quantum theory, cosmology, and complexity*. Cambridge, New York: Cambridge University Press.
- Baumeister, R. F. (1991). *Meanings of Life*. New York, N.Y.: The Guilford Press.
- Beck, U. (1999). *What is Globalization?* Cambridge: Polity Press.
- Becker, E. (1971). *The Birth and Death of Meaning: An interdisciplinary perspective on the problem of man*. New York: Free Press.
- Becker, E. (1973). *The Denial of Death*. New York: Free Press.
- Belshaw, C. (2005). *10 Good Questions About Life and Death*. Malden, Mass.: Blackwell.
- Berger, P. L. (1990 [1967]). *The Sacred Canopy: Elements of a sociological theory of religion*. New York: Anchor Books.
- Berger, P. L., Luckmann, T. (1995). *Modernity, Pluralism and the Crisis of Meaning: The orientation of modern man*. Gütersloh: Bertelsmann Foundation.

- Berger, P. L. and Huntington, S. P., eds. (2002). *Many Globalizations: Cultural diversity in the contemporary world*. Oxford, New York: Oxford University Press.
- Bitbol, M. (1996). *Schrödinger's Philosophy of Quantum Mechanics*. Dordrecht, Boston: Kluwer Academic Publishers.
- Bohm D. (n.d.). BrainyQuote.com. Retrieved April 7, 2017, from BrainyQuote.com website: <https://www.brainyquote.com/quotes/quotes/d/davidbohm392793.html>.
- Bohm, D., Hiley B. J. (1993). *The Undivided Universe: An ontological interpretation of quantum theory*. London: Routledge.
- Bohm, D. (2002). *Wholeness and the Implicate Order*. London, New York: Routledge.
- Bohr, N. (1987). *Essays 1958-1962 on Atomic Physics and Human Knowledge*. Woodbridge, Conn.: Ox Bow Press.
- Bowker, J., ed. (2009). *Knowing the Unknowable: Science and the religions on God and the Universe*. London: I.B. Tauris.
- Britton, K. (1969). *Philosophy and the Meaning of Life*. London: Cambridge University Press.
- Brockman, J. (1995). *Third Culture: Beyond the scientific revolution*. New York: Simon & Schuster.
- Brockman, J. (2002). *The Next Fifty Years: Science in the first half of the twenty-first century*. New York: Vintage Books.
- Brockman, J. (2006). *Intelligent Thought: Science versus the intelligent design movement*. New York: Vintage Books.
- Campbell, J. (2006). *Power of Myth*. New York: Highbridge Company.
- Camus, A. (1955). *The Myth of Sisyphus, and Other Essays*. New York: Knopf.
- Camus, A. (1971 [1951]). *The Rebel: An essay on man in revolt*. Harmondsworth: Penguin Books.
- Carr, B., ed. (2007). *Universe or Multiverse?* Cambridge: Cambridge University Press.
- Casey, M. A. (2002). *Meaninglessness: The solutions of Nietzsche, Freud, and Rorty*. Lanham, Md.: Lexington Books.
- Changeux, J., Connes, A. (1999). *Conversations on Mind, Matter, and Mathematics*. Princeton (NJ): Princeton University Press.
- Chiao, R. Y., et al., eds. (2011). *Visions of Discovery: New light on physics, cosmology, and consciousness*. Cambridge, New York: Cambridge University Press.
- Chopra, D., Mlodinow, L. (2012). *War of the Worldviews: Where science and spirituality meet – and do not*. New York: Three Rivers Press.
- Close, F. (2011). *The Infinity Puzzle: Quantum Field Theory and the Hunt for an Orderly Universe*. Oxford: Oxford University Press.
- Cottingham, J. (2003). *On the Meaning of Life*. New York: Routledge.

- Coyne, G. V., Heller, M. (2008). *A Comprehensible Universe: The interplay of science and theology*. Berlin, London: Springer.
- Dalai Lama. (2005). *The Universe in a Single Atom: The convergence of science and spirituality*. New York: Morgan Road Books.
- Davies, P. C. W. (1992). *The Mind of God: The scientific basis for a rational world*. New York: Simon & Schuster.
- Davies, P. C. W. (1996). *About Time: Einstein's unfinished revolution*. New York: Touchstone Book.
- Davies, P. C. W. (1999). *The Fifth Miracle: The search for the origin and meaning of life*. New York: Simon & Schuster.
- Davies, P. C. W. (2007). *The Goldilocks Enigma: Why is the universe just right for life?* London: Penguin.
- Dawkins, R. (1994). *Burying the Vehicle: Commentary*. *Behavioral and Brain Sciences*, 17 (4): 616-617.
- Dawkins, R. (2006). *The God Delusion*. London: Bantam Press.
- Dennett, D. C. (1995). *Darwin's Dangerous Idea: Evolution and the meanings of life*. New York: Simon & Schuster.
- Dennett, D. C., Plantinga, A. (2011). *Science and Religion: Are they compatible?*. New York: Oxford University Press.
- Deutsch, D. (1997). *The Fabric of Reality*. London: Allen Lane, The Penguin Press.
- Diener, E., Ng, W., Harter, J., & Arora, R. (2010). "Wealth and happiness across the world: Material prosperity predicts life evaluation, whereas psychosocial prosperity predicts positive feeling". *Journal of Personality and Social Psychology*, 99: 52-61.
- Dobzhansky, T. (1954). "An Ethical Problem for Scientists in a Divided World". *Science*, 119: 908-9.
- Dobzhansky, T. (1967). *The Biology of Ultimate Concern*. New York: The New American Library.
- Dowe, P. (2005). *Galileo, Darwin, and Hawking: The interplay of science, reason, and religion*. Grand Rapids, Mich.: W.B. Eerdmans Pub. Co.
- Dyson, F. J. (1979). *Disturbing the Universe*. New York: Basic Books.
- Dyson, F. J. (1985). *Origins of Life*. Cambridge: Cambridge University Press.
- Dyson, F. J. (2004). *Infinite in all Directions*. New York: Perennial.
- Eddington, A. S. (1928). *The Nature of the Physical World*. London: Dent.
- Eddington, A. S. (1929). *Science and the Unseen World: Swarthmore lecture, 1929*. New York: Macmillan.
- Egan, J. (2009). *The Godless Delusion: Dawkins and the limits of human sight*. Bern, Oxford, New York: Peter Lang AG.

- Einstein, A. (1955). *Essays in Science*. New York: Philosophical Library.
- Eliot, T. S. (1934). *After Strange Gods: A primer of modern heresy*. London: Faber and Faber Limited.
- Epperson, M. (2004). *Quantum Mechanics and the Philosophy of Alfred North Whitehead*. New York: Fordham University Press.
- Etzioni, A. (2004). "The Emerging Global Normative Synthesis". *The Journal of Political Philosophy*, Volume 12, Number 2: 214-244.
- Evans, J., Thorndike, A. S., eds. (2007). *Quantum Mechanics at the Crossroads: New perspectives from history, philosophy and physics*. New York, Berlin, Heidelberg: Springer.
- Featherstone, M., Lash, S., and Robertson, R., eds. (1995). *Global Modernities*. Los Angeles, London, New Delhi, Singapore, and Washington, D.C.: SAGE Publications Ltd.
- Ferry, L. (2002). *Man Made God: The meaning of life*. Chicago: University of Chicago Press.
- Feynman, R. P. (1998). *The Meaning of it All: Thoughts of a citizen scientist*. Reading (Mass.): Addison-Wesley.
- Feynman, R. P. (1999). *The Pleasure of Finding Things Out: The best short works of Richard P. Feynman*. Cambridge, MA: Perseus Books.
- Fischer, E. P. (2004). *Brücken zum Kosmos: Wolfgang Pauli – Denkstoffe und Nachtträume zwischen Kernphysik und Weltharmonie*. Lengwil: Libelle.
- Flanagan, O. (1996). *Self Expressions: Mind, morals, and the meaning of life*. New York and Oxford: Oxford University Press.
- Frankl, V. E. (1963). *Man's Search for Meaning*. Boston: Beacon Press.
- Franks, M. R. (2003). *The Universe and Multiple Reality: A physical explanation for manifesting, magick and miracles*. New York: iUniverse, Inc.
- Fuller, S. (2007). *Science vs Religion? Intelligent design and the problem of evolution*. Cambridge: Polity.
- Gaál, B. (2003). *The Faith of a Scientist: James Clerk Maxwell*. Debrecen: The István Hatvani Theological Research Centre, Debrecen University of Reformed Theology.
- Gieser, S. (2005). *The Innermost Kernel: Depth psychology and quantum physics; Wolfgang Pauli's dialogue with C.G. Jung*. Berlin, Heidelberg, New York: Springer.
- Goswami, A., Reed, R. E. and Goswami, M. (1993). *The Self-Aware Universe: How consciousness creates the material world*. New York: Penguin Putnam Inc.
- Goswami, A. (2004). *The Quantum Doctor: A physicist's guide to health and healing*. Charlottesville, VA: Hampton Roads.
- Goswami, A. (2008). *God is not Dead: What quantum physics tells us about our origins and how we should live*. Charlottesville, VA: Hampton Roads.
- Gould, S. J. (1999). *Rocks of Ages: Science and religion in the fullness of life*. New York: Ballantine Pub. Group.

- Greene, B. (1999). *The Elegant Universe: Superstrings, hidden dimensions, and the quest for the ultimate theory*. London: Jonathan Cape.
- Gregersen, N. H., Van Huyssteen, J. W. (Eds.). (1998). *Rethinking Theology and Science: Six models for the current dialogue*. Grand Rapids, Mich.: William B. Eerdmans Pub.
- Grenz, S. J., Olson, R. E. (1992). *20th-Century Theology: God and the world in a transitional age*. Carlisle: Paternoster Press.
- Griffin, D. R. (2000). *Religion and Scientific Naturalism: Overcoming the conflicts*. Albany: State University of New York Press.
- Hameroff, S. R., Kaszniak, A. W., Chalmers, D. J. (1999). *Toward a Science of Consciousness III: The third Tucson discussions and debates*. Cambridge (MA), London: MIT Press.
- Harrison, W. A. (2003). *Applied Quantum Mechanics*. Beijing: World Publishing Corporation.
- Hartshorne, C. (1967). *A Natural Theology for our Time*. La Salle, Ill.: Open Court.
- Hartshorne, C. (1971). *Reality as Social Process*. New York: Hafner.
- Hartshorne, C. (1984). *Omnipotence and other theological mistakes*. Albany: State University of New York Press.
- Hartshorne, C. (1984). *The Divine Relativity: A social conception of God*. New Haven: Yale University Press.
- Hawking, S. W., Penrose, R. (1996). *The Nature of Space and Time*. Princeton: Princeton University Press.
- Hawking, S. W. (1998). *A Brief History of Time*. New York: Bantam.
- Hawking, S. W. (2002). *The Theory of Everything: The origin and fate of the universe*. Beverly Hills: New Millennium.
- Hawking, S. W., Mlodinow, L. (2010). *The Grand Design*. London: Bantam Press.
- Heisenberg, W. (1971). *Physics and Beyond: Encounters and conversations*. New York: Harper & Row.
- Heisenberg, W. (2007). *Physics & Philosophy: The revolution in modern science*. New York: HarperPerennial.
- Heller, M. (2003). *Creative Tension: Essays on science and religion*. West Conshohocken, PA: Templeton Press.
- Henry, M. (2012). *Barbarism*. London, New York: Continuum.
- Henneaux, M., Zanelli, J., eds. (2009). *Quantum Mechanics of Fundamental Systems: The quest for beauty and simplicity*. New York: Springer.
- Hetherington, N. S., ed. (1993). *Cosmology: Historical, literary, philosophical, religious, and scientific perspectives*. New York: Garland Pub.
- Hobsbawm, E. (1994). *Age of Extremes: The short twentieth century 1914 – 1991*. London: Abacus.

- Hodgson, P. E. (2003). Relativity and Religion: The Abuse of Einstein's Theory. *Zygon*[®], 38: 393–409. doi:10.1111/1467-9744.00506.
- Hofstede, G. (2001). *Culture's Consequences: Comparing values, behaviors, institutions and organizations across nations*. Thousand Oaks, CA: Sage Publications.
- Hoyle, F. (1975). *Astronomy and Cosmology: A modern course*. San Francisco, Calif.: Freeman.
- Hoyle, F. (1984). *The Intelligent Universe*. New York: Holt, Rinehart and Winston.
- Inglehart, R. F. (1997). *Modernization and Postmodernization: Cultural, Economic, and Political Change in 43 Societies*. Princeton: Princeton University Press.
- Inglehart, R. F., and Welzel, C. (2010). Changing Mass Priorities: The Link between Modernization and Democracy. *Perspectives on Politics*, 8(2): 551-567.
- Ivancevic, V. G., Ivancevic, T. T. (2008). *Quantum Leap: From Dirac and Feynman, across the universe, to human body and mind*. Singapore: World Scientific Publishing Company.
- Jaspers, K. (1965 [1932]). *Die geistige Situation der Zeit*. Berlin: Walter de Gruyter.
- J Jeans, J. H. (1976 [1930]). *The Mysterious Universe*. New York: AMS Press.
- Kaku, M. (2005). *Parallel Worlds: A journey through creation, higher dimensions, and the future of the cosmos*. New York: Doubleday.
- Klemke, E. D., ed. (1981). *The Meaning of Life*. Oxford and New York: Oxford University Press.
- Klemke, E. D. & Cahn, S. M., eds. (2008). *The Meaning of Life: A Reader*. Oxford and New York: Oxford University Press.
- Kragh, H. (1996). *Cosmology and Controversy: The historical development of two theories of the universe*. Princeton: Princeton University Press.
- Krauss, L. M. (2012). *A Universe From Nothing: Why there is something rather than nothing*. New York: Free Press.
- Küng, H. (2005). *Der Anfang aller Dinge: Naturwissenschaft und Religion*. München, Zürich: Piper.
- Kurtz, P. (2003). *Science and Religion: Are they compatible?*. New York: Prometheus Books.
- Laurikainen, K. V. (1988). *Beyond the Atom: The philosophical thought of Wolfgang Pauli*. Berlin, New York: Springer-Verlag.
- Lautréamont, comte de. (1869). *Les chants de Maldoror*. Paris: En vente chez tous les libraires.
- Lee, C., Hahn, B., eds. (1999). *Patterns of Inter-Korean Relations*. Seoul: Sejong Institute.
- Lederman, L. M., Teresi, D. (2006 [1993]). *The God Particle: If the universe is the answer, what is the question?* Boston: Houghton Mifflin Company.
- Lehmkuhl, U., Sasse H., Wahl, P., eds. (2007). *Wozu leben wir? Sinnfragen und Werte heute. Beiträge zur Individualpsychologie*. Gottingen: Vandenhoeck & Ruprecht.
- Lennox, J. C. (2011). *Gunning for God: Why the new atheists are missing the target*. Oxford: Lion.

- Lewis, D. K. (1986). *On the Plurality of Worlds*. Oxford: Blackwell.
- Lindorff, D., Fierz, M. (2004). *Pauli and Jung: A meeting of great minds on the unity of matter and spirit*. Wheaton, Ill.: Quest.
- Loewenstein, W. R. (2013). *Physics in Mind: A quantum view of the brain*. New York: Basic Books.
- Mack, B. (2000). "Social Formation". In W. Braun and R. T. McCutcheon (Eds.), *Guide to the Study of Religion*. London, New York: Cassell: 283-296.
- Manson, N. A. (2003). *God and Design: The teleological argument and modern science*. London, New York: Routledge.
- Maudlin, T. (2011). *Causation, in Quantum Non-Locality and Relativity: Metaphysical intimations of modern physics*. Oxford: Wiley-Blackwell.
- McGrath, A. (2005). *Dawkins' GOD: Genes, memes, and the meaning of life*. Malden MA, Oxford: Blackwell Publishing Ltd.
- Mensky, M. B. (2011). "Logic of Quantum Mechanics and Phenomenon of Consciousness". *Journal of Cosmology*, Vol. 14.
- Miller, K. R. (1999). *Finding Darwin's God: A scientist's search for common ground between God and evolution*. New York: Cliff Street Books/HarperCollins.
- Mindell, A. (2000). *Quantum Mind: The edge between physics and psychology*. Portland, OR: Lao Tse Press.
- Miyanaga, K. (1991). *The Creative Edge: Emerging individualism in Japan*. New Brunswick: Transaction Publishers.
- Mlodinow, L. (2011). *Feynman's Rainbow: A search for beauty in physics and in life*. New York (NY): Vintage.
- Monod, J. (1971). *Chance and Necessity: Essay on the Natural Philosophy of modern Biology*. Glasgow: Collius – Fontana.
- Moorhead, H. S., ed. (1988). *The Meaning of Life*. Chicago: The Chicago Review Press.
- Moreland, J. P., ed. (1994). *The Creation Hypothesis: Scientific evidence for an intelligent designer*. Downers Grove: InterVarsity Press.
- Nelson, A. (2005). *A Companion to Rationalism*. Oxford: Blackwell.
- New American Bible Revised Edition (2011). *Confraternity of Christian Doctrine*.
- O'Murchu, D. (1997). *Quantum Theology*. New York: The Crossroad Publishing Company.
- Penrose, R. (1989). *The Emperor's New Mind: Concerning computers, minds, and the laws of physics*. Oxford, New York: Oxford University Press.
- Penrose, R. (1994). *Shadows of the Mind: A search for the missing science of consciousness*. Oxford, New York: Oxford University Press.
- Penrose, R., Hameroff, S. R., Kak, S., Tao, L. (2011). *Consciousness and the Universe: Quantum physics, evolution, brain & mind*. Cambridge, MA: Cosmology Science Publishers.

- Polkinghorne, J. C. (2005). *Quarks, Chaos & Christianity: Questions to science and religion*. New York: Crossroad Pub. Co.
- Polkinghorne, J. C., ed. (2010). *The Trinity and an Entangled World: Relationality in physical science and theology*. Grand Rapids, Mich.: Wm. B. Eerdmans Pub.
- Putnam, H. (1965). *Probability and Confirmation*. Washington D. C.: Voice of America.
- Putnam, H. (2005). *Ethics Without Ontology*. Cambridge, London: Harvard University Press.
- Putnam, H. (2008). *Jewish Philosophy as a Guide to Life: Rosenzweig, Buber, Lévinas, Wittgenstein*. Bloomington: Indiana University Press.
- Radin, D. (1997). *The Conscious Universe: The scientific truth of psychic phenomena*. San Francisco, Calif.: HarperEdge.
- Radin, D. (2006). *Entangled Minds: Extrasensory experiences in a quantum reality*. New York, Londres, Toronto, Sydney: Paraview.
- Redhead, M. (1987). *Incompleteness, Nonlocality and Realism: A prolegomenon to the philosophy of quantum mechanics*. Oxford: Clarendon Pr.
- Reker, G. T., Chamberlain, K., eds. (2000). *Exploring Existential Meaning: Optimizing human development across the life span*. Thousand Oaks, London, New Delhi: SAGE Publications.
- Ricard, M., Thuan Trinh, X. (2001). *The Quantum and the Lotus: A journey to the frontiers where science and Buddhism meet*. New York: Crown Publishers.
- Rosenblum, B., Kuttner, F. (2011). *Quantum Enigma: Physics encounters consciousness*. New York: Oxford University Press.
- Ross, F. H. (1952). *The Meaning of Life in Hinduism and Buddhism*. London: Routledge & Kegan Paul Ltd.
- Ross, H. (2000). *The Fingerprint of God*. New Kensington, PA: Whitaker House.
- Ross, H. (2010). *Beyond the Cosmos: What recent discoveries in astrophysics reveal about the glory and love of God*. Orlando, Fla.: Signalman Publishing.
- Roth, R. F. (1992). *Die Gottsucher Eine Vereinigung der christlichen Mystik und der Quantenphysik in der Synchronizität C.G. Jungs*. Frankfurt: Verlag Haag & Herchen.
- Runzo, J., Martin, N. M. (Eds.). (2000). *The Meaning of Life in the World Religions*. Oxford: Oneworld Publications.
- Ruse, M. (2001). *The Evolution Wars: A guide to the debates*. New Brunswick, New Jersey: Rutgers University.
- Russel, B. (1929). *Mysticism and Logic*. New York: W. W. Norton & Company.
- Russel, B. (1948). *Human Knowledge: Its scope and limits*. London: George Allen & Unwin Ltd.
- Sanders, S., Cheney, D. R. (1980). *The Meaning of Life: Questions, answers and analysis*. Upper Saddle River, N.J.: Prentice-Hall.
- Sartre, J. P. (1948). *Existentialism and Humanism*. London: Methuen.

- Sassen, S. (2007). *A Sociology of Globalization*. New York: W. W. Norton & Company.
- Satinover, J. (2001). *The Quantum Brain: The search for freedom and the next generation of man*. New York: J. Wiley.
- Schindler, D. L. (Ed.). (1986). *Beyond Mechanism: The universe of recent physics and Catholic thought*. Lanham: University Press of America.
- Schlagel, R. H. (1985). *From Myth to Modern Mind: A study of the origins and growth of scientific thought*. Bern: Peter Lang Publishing.
- Scott, J. W. (2009). *Secularism*. Florence: European University Institute.
- Shults, F. L., Murphy, N. C., Russell, R. J. (Eds.). (2009). *Philosophy, Science, and Divine Action*. Leiden: Brill.
- Singer, I. (1992). *Meaning in Life: The creation of value*. New York: Free Press.
- Sloterdijk, P. (2009). *God's Zeal: the battle of the three monotheisms*. Cambridge, Malden: Polity Press.
- Snow, C. P. (1969). *The Two Cultures: An expanded version of the Two Cultures and the Scientific Revolution*. Cambridge: Cambridge University Press.
- Stapp, H. P. (2007). *Mindful Universe: Quantum mechanics and the participating observer*. Berlin, New York: Springer.
- Stenger, V. J. (2007). *God The Failed Hypothesis: How science shows that God does not exist*. Amherst, N.Y.: Prometheus Books.
- Stenger, V. J. (2009). *The New Atheism: Taking a stand for science and reason*. Amherst, N.Y.: Prometheus Books.
- Stenger, V. J. (2011). *The Fallacy of Fine-Tuning: Why the universe is not designed for us*. Amherst (NY): Prometheus Books.
- Stump, J. B., Padgett, A. G., eds. (2012). *The Blackwell Companion to Science and Christianity*. Malden, MA: Wiley-Blackwell.
- Talbot, M. (1988). *Beyond the Quantum*. Toronto: Bantam books.
- Tegmark, M. (2004). "Parallel Universes". In J. Barrow, P. C. W. Davies, C. L. Harper, Jr, eds. *Science and Ultimate Reality*. Cambridge: Cambridge University Press: 459-491.
- Teilhard de Chardin, P. (1959). *The Phenomenon of Man*. New York: Harper.
- Tipler, F. J. (1994). *The Physics of Immortality: Modern cosmology, God, and the resurrection of the dead*. New York: Doubleday.
- Turok, N. (2012). *The Universe Within: From quantum to cosmos*. Toronto, Ont: Anansi.
- Walker, E. H. (2000). *The Physics of Consciousness: The quantum mind and the meaning of life*. Cambridge, Mass.: Perseus Books.
- Wheeler, J. A. (1994). *At Home in the Universe*. New York: American Institute of Physics.
- Wheeler, J. A., Ford, K. (1998). *Geons, Black Holes, and Quantum Foam*. New York: W.W.Norton & Company.

- Whitehead, A. N. (1920). *The Concept of Nature*. Cambridge: Cambridge University press.
- Whitehead, A. N. (1933). *Adventures of Ideas*. New York: The Macmillan Company.
- Whitehead, A. N. (1933). *Science and the Modern World*. Cambridge: Cambridge University Press.
- Whitehead, A. N. (1978 [1929]). *Process and Reality: An essay in cosmology*. New York: Free Press.
- Wilson, R. A. (1990). *Quantum Psychology: How brain software programs you and your world*. Tempe: New Falcon publications.
- Wolf, F. A. (1981). *Taking the Quantum Leap: The new physics for non-scientists*. Cambridge: Harper & Row.
- Wolf, F. A. (1988). *Parallel Universes: The search for other worlds*. New York: Touchstone Books.
- Wolf, F. A. (1996). *The Spiritual Universe: How quantum physics proves the existence of the soul*. New York: Simon and Schuster.
- Wong, P. T. P., Fry, P. S., eds. (1998). *The Human Quest for Meaning: a handbook of psychological research and clinical applications*. Mahwah, N.J.: Lawrence Erlbaum Associates.
- Young, J. (2003). *The Death of God and the Meaning of Life*. London: Routledge.
- Zohar, D., Marshall, I. H. (1990). *The Quantum Self: Human nature and consciousness defined by the new physics*. New York: Morrow.