

Now none of the theories which have a purported quantum mechanical base have any empirical support. In the Hartle-Hawking model the introduction of the imaginary, i , to replace the time variable, t , in the general equation for the universe wave-function (if such were to exist) is arbitrary, done only for aesthetic reasons (to remove a singularity). Robert J. Russell and Chris Isham claim that the Hartle-Hawking model is consistent with creatio continua, with nothing at the boundary of the closed universe. Robert J. Russell also argues that a finite universe is consistent with Creation theology, even if there is no definite beginning (as in Hawking's argument that the south (or north) pole is not the beginning of the earth.) I don't understand that argument. George F.R. Ellis points out that Hawking's argument that the universe is pre-existent, caused by nothing other than gravity, is not correct since the Hartle-Hawking model includes: "(pre-existent Hilbert spaces, quantum operators, Hamiltonians, etc.) whose existence is if anything more mysterious than that of the universe itself." quoted by Robert J. Russell.

MY TAKE

It seems to me that the science/physics/cosmology of creation is not altogether settled, but does show empirical evidence for a creation event, a "Big Bang": the red shift showing a universe expansion; the COBE microwave background radiation showing the burnt embers of a very initial epoch; the hydrogen/helium ratio and lack of carbon-12 in ancient (far distant) stars; the more recent B-mode COBE results showing effects of early inflation.

Theologians seem to be wary about falling into a "God of the Gaps" pit, using the deity to explain what science cannot. That fear I believe is unfounded. At some point a God of the Gaps argument has to be introduced, as a prime mover, to explain why there is a science illumined by mathematical theory. There are theological and philosophical issues that are not yet (and may never be) settled: What is time? Does God change with time, or is He eternally fixed and, if so, how does he act in time?

I'm not sure whether the theologians and scientists have improved very much, if at all, on the insights of Sts. Augustine and Aquinas. Faith and revelation give insight. The arguments of the Catechism are as forceful now as they were when first propounded by Theophilus of Antioch. And finally, we should keep in mind the aphorism of St. Thomas Aquinas: "It is not that God is irrational but that our understanding is limited."

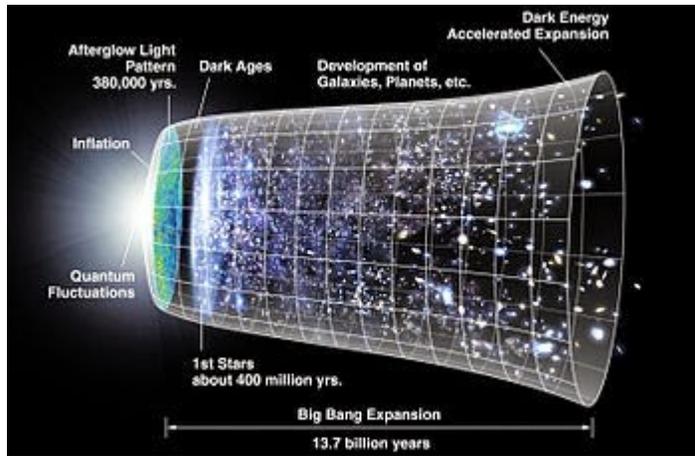
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Catholic Physics - Reflections of a Catholic Scientist - Part 30 Philosophic Issues in Cosmology 4: Creatio Ex Nihilo--Theology versus Physics



- ♦ 1200's
- ♦ Authority on physics, geography, astronomy, mineralogy, chemistry, zoology, and physiology
- ♦ "The aim of natural science is not simply to accept the statements of others, but to investigate the causes that are at work in nature"
- ♦ He understood that the Church is not opposed to study of nature
- ♦ Patron Saint of Scientists

Philosophic Issues in Cosmology 4: Creatio Ex Nihilo--Theology versus Physics



Evolution of the Universe (Wikipedia)

"In the beginning God created the heavens and the earth. The earth was formless and void, and darkness was over the surface of the deep, and the Spirit of God was moving over the surface of the waters...."
Gen 1:1-2 (KJV).

Bible-Hub.com Lexicon

"The laws of nature themselves tells us that not only can the universe have popped into existence like a proton and have required nothing in terms of energy but also that it is possible that nothing caused the big bang," Professor Steven Hawking (Discovery Channel broadcast).

"When men choose not to believe in God, they do not thereafter believe in nothing, they then become capable of believing in anything."
G.K. Chesterton"

in a world that progresses in time; in other words, what can we say about the temporality of God? This question is addressed in Quantum Cosmology and the Laws of Nature by several of the authors.

THE OPINIONS OF THEOLOGIANS.

The Big Bang hypothesis confirms creatio ex nihilo by showing the Universe began at a definite time ($t=0$): William L. Craig, Ted Peters.

The Big Bang hypothesis might be true, but it is also possible that the Universe could be eternal, with creatio continua by God: George F.R. Ellis**, Richard Swinburne, Keith Ward

The Big Bang hypothesis and cosmology, for one reason or another, are not all that relevant to theological ideas about creation: William Alston**, Ian Barbour (in Robert John Russell's article), Karl Barth, Wilhelm Drees, Arthur Peacocke (in Robert John Russell's article), William Stoeger

The Hartle-Hawking model offers theologic possibilities (see Summary below): Wilhelm Drees, Chris Isham**, Robert John Russell.

SUMMARY

The science/physics of creation is not all that settled with respect to creatio ex nihilo, either as a beginning in/of time or as a component of creatio continua. In terms of treatments of General Relativity (GR), the FLRW model yield a singularity at $R=0$ ($t=0$), the Penrose-Hawking singularity theorem showed that singularities are generally found as solutions of the GR field equations, and the Borde-Guth-Vilenkin theorem demonstrates for classical relativity, if the Universe has an average positive expansion, it has to have a beginning. But GR fails in the domain near $R=0$, $t=0$, such that quantum gravity theory would have to be invoked--but there is no theory of quantum gravity.

evolution of the universe, and whether "creatio ex nihilo" requires a beginning, an instant in time about which we can say this is $t=0$, and there is no $t<0$.

Our ordinary understanding of a universal time is confounded by the prescriptions in special and general relativity. Special relativity requires that the time of an event depends on the frames of reference of the object and observer; thus, an event A might be in the future for observer X in one frame of reference and in the past for observer Y in a different frame.

A further complication is found in general relativity, gravitational time dilation. To take these complications into account, spacetime is divided into space-like slices, for which some proper time, t , is assumed to be the same everywhere in the slice. This proper time can be replaced by another parameter (varying with time) such as R (the radius of the universe) which is constant in a slice.

The uncertainty principle of quantum mechanics introduces still another complication: uncertainty in time \times uncertainty in energy $> h/(2\pi)$. This means that to specify $t=0$ exactly there would have to be an infinite uncertainty in the energy of the system.

CONTEMPORARY

Now to consider the positions taken by contemporary theologians (including physicists and philosophers who put forth theological arguments): for the most part these are reactive to various cosmological theories about the origin (or non-origin) of the universe. I'll focus on the Big Bang ($t=0$) hypothesis and the Hartle-Hawking model (no beginning). The list of theologians cited is not exhaustive but drawn mainly from various articles in Quantum Cosmology and the Laws of Nature.

Also, if we ask whether the universe had a beginning or existed eternally, and we believe in God as Creator, then there is another hidden question (which I'll not discuss). If God is eternal and timeless, how does God act

"My reasons for presenting the ideas underlying a modern scientific theory stem rather from a belief that philosophy and theology are indeed the 'queen of sciences' (emphasis added) and, as such, are charged with the awe-inspiring task of overseeing all modes of enquiry and of cohering them in a unity of vision that is both emotionally and intellectually satisfying." Chris Isham, "Creation as a Quantum Process" in Physics, Philosophy and Theology.

"We believe that God needs no pre-existent thing or any help in order to create, nor is creation any sort of necessary emanation from the divine substance. God creates freely "out of nothing": If God had drawn the world from pre-existent matter, what would be so extraordinary in that? A human artisan makes from a given material whatever he wants, while God shows his power by starting from nothing to make all he wants." Catholic Catechism 296.

HISTORICAL

The Hebrew for "formless and void" in Gen 1:1 is "tohu-bohu" or "tohu va vo-hu). A scholar in Hebrew (as a distinguished from a Hebrew scholar--this guy was a retired Irish physician) told me that the real translation of "Tohu Bohu" was topsy-turvy, a mess, confusion. That would be more in accord with notion held by many physicists that Creation arose from quantum fluctuations, as indicated in Hawking's quote and the diagram above.

So, where did "ex nihilo" come from? One citation from the Old Testament can be used to justify this:

"I beseech thee, my son, look upon the heaven and the earth, and all that is therein, and consider that God made them of things that were not; and so was mankind made likewise." (2 Maccabees 7:28, KJV)

And in the New Testament:

"By faith we understand that the universe was created by the word of God, so that what is seen was not made out of things that are visible" Hebrews 11:3

The first Christian writer to promote the doctrine of "Creatio ex nihilo" was Theophilus of Antioch in the late 2nd Century, who wrote:

"but then they (the Platonists) maintain that matter as well as God is uncreated, and aver that it is coeval with God. But if God is uncreated and matter uncreated, God is no longer, according to the Platonists, the Creator of all things, nor, so far as their opinions hold, is the monarchy of God established. And further, as God, because He is uncreated, is also unalterable; so if matter, too, were uncreated, it also would be unalterable, and equal to God; for that which is created is mutable and alterable, but that which is uncreated is immutable and unalterable. And what great thing is it if God made the world out of existent materials? For even a human artist, when he gets material from some one, makes of it what he pleases. But the power of God is manifested in this, that out of things that are not He makes whatever He pleases;" Theophilus of Antioch, Letter to Autolytus

It's a long quote but well expressed (note the points taken up in The Catechism). Theophilus was contesting the view of Greek philosophers, Platonists, neo-Platonists, that the universe was eternal, that a demi-urge had created it from pre-existing stuff. Theophilus's theologic cudgel was wielded against the Gnostics by later Christian theologian/philosophers and fully developed by St. Augustine.

It was St. Augustine who developed arguments about time, that time could have begun with creation, which is a view remarkably in accord with much of modern cosmology.

"...no time passed before the world, because no creature was made by whose course it might pass." St. Augustine, City of God bk 11, ch.4. As Keith Ward puts it,

"For Augustine, God brought about time and space as well as all the things that are in them. Just as God did not create space at a certain place, but non-spatially caused all places to exist, so God did not create time at a certain moment, but non-temporally caused all time to exist." Keith Ward, Quantum Cosmology and the Laws of Nature.

Note that Ward's interpretation above does not require a first moment of time, a "t=0", although Augustine did accept, on the basis of Revelation, that the Universe (which to him was much smaller than our conception) had a definite beginning.

St. Thomas Aquinas also contended against the Greek philosophers' version of Creation. He agreed with Aristotle that creation required a First Cause, which Aristotle called the Prime Mover and which Aquinas called God. However, he believed that only Revelation, not reason, could assert that Creation began at an instant in time:

"By faith alone do we hold, and by no demonstration can it be proved, that the world did not always exist ... it cannot be demonstrated that man, or heaven, or a stone were not always. Likewise neither can it be demonstrated on the part of the efficient cause, which acts by will. For the will of God cannot be investigated by reason, except as regards those things which God must will of necessity; and what He wills about creatures is not among these, as was said above." St. Thomas Aquinas, Summa Theologica, Part I, Question 46.

Even though the world might be eternal, Aquinas maintained that God's creative agency would be and is continually active, as a creatio continua.

TIME ISSUES

Before discussing the positions on creatio ex nihilo taken by contemporary theologians, I should briefly comment about the forms "time" might take in a cosmological description of the