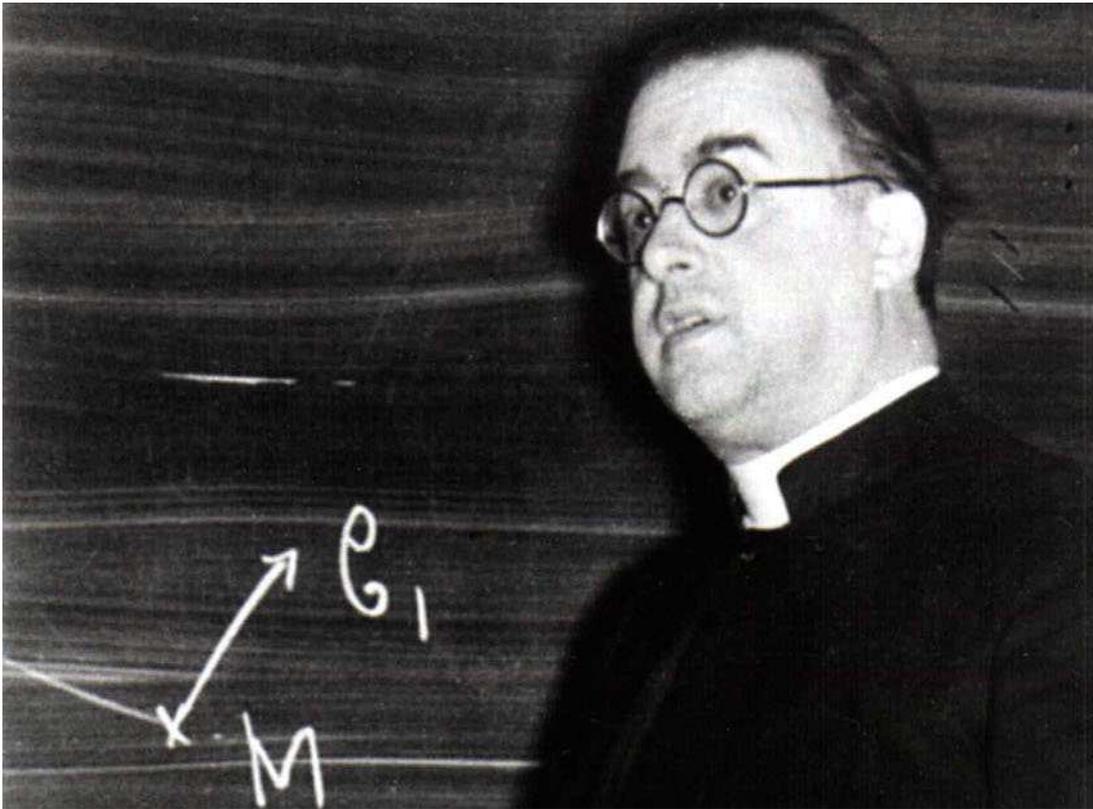


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Georges Lemaître, the Scientist and Priest who "Could Conceive the Beginning of the Universe"

August 23, 2017 | By Pablo de Felipe



Last year marked the 50th anniversary of the death of someone who is generally considered the “father” of the Big Bang theory. The anniversary, as the man himself in life, went nearly unnoticed. Here I would like to give a humble tribute to the life and work of Georges Lemaître, the scientist and priest that helped modern scientific cosmology take a huge leap forward, and who had deep insights regarding the relationship between science and faith.

Becoming a scientist and a priest

Georges Lemaître was born in Belgium in 1894 in a well-off, devoutly Catholic family. From the age of 9, he knew his vocation: to become a priest *and* a scientist.^[1] Living in a coal mining region, his father directed him to study Mining Engineering, and Lemaître went to the Catholic University of Leuven in 1911. However, World War I interfered with his studies and Georges and his brother Jacques volunteered to defend their small country.

The young Lemaître was already beginning to think deeply about the beginning of the universe, in the context of his Christian faith. On May 28th, 1917, he wrote to his friend van Severen from the trenches: “I have understood the ‘*Fiat Lux*’ [Latin for “let there be light”] as the reason of the

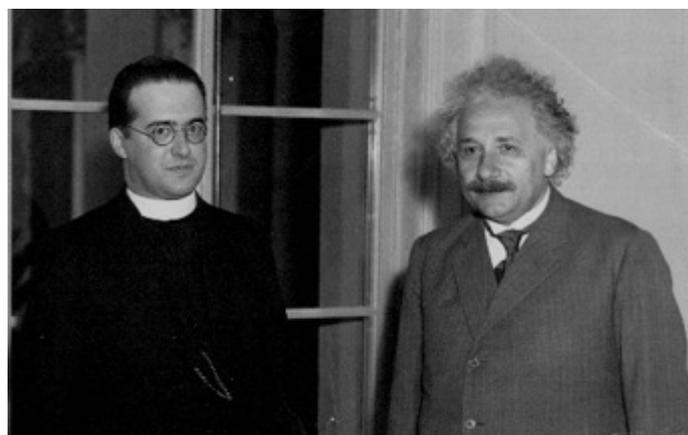
universe.”^[2] An unpublished document from the early years after the war (*God’s First Three Declarations*, also translated sometimes as *The First Three Words of God*, written around 1921) shows him taking great pains to establish an elaborate concordism around the idea of light at the origin of the universe inspired in Genesis 1:3.^[3]

After the war Lemaître changed direction and completed studies in mathematics, physics, and Thomist philosophy. In 1920, he began studies at a seminary in Malines, Belgium, where he was ordained as a Catholic priest in 1923. Interestingly, during these years he became an expert on Einstein’s recently published [Theory of Relativity](#), even writing an entire manuscript on the subject.^[4] This led him to obtain a postgraduate grant at the University of Cambridge during 1923-24 to study under the famous astronomer Arthur Eddington, who had just observationally confirmed the Theory of Relativity in 1919 (showing how gravitation was able to bend the light from a distant star while traveling near the Sun). The Catholic Lemaître and the Quaker Eddington got along very well, and Eddington became a key mentor of Lemaître for many years. A new grant allowed him to move in 1924 to the US to pursue a PhD at MIT, which he completed in 1926. As we will see, it was the right time to have gone to America.

Locking around and forward: A dynamic universe in expansion

In 1917, Einstein proposed a static (i.e. eternal) model for the universe, introducing a *cosmological constant* that canceled the contracting gravitational effect that he detected when the Theory of Relativity was applied to the universe as a whole. Between 1922 and 1924, the Russian mathematician and physicist Alexander Friedmann did groundbreaking work on theoretical cosmology and realized that the universe, according to the Theory of Relativity, could be in expansion, contraction or oscillating between both.^[5] After a brief technical debate with Einstein (who disliked such dynamic models of the universe for philosophical reasons), he finally agreed to the validity of the calculations. Sadly, Friedmann died prematurely in 1925, just while hard astronomical evidence was being gathered to decide what the real situation was.

On his return to Belgium in 1925, Lemaître took up a teaching post at the Catholic University of Leuven. In 1927 he arrived at what later became known as Hubble law, the relation of the velocities and the distances of the galaxies in their movements away from us.^[6] Lemaître interpreted that correctly as evidence that the space between galaxies was expanding.^[7] His revolutionary idea went unnoticed. However, Lemaître had the chance to talk with Einstein later that year. Einstein accepted his mathematics, but rejected his physical interpretation.



Mounting doubts on the stability of the static universe helped Lemaître to convince Eddington in 1930 of the importance of his results and he arranged an English version of Lemaître's 1927 paper to be published in 1931.^[8] By that time, Hubble had published his famous 1929 paper containing the law relating speed and distance of the galaxies that carries his name until today.^[9] Curiously, while Einstein was finally convinced after 1931, Hubble himself did not support the interpretation of "his" law in terms of an expansion of the universe!^[10]

Looking backwards: The origins of the Big Bang cosmology

This was a scientific explanation of the universe's *present* and its immediate *future* path. However, Lemaître assumed an eternal universe stretching into the *past*, in accordance with the 1917 cosmological model of Einstein. He believed this because the little data available to Lemaître in 1927 indicated a very "recent" expansion of the universe happening less than 1 billion years ago, well after what was already known of the age of the Earth. However, in 1931 Lemaître had already traced the footprints of the universe back in time to arrive at what he termed the "hypothesis of the primeval atom", that he published in a very short article of 457 words in *Nature*. In it, he hypothesized that:

If we go back in the course of time we must find fewer and fewer quanta, until we find all the energy of the universe packed in a few or even in a unique quantum [...] If the world has begun with a single quantum, the notions of space and time would altogether fail to have any meaning at the beginning; [...] we could conceive the beginning of the universe in the form of a unique atom, the atomic weight of which is the total mass of the universe.^[11]

All this was more intuition than a proven cosmological model, although Lemaître was later able to make insightful predictions, such as giving the universe an age of around 10 billion years (quite good compared with our current calculations of 13.7 billion years).

The idea of a universe with a finite age, not acceptable for centuries, became more palatable at the beginning of the 20th century with the discovery of radioactivity and thermodynamic entropy. The existence of elements that were still radioactive showed that the age of the universe had to be finite. Similarly, the idea of entropy indicated that the universe was becoming disordered over time, but the fact that this process was still unfinished was an evidence of its finite age.^[12] In this context, Lemaître's ideas fit well, providing a further independent evidence for an universe with a finite age.

The clash of cosmogonical models in the mid-20th century

His explosive origin to the universe became well known during the 1930s, even in the popular press, but professional scientists were mostly unconvinced. This time, neither Einstein nor Eddington could accept Lemaître's visionary ideas. He even had a cold reaction among Christians in the field like Robert Millikan, W. H. McCrea or the mathematician Bishop of Birmingham Ernest Barnes and some noted theologians who preferred a model of continuous creation emphasizing the creative *and* preservation activities of God.

On the other hand, atheist cosmologist Fred Hoyle, who was the inventor of the pejorative name "Big Bang" in 1949, rejected it until his death in 2001. He considered the Big Bang to be a religious idea in disguise. Instead, he promoted the Steady State cosmology, which postulated that matter

was continuously “appearing” to maintain the density of an eternally expanding universe. In this way, the Steady State model turned antireligious the idea of continuous creation, which in a generation earlier was seen as “more Christian” than the explosive creation! In spite of all that, the cheerful Lemaître kept good personal relations with Hoyle, as well as with Einstein before.^[13]

Lemaître always had the suspicion that there could be a kind of echo, some direct evidence of the explosive beginning of the universe. He decided to find it investigating the cosmic rays and devoted many years studying them, without finding the evidence he searched for. Lemaître role as the prime defender of the Big Bang cosmology was replaced in the mid-1940s by George Gamow (together with Ralph Alpher and Robert Herman), a former student of Friedmann exiled in the USA. They proposed the current model of a hot Big Bang, where hydrogen and helium are *formed* under the extraordinary conditions of the first moments of the Big Bang by thermonuclear reactions fusing elementary particles, rather than being the result of a radioactive disintegration of a primeval super-atom.

In 1948, it was proposed that a weak signal should be detected as the echo of the Big Bang. The cosmic microwave background radiation was actually found in 1965. Lemaître was told of the discovery by his assistant Odon Godart when he was in a hospital a little before his death in 1966.^[14]

From concordism to a careful and amicable separation of science and faith

Lemaître had a profound but very personal spirituality. He was part of a small community of priests, the *Friends of Jesus*, who sought a deeper spirituality through studying mystics, regularly attending silent retreats and taking special vows, such as poverty and a complete offering of their lives to Christ.^[15] Lemaître was always upfront regarding his faith, and he always appears in photographs dressed in the garb of a Catholic priest in every occasion. However, he did not use his scientific position to proselytize and rarely mentioned his religious ideas in scientific contexts.

Although we know little of the early concordist ideas of his youth, surviving unpublished documents of the late 1910s give us a glimpse of them.^[16] In his unpublished *God's First Three Declarations*, he rejected the idea that the Bible teaches science, mentioning pope Leo XIII's encyclical letter *Providentissimus Deus* (1893) and Augustine of Hippo. However, he then speculated with the idea that God might have somehow directed the authors to leave some insights of scientific knowledge in the pages of the Bible in a veiled prophetic way. Some examples are his attempt to read the creation *ex nihilo* in Gen 1:3 arguing with a reference to the blackbody radiation that “physically, absolute darkness is nothingness”^[17] or his interpretation of the waters of Genesis 1:7-9 as a “mass of lights” that could then be “condensed” into liquid and solid states of matter.^[18]

We lack information about how Lemaître's ideas on science and faith developed in the 1920s. The next solid thing we know about the topic is a long interview in *The New York Times*, published on February 19th, 1933, where the interviewer appears more interested in his religious views than in his science. There he rejected concordism and the use science for apologetics. At this point we find this striking dialogue with the interviewer:

If the Bible does not teach science, among other things, what does it teach, you ask. “The way to salvation,” comes the reply. “Once you realize that the Bible does not purport to be a textbook of science, the old controversy between religion and science vanishes.”^[19]

What is the advantage of being a Christian for a scientist?

Although Lemaître never engaged in a systematic exposition of his science and faith views, the longest and more elaborate source for knowledge of his ideas, apart from the 1933 interview, is his 1936 lecture on science and faith at the 6th Catholic Congress of Malines held in that Belgian city. In this lecture, Lemaitre advanced three ideas.^[20]

First, Lemaître’s views were dominated by the image of the “two ways to truth.” According with the intuition that he had right back to his childhood, he considered both science and faith as two different ways to know truth, and he said at the very beginning of his 1936 lecture that: “The pursuit of truth is the highest human activity.”^[21] However, he criticized those who “by exaggeration” consider science “as the only thing that matters,” but also those that do not grant it “the consideration that the scientific activity deserves,” leading people to be “alienated from the Church because they imagine it despises the search for the natural truth.”^[22]

Lemaître views on how faith should relate to science were critical of many common models, many of which are still widely used. He rejected the conflict model, as we saw above in the 1933 interview and he repeated this rejection with confidence again in 1936, even criticizing theologians for their resistance to accept new developments in science: “they are too prone to stall until the last moment before the [new] hypothesis is definitely proved.”^[23] In turn, he also targeted “second and third rate popularizers, who attack religion in the name of what they believe to have understood from science.”^[24]

Lemaître also rejected the opposite model of concordism, something that he practiced himself up to the 1920s. This rejection is very clear in the 1933 interview and resurfaced in 1936 when he criticized concordism and conflict talking about “improper mixing or imaginary conflict.”^[25] He also rejected a third solution of disconnection / compartmentalization, defending that the Christian researcher “should keep the middle ground between two extremes. One is considering [...] completely disconnected compartments [...]. The other is, rashly and irreverently, mixing and confusing what must remain separate.”^[26]

The second important view in Lemaître’s thinking is the “hidden God,” following an expression in Isaiah 45:15. In what is probably in itself a veiled reference of Laplace’s famous answer to Napoleon’s question about the role of God in his system of the universe (“Sir, I had no need of that hypothesis”), Lemaître affirmed in 1936 that, “The omnipresent divine action is everywhere essentially hidden. It is forever out of question to reduce the supreme Being to the level of a scientific hypothesis.”^[27] The way to relate the Bible and science was, for Lemaître, something that is usually labeled as the “accommodation principle.” This idea, dating back to the Church Fathers (notably to Augustine of Hippo), does not consider the Bible to be a book of science, and therefore does not expect to find modern science hidden between its words. As Lemaître put it in 1936, “Divine revelation never taught us what we could have found out by ourselves.”^[28]

A third line of Lemaître's thought was the view of nature as a solvable "enigma." In different papers and lectures from the early 1930s, he compared the mysteries of nature with the cuneiform bricks of the Babylonians or the hieroglyphs of the Egyptians, calling it an effort "to decipher nature's multiply interlocked palimpsest."^[29] However, a key concept in Lemaître's approach to science was his tireless optimism in the human possibility to solve the enigma. In this effort, he believed that the Christian researcher "may even have an edge over his unbelieving colleague."^[30] He explains:

But the believer has the advantage of knowing that the enigma has a solution, that the underlying logic is ultimately the work of an intelligent being, that, therefore, the problem posed by nature was posed to be solved, and that its difficulty is probably proportionate to our human abilities, be it today or tomorrow. This knowledge might not provide him with new investigation resources, but it will help him maintain the healthy optimism without which a sustained effort cannot long endure.^[31]

It is hard not to see Lemaître here talking of himself and the source of his optimism in working his way to deciphering the history of the universe as well as his wisdom in avoiding the use of faith to influence science or abusing science to buttress faith.

Lemaître's final stand against the apologetic abuse of "his" science

In 1936, Lemaître was chosen by Pope Pius XI to be a member of the [Pontifical Academy of Sciences](#), of which he became president from 1960 until his death. He had a mixed relationship with the Vatican. He reacted negatively to Pius XII's appropriation of his cosmological views to defend the doctrine of creation by God in 1951. At that time, such a connection was dangerous and potentially damaging, as the hypothesis of the primeval atom remained very controversial in the light of the Steady State theory. In addition, such "apologetic" use of the Big Bang ran against Lemaître's rejection of concordism and against his defense of the independence of science and faith. Lemaître appealed to the scientific advisor of the pope, who persuaded Pius XII to avoid the apologetic use of his cosmology.

Lemaître is a fascinating character. A pioneer of contemporary science, many of his scientific intuitions and suggestions have been shown true. Well-known in his time, his figure was later somehow forgotten until interest in his life and work has been recently rekindled.

Even less known are his ideas about the relationship between science and faith. Apart of his 1933 interview in the *New York Times*, most of what he wrote in this field has existed in little-known texts written in French.^[32] His rejection of most of the traditional ways of relating science and faith—conflict, compartmentalization and concordism—is relevant and important for Christians thinking about these issues in the 21st century.

That the scientific "father" of the Big Bang—who was also a priest—rejected the (ab)use of his own science for apologetic purposes, while keeping a vibrant personal Christian faith, is a call to think twice about hurried apologetic shortcuts inspired by the latest scientific developments.

References & Credits

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^[1] Aikman, D. "Lemaître follows two paths to truth. The famous physicist, who is also a priest, tells why he finds no conflict between science and religion." [*The New York Times Magazine* \(19th February 1933\), p. 3, 18.](#)

^[2] Quoted by Lambert, D. *L'itinéraire spirituel de Georges Lemaître. Suivi de Univers et atome. Conférence inédite de G. Lemaître.* Bruxelles: Éditions Lessius (2007), p. 26.

^[3] This document was published for the first time in: Stoffel, J-F. (ed.). *Monseigneur Georges Lemaître, savant et croyant: Actes du colloque commémoratif du centième anniversaire de sa naissance, (Lovain-la-Neuve le 4 novembre 1994); suivi de: La physique d'Einstein* (texte inédit de Georges Lemaître, édités par Stoffel, J-F.). Louvain-la-Neuve: Centre interfacultaire d'étude en histoire des sciences (1996), pp. 107-111.

^[4] *The Physics of Einstein.* Composed in 1922, this text remained unpublished until it was printed in 1996 for the first time in the book cited in the footnote above: Stoffel, J-F. (ed.). *Op. cit.*, pp. 223-360.

^[5] An English translation of those historical papers was published in 1999 in the journal [*General Relativity and Gravitation* 32: 1991-2000 and 2001-2008](#) (corresponding to the 1922 and 1924 papers respectively).

^[6] In fact, during the 1920s new evidence indicated nebulae as distinct galaxies, in particular the work of Edwin Hubble who was able to measure the distance to these distant "island universes" showing that they were not part of our Milky Way. In parallel, since the early 1910s, Vesto Slipher was accumulating data from the velocities of these galaxies, and most of them showed redshifts, indicating that they were becoming more and more distant from us. In 1922 Slipher had already found redshifts corresponding to 41 galaxies that were listed by Eddington in his 1923 *The Mathematical Theory of Relativity* (Cambridge University Press) and noted that "the great preponderance of positive (receding) velocities is very striking" (p. 162). Lemaître made good use of his year in the USA and met Hubble and Slipher, as well as other astronomers.

^[7] Lemaître, G. (1927). Un univers homogène de masse constante et de rayon croissant rendant compte de la vitesse radiale des nébuleuses extragalactiques. [*Annales de la Société Scientifique de Bruxelles* 47A: 49-59.](#)

^[8] Lemaître, G. (1931) A Homogeneous Universe of Constant Mass and Growing Radius Accounting for the Radial Velocity of Extragalactic Nebulae. [*Monthly Notices of the Royal Astronomical Society* 91: 483-490.](#)

^[9] Hubble, E. (1929). A relation between distance and radial velocity among extra-galactic nebulae. [*Proceedings of the National Academy of Sciences of the United States of America* 15: 168-173.](#)

^[10] On the historical complexities of the discovery of the expansion of the universe, see Kragh, H. & Smith, R.W. (2003). Who discovered the expanding universe? [*History of Science* 41: 141-162.](#)

^[11] Lemaître, G. (1931). The Beginning of the World from the Point of View of Quantum Theory. [*Nature* 127: 706.](#)

^[12] On the early history of Lemaître's hypothesis of the primeval atom, see: Kragh, H. & Lambert, D. (2007). The context of discovery: Lemaître and the origin of the Primeval-Atom universe. [*Annals of Science* 64: 445-470.](#)

^[13] On the controversy between the primeval atom and the Steady State cosmogonies, see Holder, R. (2012). Lemaître and Hoyle: Contrasting Characters in Science and Religion. [*Science & Christian Belief* 24: 111-127.](#)

^[14] For a comprehensive study of Lemaître's work, see Lambert, D. *The Atom of the Universe*. Cracow: Copernicus Center Press (2015). This is a translation of his 2000 book *Un Atome d'Univers: La Vie et l'Œuvre de Georges Lemaître*. Brussels: Éditions Racine.

^[15] The most complete and updated recollection of the many fragmentary sources needed to reconstruct a picture of his little known spiritual life has been researched with great zeal and published recently by the scientist and philosopher Dominique Lambert in his 2007 book quoted in footnote 2. For a concise summary of his scientific and spiritual life, including his science and faith ideas, the reader is referred to Lambert, D. (2012). Georges Lemaître: The Priest Who Invented the Big Bang. In R.D. Holder and S. Mitton (eds.). *Georges Lemaître: life, Science and Legacy*. Berlin and Heidelberg: Springer-Verlag, pp. 9-21.

^[16] For this 'concordist' phase of Lemaître, see the texts quoted in footnotes 2 and 3 above.

^[17] *God's First Three Declarations*, see reference in footnote 3, quotation from p. 110.

^[18] Idem, p. 111.

^[19] Aikman, D. Op. cit., p. 3.

^[20] de Felipe, P., Bourdon, P. & Riaza, E. (2015). Georges Lemaître's 1936 Lecture on Science and Faith. [*Science & Christian Belief* 27: 154-179](#).

^[21] P. 65. The page numbers refer to the original French edition of the lecture (reproduced in French and translated into English in the article referred to in footnote 20).

^[22] Pp. 65, 66.

^[23] P. 66.

^[24] P. 67.

^[25] P. 70.

^[26] P. 69.

^[27] P. 69.

^[28] P. 69.

^[29] P. 70.

^[30] P. 70.

^[31] P. 70.

^[32] Many different small pieces from Lemaître on science and faith have survived, some published in his lifetime, some in recent years and some still unpublished. After directing the Spanish edition of Lambert's 2007 book on Lemaître spiritual itinerary (Lambert, D. *Ciencia y Fe en el Padre del Big Bang, Georges Lemaître*. Madrid: Fliedner Ediciones, 2014; translation of the book referred to in footnote 2) and the publication of a paper (in 2015, see footnote 20) with the study and translation of his 1936 lecture, I am currently working with Dr. Dominique Lambert on the edition of the complete collection of Lemaître's texts on science and faith. A task we hope to accomplish in the near future for all to learn from and enjoy.