

Theology and the Big Bang

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Historians of science are generally agreed that Albert Einstein was the greatest theoretical physicist of the twentieth century, but what was arguably the most momentous scientific discovery of the century was one that Einstein himself initially would not accept—the expansion of the universe. Contrary to the almost universal opinion of scientists at the time, in the 1920s the Russian astronomer Aleksandr Friedmann and the Belgian mathematician Georges Lemaître, working independently of each other, had reasoned on theoretical grounds that the universe was not static but expanding. Carefully documented experimental evidence for this surmise came toward the end of that decade with the findings of the American astronomers Edwin Hubble and Milton Humason at the Mount Wilson Observatory in California. Already in the mid-1920s and on the basis of meticulous examination of photographic studies of the night sky, Hubble had determined that many of the nebulae (“clouds”) detectable in the night sky were not within the Milky Way (which was at that time believed to be the whole of the universe) but were galaxies in their own right. Hubble and Humason subsequently detected that the light emitted from these galaxies was shifted toward the red end of the spectrum. The most widely accepted interpretation of this red shift ascribes it to the Doppler Effect, meaning that the longer wave lengths associated with that end of the color spectrum are due to the receding of the galaxies from one another as well as from observers on earth. In this regard, it is worth noting that the 2011 Nobel Prize in physics was awarded to two teams of researchers who discovered that the expansion of the universe is actually accelerating; in other words, the galaxies are not only pulling apart from one another but are doing so with ever-quickenning speed.

As a result of these findings, a large majority of contemporary astronomers have concluded that at some point in the very distant past (about fourteen billion years ago) the present universe took its origin from what is known as a singularity, a point sometimes described as being of “infinite density and zero volume.” Some theologians and religious thinkers have taken this event (commonly called “the big bang”) to be the moment of creation referred to at the beginning of the Book of Genesis and elsewhere in the Bible. One of the best-known assertions of this kind of connection between modern scientific findings and religious doctrine was made by Pope Pius XII in an address to the Pontifical Academy of Sciences on November 22, 1951. After stating his wish to give his hearers a summary of “the priceless services rendered by modern science to the demonstration of the existence of God,”¹ the pope went on to give brief descriptions of various scientific discoveries, including those of Hubble. While admitting that such discoveries did not provide absolute proof of creation in time, he came very close to such a conclusion by claiming that

with that concreteness which is characteristic of physical proofs, it [modern science] has confirmed the contingency of the universe and also the well-founded deduction as to the epoch when the cosmos came forth from the hands of the Creator.

Hence, creation took place in time. Therefore, there is a Creator. Therefore, God exists! Although it is neither explicit nor complete, this is the reply we were awaiting from science, and which the present human generation is awaiting from it.²

Even at that time, some (including Lemaître, himself a Catholic priest) felt that the pope's conclusion was unwarranted, and it is noteworthy that Pope John Paul II, some thirty years later, was much more cautious in referring to the same scientific findings. In an address to the Pontifical Academy of Sciences on October 3, 1981, he said:

Any scientific hypothesis on the origin of the world, such as the hypothesis of a primitive atom from which derived the whole of the physical universe, leaves open the problem concerning the universe's beginning. Science cannot of itself solve this question. There is needed that human knowledge that rises above physics and astrophysics and which is called metaphysics; there is needed above all the knowledge that comes from God's revelation.³

Even though nowadays we normally speak of the notion of the big bang as a "theory" instead of using the pope's weaker term "hypothesis," we should nevertheless recognize that the theory that there is but one universe and that it had a temporal beginning some fourteen billion years ago is not unanimously accepted. Some cosmologists have suggested that the big bang at the origin of our present universe is only one of many expansions that have been going on in an oscillating universe that keeps expanding and contracting, while still others surmise that there may be numerous universes existing simultaneously, with ours just happening to be one in which conditions allowed for the development of life and consciousness.⁴ For this reason, it would surely be unwise for theologians and other religious thinkers to bind themselves too closely to the big bang theory, since no one has any way of knowing how this theory might evolve or be replaced in decades or centuries to come. As Fr. George Coyne of the Vatican Observatory has said, "The theology that weds the science of today is the widow of tomorrow." Nevertheless, the

theory of the big bang is certainly the position that has gained broadest acceptance among cosmologists today. If theology is to be true to the interdisciplinary character that has always marked it at its best, then it is incumbent on at least some theologians to reflect seriously on what this particular cosmological theory holds. In the words of the Jesuit scientist William Stoeger, “it is important for the theologian to take into consideration what cosmology, and science in general, reveals to us of the universe and our place in it.... Certainly, at least in some way, such a perspective and such understanding enriches theological reflection and provides *some* of the detailed experiential points of reference from which we consider who God is, and who He is not, and who we are in relation to Him, to one another, and to our world.”⁵ It is in the spirit of Fr. Stoeger’s words that I offer the following theological reflections on the Christian doctrine of creation.

The Doctrine of Creation in Scripture and in

The Patristic and Medieval Eras

The roots of the Christian doctrine of creation lie in many parts of the Hebrew Bible, including hymnic passages like Psalm 104 with its praise of God who “spread out the heavens like a tent-cloth” and “fixed the earth upon its foundation, not to be moved forever” (Ps. 104:2,5) and God’s powerful and lengthy questioning Job out of the storm: “Where were you when I founded the earth?... Have you fitted a curb to the Pleiades or loosened the bonds of Orion?... Do you give the horse his strength and endow his neck with splendor? Do you make the steed to quiver, while his thunderous snorting spreads terror?” (Job 38:4,31; 39:19-20). These, and similar passages in some of the prophetic books, provide rich imagery for the doctrine of

creation, including that ongoing divine preservation of the world known technically as *creatio continua* (“continuous or ongoing creation”).

There is, however, no doubt but that the most widely discussed biblical text about creation is the opening of the Book of Genesis. Its first verse has frequently been translated into English as “In the beginning God created heaven and earth” (or some slight variation of these words). This translation is faithful to ancient versions of the Old Testament in Greek and Latin. Recent scriptural scholarship, however, has argued that the opening words in the Hebrew text should not be translated in exactly this way. The Old Testament scholars Richard Clifford and Roland Murphy, noting parallels with other biblical and Near Eastern cosmogonies, translate instead: “When God began to create heaven and earth—the earth being formless and void, with darkness over the surface of the deep, and a wind of God sweeping over the waters—then God said, ‘Let there be light,’ and there was light.”⁶ Another scriptural commentator, E.A. Speiser, renders the passage as follows: “When God set about to create heaven and earth—the world being then a formless waste, with darkness over the seas and only an awesome wind sweeping over the water—God said, ‘Let there be light.’ And there was light.”⁷ The difference between these and the more traditional rendering may appear to be slight, but the newer translations do render less certain the longstanding conviction that the opening verses of the Bible clearly taught a temporal beginning of the universe. One could possibly interpret these verses as implying an already existing earth—formless, void, and dark—with the creative action being that of introducing light, order, and eventually living beings into a scene of primal chaos. In the words of the British scholar Wilfred Lambert, a specialist in Near Eastern archeology, the opening verses of the Book of Genesis are “about the processes by which the universe we know reached its present form, with no attempt to delve into the question of ultimate origin.”⁸

A further point regularly noted by modern commentators is that the Hebrew verb here translated as “create” (*bara*) is regularly used in the Bible only when God is the subject, whereas another Hebrew verb (*asah*), usually translated as “make,” is used with either God or human beings as subject. “Making” is thus analogous to human “manufacture,” by which an object is fashioned so as to receive its particular character, whereas “creating” is not comparable to what humans can do.⁹ God alone could “create” heaven and earth, whatever this activity might mean more exactly.

In fact, it did not take long within the Christian era for speculation to begin about the precise meaning of “create,” for early Christians had to combat two heresies—Gnostic dualism and pantheism—that had at least one point in common: the claim that matter was in some sense eternal. Almost from the beginning, Christian thinkers opposed an understanding of reality in which matter, as over against a form-giving God, was equally fundamental and primary, for this was judged to derogate from the divine sovereignty. Thus Tatian, a second-century apologist of Syrian origin, taught that matter was generated directly by God, for if ungenerated it would be a second principle, in some respects equal to God.¹⁰ In the same century, Bishop Theophilus of Antioch argued explicitly against the eternity of the world. After commending Plato and his followers for acknowledging that God is unbegotten, he went on to criticize them for holding that matter is also uncreated and therefore coeval with God: “If God is uncreated and matter is uncreated, then, according to the Platonists, God is no longer the Creator of all things.” Moreover, “what great thing would it be if God made the world out of existing matter? Even a human artist, when he obtains material from someone, makes of it whatever he pleases. But the power of God is made evident in this, that He makes out of what does not exist whatever He pleases, and the giving of life and movement belongs to none other, but to God alone.”¹¹ St.

Irenaeus of Lyons, the most important Christian theologian of the second century, made the same point when he wrote: “Humans, indeed, are not able to make something from nothing, but only from existing material. God, however, is greater than humans first of all in this: that when nothing existed beforehand, He called into existence the very material for His creation.”¹² Such texts contributed significantly to the Christian doctrine of creation out of nothing, *creatio ex nihilo*. St. Augustine of Hippo, the greatest theologian in the Western church during the patristic era, pondered the question of creation at still greater length than any of the theologians just mentioned. His reflections on creation and time in book eleven of his *Confessions* are still regularly cited by philosophers, above all his insight that it is pointless to ask what God was doing before he made heaven and earth, since time itself was created at that point. In Augustine’s words, “It is therefore true to say that when you had not made anything, there was no time, because time itself was of your making. And no time is co-eternal with you, because you never change; whereas, if time never changed, it would not be time.”¹³

In those early Christian centuries, then, any teaching about the eternity of matter was roundly condemned. In the Middle Ages, it was even thought by some theologians, such as St. Bonaventure, that one could prove philosophically that the world had a beginning in time. However, his still more influential contemporary, Thomas Aquinas, disagreed, and St. Thomas’s position is now widely accepted. His basic argument is that the articles of faith cannot be proved demonstratively and that God’s creation of the world is clearly such an article—is, in fact, the very first article of the creed: “I believe in one God, the Father almighty, creator of heaven and earth.” Therefore the temporal beginning of the world (*novitas mundi*) can be known only by revelation, and for Thomas such revelation is manifest in the very first words of the Bible, which he quotes from the Vulgate: *In principio creavit Deus caelum et terram* (“In the beginning God

created heaven and earth”). His answer is accordingly clear and concise: “By faith alone do we hold, and by no demonstration can it be proved, that the world did not always exist.”¹⁴

Some Contemporary Thinkers on the Doctrine of Creation

In his reply to one of the objections to this position, Thomas notes that even some who (like the Islamic philosopher Avicenna) claim that the world is eternal nevertheless do not reject the word creation, understanding the term to mean that the world “was not made from something else.”¹⁵ This comment points to a distinction that is regularly found among theologians and philosophers who write about creation in our own day. Although most people probably understand God’s creation of the world to imply that the latter had an absolute temporal beginning (sometimes called “historical origination”), in the most fundamental sense creation means only the dependence of the world upon God (“ontological origination”).¹⁶ Emphasizing the latter meaning, the scientist-theologian Arthur Peacocke wrote: “The principal stress in the Judeo-Christian doctrine of creation ... is on the dependence and contingency of all entities, and events, other than God himself: it is about a personal relationship between God and the world and not about the beginning of the Earth, or the whole universe, at a point in time.”¹⁷ Keith Ward, Regius Professor of Theology at the University of Oxford, states similarly that “it is irrelevant to a doctrine of creation *ex nihilo* whether the universe began or not; that the universe began was usually accepted because of a particular reading of Genesis 1. The doctrine of creation *ex nihilo* simply maintains that there is nothing other than God from which the universe is made, and that the universe is other than God and wholly dependent upon God for its existence.”¹⁸ The distinction drawn by Peacocke and Ward is important for our science-and-religion dialogue, for it indicates that a theology of creation need not be wedded to a

cosmological theory that has the universe beginning in (or with) time. Although it is difficult to see how the existence of an eternal, oscillating universe could ever be scientifically confirmed, even the possibility of its existence would not pose problems for theologians like the two just mentioned.

For other theologians, however, the note of temporal or “historical” origination is far more important. The prominent German theologian Jürgen Moltmann, for example, fears that if the notion of *creatio ex nihilo* were simply reduced to the giving of form to a not-yet-actualized primordial matter, then we would have to consider the world process to be just as eternal and without any beginning as God himself, and this, he alleges, would lead to pantheism, for the world process would then “be one of God’s natures. And in this case we [would] have to talk about ‘the divinization of the world’. God and nature are fused into a unified world process.”¹⁹ An American theologian, Ted Peters, is likewise wary of attempts to emphasize creation as ontological dependence at the expense of creation as implying a temporal beginning. He asks: “Why are we so quick to give up the idea of an initial origin? ... To reduce *creatio ex nihilo* to a vague commitment about the dependence of the world upon God—though accurate—does not help much. It simply moves the matter to a higher level of abstraction. We still need to ask: just what does it mean for the world to owe its existence to God? One sensible answer is this: had God not acted to bring the spacetime world into existence, there would be only nothing.”²⁰ Retaining the emphasis on “an initial origin,” he feels, is altogether in accord with discussions already taking place within scientific cosmology and therefore offers theology an opportunity for fruitful dialogue with science.

I should add that at least one very prominent scientist would join the theologians Moltmann and Peters in so arguing. Francis Collins, the longtime head of the Human Genome

Project and the current director of the National Institutes of Health, writes the following in his book *The Language of God*: “The Big Bang cries out for a divine explanation. It forces the conclusion that nature had a defined beginning. I cannot see how nature could have created itself. Only a supernatural force that is outside of space and time could have done that.”²¹

Concluding Reflections on These Issues

As I come to the final section of my presentation, I therefore ask: What relevance does the theory of the big bang, widely held by contemporary scientists, have for our understanding of the doctrine of creation? How should we even go about trying to answer this question?

To begin, it is important to note that the very methodology of science that has allowed it to make such progress since the seventeenth century has inherent limitations. Science as such deals with empirically verifiable data. The Polish bishop Joseph M. Zycinski, who is also a trained philosopher of science, has pointed out that “the methodological principles of modern physics imply that any physical state ... should be explained by reference to an earlier state For methodological reasons, the scientific series of explanations in the past of the universe should be continued ad infinitum unless one proves that [a particular] moment ... must be introduced into cosmic history as an ‘absolute zero,’ much as the absolute zero of temperature must be accepted in Kelvin’s scale.”²² But we have already seen that there can apparently be no absolute proof that a singularity at the beginning of our universe corresponds to an absolute beginning of time, since the theory of an oscillating universe, even if itself undemonstrable, remains tenable. For this reason, Professor Wentzel van Huyssteen at Princeton Theological Seminary has written that “the why of it all, the ultimate explanation of existence, turns out to be unanswerable in terms of scientific methodology.”²³ Similarly, Ted Peters observes: “The

scientific method cannot deny the relevance of the Beyond; but it cannot affirm it either.... The Beyond lies outside the perimeter of scientific knowing, and always will.”²⁴

Peters’ comment in particular, with its reference to “the Beyond,” correctly implies that the notion of creation is a properly religious one. It is understandable that persons who are already imbued with a religious perspective on the world, such as Pope Pius XII, whom I quoted earlier, would readily interpret big bang cosmology in theistic terms, but the way in which he did so will almost inevitably not be convincing to those who do not share that basic perspective. Even in the extremely unlikely case that it could somehow be shown conclusively that our universe originated in “a singular event” that was not preceded by the contraction of an earlier universe (a so-called “big crunch”) and that ours is the only universe that is or ever was, this would still not allow cosmology *as such* to demonstrate the existence of a Creator. A non-theistic scientist or philosopher could still say, in the words of the atheist Quentin Smith, that this world “exists ... improbably, and causelessly. It exists *for absolutely no reason at all*. It is *inexplicably* and *stunningly actual*.... The impact of this captivated realization upon me is overwhelming. I am completely stunned.”²⁵

For this reason, one would surely have to agree with Pope John Paul II when he stipulated that science itself cannot solve the question of the universe’s beginning. As he said, “There is needed that human knowledge that rises above physics and astrophysics and which is called metaphysics.” Among other things, this should caution a theistic philosopher or theologian from relying too closely on a particular cosmological theory when pondering the question of creation. The best starting point will not be the big bang theory but rather the very fact that the universe exists. The bishop-scientist Joseph Zycinski recalls that in a 1992 interview the well-known British physicist Stephen Hawking pointed out that even his physical

description of a “no-boundary universe” does not explain why the universe exists at any particular moment of cosmic time. Zyncinski commented: “In this profound remark we can find an echo of [the philosopher] Leibniz’s question, Why is there anything rather than nothing?”²⁶

To be sure, one could still say in reply to the Leibnizian question that the existence of the universe is simply a matter of random chance, something inexplicable, causeless, and ultimately pointless. We have just heard Quentin Smith holding this position. In another of his works, and in a similar vein, Smith writes: “I find it quite easy to conceive of the universe beginning to exist without a cause.... I find this uncaused beginning astonishing, amazing, ‘mind-boggling’, and utterly awesome, but that is different from saying I cannot conceive it to be the case.”²⁷ For many, however, including myself, it is philosophically far more adequate to argue that the universe is not causeless. William Lane Craig’s critique of Smith’s claim is trenchant:

On the theistic view, the potentiality of the universe’s existence lay in the power of God to create it. On the atheistic interpretation, on the other hand, there did not even exist any potentiality for the existence of the universe. But then it seems inconceivable that the universe should come to be actual if there did not exist any potentiality for its existence. It seems to me therefore that a little reflection discloses that our mental picture of the universe arising uncaused out of absolutely nothing is just that: pure imagination. Philosophical reflection reveals it to be inconceivable.²⁸

To say that the universe is not causeless but that it finds its ultimate source in God is to make a claim for which ineluctable proof cannot be given (otherwise there would be no counter-

positions such as that held by Quentin Smith), but it is nevertheless a claim that is reasonable, coherent, and able to be understood as what Keith Ward has called “the completion of that search for intelligibility which characterizes the scientific enterprise.”²⁹ It must be emphasized, however, that a genuinely theological doctrine of creation says something different from and much more comprehensive than what could be deduced from any cosmological theory. The Polish philosopher Michael Heller rightly notes that an historical analysis of the development of this doctrine “shows persuasively that the theological idea of creation is immensely richer than anything physics or cosmology is able to say.”³⁰ It holds not only that every moment of time (and not just some first moment) comes from God’s creative power, but also that everything that exists is properly to be viewed within the context of a divine love that brought it into being and maintains it so. This means, as the South African cosmologist George Ellis points out, that the proper context for reflecting on the “Why?” of creation is not simply that of physics and chemistry but that of “the full nature of our existence, with our fears and hopes, love and caring, value judgments, ethical choices and moral responsibility, whose reality I take to be at least as indubitable as any other area of experience.”³¹ It is not merely pious sentimentality but respect for the full expanse of human experience to consider creation from this broader perspective, which means taking into account what poets, mystics, and religiously sensitive persons have had to say. Among these would surely be numbered the late Jesuit priest-scientist Pierre Teilhard de Chardin, who in the very midst of his paleontological explorations would regularly reflect on the earth and the surrounding universe as God’s creation, as when he wrote:

In the beginning was *Power*, intelligent, loving, energizing. In the
beginning was the *Word*, supremely capable of mastering and moulding whatever

might come into being in the world of matter. In the beginning there were not coldness and darkness: there was the *Fire*. This is the truth.

So, far from light emerging gradually out of the womb of our darkness, it is the Light existing before all else was made which, patiently, surely, eliminates our darkness.... You, my God, are the inmost depths, the stability of that eternal *milieu*, without duration or space, in which our cosmos emerges gradually into being and grows gradually to its final completeness, as it loses those boundaries which to our eyes seem so immense.³²

The sacramental view of the world evident in those lines from Teilhard are reflected as well in the poetry of someone like Gerard Manley Hopkins, one of whose best-known poems, “God’s Grandeur,” ends with the lines:

nature is never spent;
There lives the dearest freshness deep down things;
And though the last lights off the black West went
Oh, morning, at the brown brink eastward, springs—
Because the Holy Ghost over the bent
World broods with warm breast and with ah! bright wings.

It is not at all fanciful to suggest that we, living well more than a century after Hopkins’s death and far more conversant than he could have been about the immensity of the universe and

the complexities of its structure, are in a much more privileged position to sense something of that “grandeur of God” of which he wrote. William Stoeger notes that “material reality is on every level more vast, more intricate in its structure and development, more amazing in its evolution, in its variety flowing from fundamental levels of unity, and in its balance of functions, than we could have imagined without the contributions of the sciences.”³³ To have learned this from contemporary scientific cosmology is more conducive to a full appreciation of the doctrine of creation than any particular cosmological theory could be.

Notes

¹ Pope Pius XII, “Modern Science and the Existence of God,” *The Catholic Mind* 50 (March 1952):184. The original Italian version of the address is to be found in *Acta Apostolicae Sedis* 44 (1952):31-43.

²Ibid., 191.

³Pope John Paul II, “The Path of Scientific Discovery,” *Origins* 11.18 (October 15, 1981):279.

⁴For a brief overview of these theories, see Lawrence Osborn, “Theology and the New Physics,” chapter 3 of *God, Humanity, and the Cosmos*, ed. Christopher Southgate et al. (Harrisburg, Pa.: Trinity Press International, 1999), 126-27.

⁵Stoeger, “Contemporary Cosmology,” 240.

⁶Richard J. Clifford, S.J., and Roland E. Murphy, O.Carm., “Genesis,” in *The New Jerome Biblical Commentary*, ed. Raymond E. Brown et al. (Englewood Cliffs, N.J.: Prentice Hall, 1990), 10.

⁷*Genesis*, Introduction, translation, and notes by E.A. Speiser, The Anchor Bible (Garden City, N.Y.: Doubleday, 1964), 3.

⁸Wilfred G. Lambert, “Mesopotamian Creation Stories,” in *Imagining Creation*, ed. Markham J. Geller and Mineke Schipper (Leiden: Brill, 2007), 15-16.

⁹Further details about this distinction may be found in Jürgen Moltmann, *God in Creation: A New Theology of Creation and the Spirit of God*, trans. Margaret Kohl (San Francisco: Harper and Row, 1985), 73.

¹⁰Tatian, *Oratio ad graecos* 5.

¹¹Theophilus of Antioch, *Ad Autolyicum* 2,4 (trans. W.A. Jurgens, *The Faith of the Early Fathers*, vol. 1 [Collegeville, Minn.: Liturgical Press, 1970], 75).

¹²Irenaeus, *Adversus haereses* 2,10,4 (trans. Jurgens, 87).

¹³Augustine, *Confessions* 11,14 (trans. R.S. Pine-Coffin [Harmondsworth and New York: Penguin, 1961], 263).

¹⁴Thomas Aquinas, *Summa theologiae* I, q.46, a.2 (trans. English Dominicans [New York: Benziger, 1947], 1:243).

¹⁵*Ibid.*, I, q.46, a.2, ad 2.

¹⁶The two phrases in quotation marks are taken from Robert John Russell, “Finite Creation without a Beginning: The Doctrine of Creation in Relation to Big Bang and Quantum Cosmologies,” in *Quantum Cosmology and the Laws of Nature* (note 7), 294. In somewhat different terminology, Antony Flew has made the same basic point: “If the world was eternal and had no beginning, then there would be no room for creation, in this [popular] sense. In the second, the theological sense, questions about creation are questions about an absolute ontological dependence to which particular scientific discoveries are simply irrelevant. This distinction is important; but difficult, because almost everyone—including St. Thomas—who has believed in creation in the second sense has also believed that the world had a beginning, and that it was in the first sense, also, created” (A. Flew and A. Macintyre, *New Essays in Philosophical Theology* [New York: Macmillan, 1955], 174).

¹⁷Peacocke, *Creation and the World of Science*, 78.

¹⁸Keith Ward, “God as a Principle of Cosmological Explanation,” in *Quantum Cosmology and the Laws of Nature* (note 7), 248-49.

¹⁹Moltmann, *God in Creation*, 78.

²⁰Ted Peters, “On Creating the Cosmos,” in *Physics, Philosophy, and Theology*, 288.

²¹ Francis S. Collins, *The Language of God: A Scientist Presents Evidence for Belief* (New York: Free Press, 2006), 67.

²²Joseph M. Zyncinski, “Metaphysics and Epistemology in Stephen Hawking’s Theory of the Creation of the Universe,” *Zygon* 31 (1996):271.

²³J. Wentzel van Huyssteen, *Duet or Duel: Theology and Science in a Postmodern World* (Harrisburg, Pa.: Trinity Press International, 1998), 68. Consider, too, these words of William Stoeger: “It seems highly unlikely that cosmology, or any physical science, will ever be able to unveil a point of *absolute* beginning—before which *nothing* existed, before which time of any sort was not—which would require the direct influence of God. That does not mean that such an event did not occur. It does mean that cosmology is *not* able to discover it and reveal it as the ‘Ur-event,’ the event needing other than secondary causes for its immediate explanation” (“Contemporary Cosmology and Its Implications for the Science-Religion Dialogue,” 240).

²⁴Peters, “Cosmos as Creation,” 107.

²⁵Quentin Smith, *The Felt Meanings of the World: A Metaphysics of Feeling* (West Lafayette, Ind.: Purdue University Press, 1986), 300-1.

²⁶Zyncinski, "Metaphysics and Epistemology," 282.

²⁷Quentin Smith, "A Criticism of A Posteriori and A Priori Arguments for a Cause of the Big Bang Singularity," in *Theism, Atheism and Big Bang Cosmology*, 182-83.

²⁸William Lane Craig, "A Criticism of the Cosmological Argument for God's Non-existence," *ibid.*, 275.

²⁹Ward, "God as a Principle of Cosmological Explanation," 258.

³⁰Michael Heller, "On Theological Interpretations of Physical Creation Theories," in *Quantum Cosmology and the Laws of Nature* (note 7), 99.

³¹Ellis, "The Theology of the Anthropic Principle," 381.

³²Pierre Teilhard de Chardin, "The Mass on the World," in *idem, Hymn of the Universe*, trans. Simon Bartholomew (New York and Evanston: Harper and Row, 1965), 21-22.

³³Stoeger, "Contemporary Cosmology," 240.