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## Theology and Physics Series

St Mary's University, Twickenham, London

**Fr. Dr. G. Lemaître and Rev. Dr. J. Polkinghorne:**

**Their lives at the intersection between physics and theology**

### Fr. Dr. Georges Lemaître (1894 – 1966)



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Fr Dr G. Lemaître was a Belgian cosmologist, a Catholic priest and the father of the Big Bang Theory.

**1894:** Birth of Lemaître in Charleroi, Belgium

**1911:** Lemaître entered the Catholic University of Louvain (Belgium) to study for a degree in engineering

**1914:** World War I broke out and Lemaître had to interrupt his

studies. Lemaître volunteered and served as an artillery officer in the Belgian army. He received the Military Cross for his courage but the horrors and carnages that he witnessed changed completely his life.

**1919:** After the WWI ended, Lemaître resumed his university studies. However, he lost interest in engineering and developed a deep interest for mathematics.

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**1920:** Lemaître graduates with a degree in Mathematics under the supervision of de la Vallée Poussin. The title of his dissertation was “Approximation of functions of several real variables”.

**1920 -23:** Lemaître decides to train as a priest. He enrolls at the Maison Saint Rombaut, a seminary of the Archdiocese of Malines.

**1923:** Lemaître is ordained and becomes Abbé Lemaître.

**1923-24:** Lemaître goes to Cambridge (UK) and study mathematical astronomy under the direction of Eddington who made important contribution to the theory of general relativity.

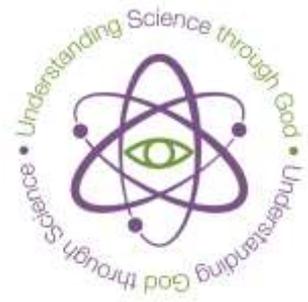
**1924-25:** Lemaître studies at the Harvard College Observatory in Massachusetts (USA).

**1925:** Lemaître accepts a lectureship at the Catholic University of Louvain (Belgium). However, he continues to spend time at Harvard and at the Massachusetts Institute of Technology (MIT) in the USA.

**1927:** Lemaître is awarded a PhD from MIT under the supervision of Harlow Shapley. His thesis is entitled “The gravitational field in a fluid”. The work that Lemaître undertook at Harvard, MIT and Louvain was published in the “Annales de la Société Scientifique de Bruxelles” with the title “Un univers homogène de masse constante et de rayon croissant rendant compte de la vitesse radiale des nébuleuses extragalactiques” (A homogeneous Universe of constant mass and growing radius accounting for the radial velocity of extragalactic nebulae). This was a groundbreaking paper in which Lemaître derived the Hubble's Law which relates the speed with which a galaxy is moving away to its distance. In the same year, Lemaître met Einstein in Brussels. Einstein said to Lemaître that the ideas that he proposed in his 1927



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seminal paper had been already presented by Friedmann in 1922. Einstein also told Lemaître that his mathematical derivation of the solutions of the equations of the general relativity was correct but that they were not physically sound. Einstein notoriously told Lemaître that “Your calculations are correct, but your grasp of physics is abominable”. The main reason of the dispute between Einstein and Lemaître is that Einstein, as many of physicists of the time, believed that the universe was static, whereas Lemaître’s calculations proved the exact contrary, namely that the universe was expanding. Lemaître was criticised by many exponents of the physic community. To try to solve the problem, Lemaître sent a copy of his 1927 seminal paper to Eddington.

**1931:** Eddington arranged for Lemaître’s paper to be translated in English and published in the “Monthly Notices of the Royal Astronomical Society”. Although, Eddington agreed with Lemaître’s view of a dynamic universe, he could not come to terms with the part of Lemaître’s theory that implied that he universe had a beginning at a finite time in the past. This was going against the general belief that the universe always existed. Some have argued that Lemaître’s deep Catholic belief made him come to the conclusion that the universe had to begin at a finite time in the past as asserted by the book of Genesis: “In the beginning God created the heavens and the earth” (Genesis 1: 1). Lemaître replied to the objections against his theory in a paper published in Nature where he said “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; they would only begin to have a sensible meaning when the original quantum had been divided into a sufficient number of quanta. If this suggestion is correct, the beginning of the world happened a little before the beginning of space and time”. This was the first explicit formulation of the “Big Bang Theory”. It is interesting to note that the name “Big Bang” was a scornful



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epithet used by Fred Hoyle, who did not accept Lemaître's theory in 1950 to describe Lemaître's ideas of early universe.

**1933:** Lemaître and Einstein gave a series of lectures in California and after listening to Lemaître's explanation of his theory Einstein stood up and said: "This is the most beautiful and satisfactory explanation of creation to which I have ever listened". In the same year, Lemaître published a more detailed version of his theory in a paper entitled "L'univers en expansion" (The expanding universe). The ideas presented in his 1933 paper reached the popular press who described Lemaître as the world's leading cosmologist. It goes without saying that the fact that Lemaître was both a leading scientist and a Catholic Priest was part of the fascination that the popular press had as clearly expressed by a journalist of the New York Times: "There is no conflict between religion and science,' Lemaître has been telling audiences over and over again in this country .... His view is interesting and important not because he is a Catholic priest, not because he is one of the leading mathematical physicists of our time, but because he is both".

**1934:** Lemaître was awarded the Francqui Prize, the highest Belgian Scientific Honour.

**1936:** Lemaître was inducted into the Pontifical Academy of Science by Pope Pius XI.

**1941:** Lemaître was elected member of the Royal Academy of Sciences and Arts of Belgium.

**1951:** Lemaître was the first to be awarded the Eddington Medal by the Royal Astronomical Society.

**1960-66:** Lemaître served as President of the Pontifical Academy of Sciences.

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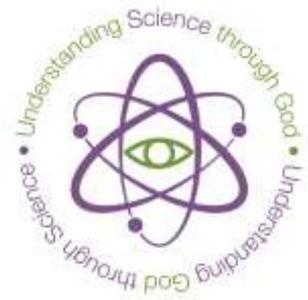
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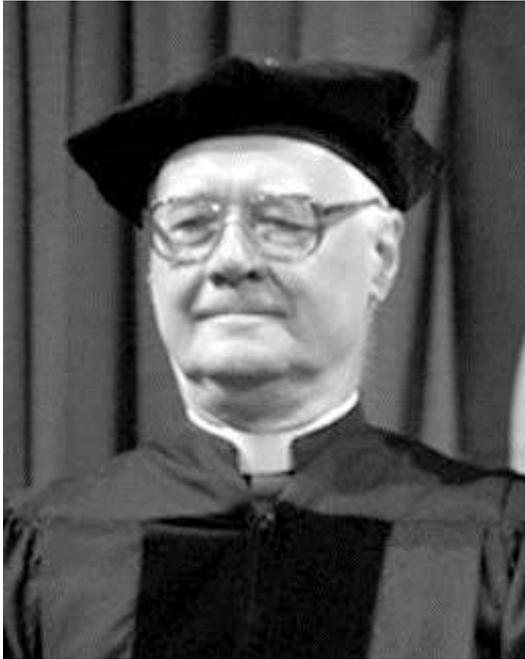
Lemaître retired in 1964 when he was made Professor Emeritus at the Catholic University of Louvain. Lemaître had been a leading cosmologist but also a Catholic priest. The main question that still has not got an answer is “Was Lemaître the scientist being guided by Lemaître the Catholic priest?” (extract from O Godart, Contributions of Lemaître to general relativity (1922-1934), in Studies in the history of general relativity, Luminy, 1988, Einstein Stud. 3 (Birkhäuser Boston, Boston, MA, 1992), 437-452; 461). We leave the reader try to find an answer.



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### Rev. Dr. John Charlton Polkinghorne (1930 - )



**1930:** Birth of Polkinghorne in Weston-super-Mare (UK).

**1937:** Polkinghorne enters the Quaker School in Street.

**1941:** Polkinghorne enters the Elmhurst Grammar School in Street.

**1945:** Polkinghorne attends Perse School in Cambridge where he excels in Mathematics and Physics.

**1948:** Polkinghorne wins a Major Scholarship to Trinity College, Cambridge.

**1949:** Polkinghorne enters to Trinity College, Cambridge after undertaking one year of National Service. One of

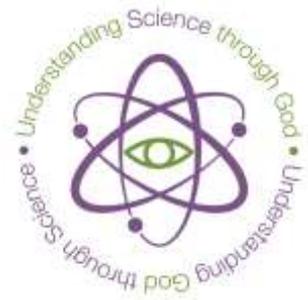
Polkinghorne's teachers at Cambridge was the leading theoretical physicist and one of the fathers of Quantum Mechanics, Paul Dirac. As Polkinghorne said in his book "From Physicist to Priest", an autobiography (Society for Promoting Christian Knowledge, 2007): "His style of lecturing was non-rhetorical and it was totally free from the slightest degree of emphasis on how he had made his own very important discoveries. Yet so profound was the material, and so closely structured was the argument, that one was carried along enthralled by the experience".

**1952:** Polkinghorne graduates from Cambridge.

**1952-55:** Polkinghorne works as a research student at Cambridge, supervised by Abdus Salam (theoretical physicist who shared the 1979 Nobel Prize in Physics for his contribution to electroweak unification) in the research group of Paul Dirac. Polkinghorne is awarded a PhD in Physics in 1955.



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**1955:** Polkinghorne marries Ruth Martin, a mathematics student who, like Polkinghorne, was a member of the Christian Union. The same year, Polkinghorne goes to the USA to take up a postdoctoral Harkness Fellowship at the California Institute of Technology (Caltech). At Caltech Polkinghorne worked with Murray Gell-Mann (physicist who received the 1969 Nobel Prize in physics for his work on the theory of elementary particles). He also attended lectures given by Richard Feynman (theoretical physicist who received the Nobel prize in 1965). In his book “From Physicist to Priest”, an autobiography (Society for Promoting Christian Knowledge, 2007), Polkinghorne compares Gell-Mann and Feynman: “You could hardly find two people more different in temperament and manner than Feynman and Gell-Mann. Each cultivated a public persona. For Murray it was the cultured polymath; for Dick it was the fun-loving, bongo drum-playing person who just happened to be a brilliant physicist”.

**1956:** Polkinghorne takes up a lecturer position at the University of Edinburgh.

**1958:** Polkinghorne returns to Cambridge as a lecturer.

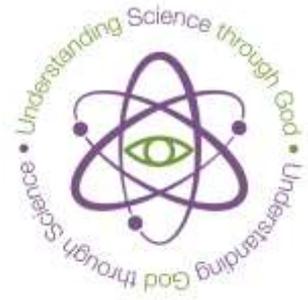
**1968:** Polkinghorne becomes professor of Mathematical Physics at Cambridge.

**1974:** Polkinghorne becomes a Fellow of the Royal Society (FRS) for his outstanding contributions to mathematical physics as testified by the number of seminal papers that he published in this topic from 1954 onwards.

**1977:** Polkinghorne makes the life-changing decision to enter the ordained ministry of the Church of England. As he writes in his book “From Physicist to Priest”, an autobiography (Society for Promoting Christian Knowledge, 2007), “The most fundamental reason for thinking about such an unconventional move was simply that Christianity has always been central to my life. Therefore, becoming a minister of word and sacrament would be a privileged vocation that held out the possibility of deep satisfaction”. As he explained in an interview in 1997: “I didn't leave science because I was disillusioned, but felt I'd done my bit for it after about twenty-five years. I was very much on the mathematical side, where you probably do your best work before you're forty-five. Having passed that significant date, I thought I would do something else. Since Christianity had always been central to my life, the idea of testing my vocation and seeking ordination seemed a suitable second career”.



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**1979:** Polkinghorne resigns his professorship at Cambridge and start training the ministry at Westcott House in Cambridge.

**1981:** Polkinghorne is ordained a deacon in Ely Cathedral.

**1982:** Polkinghorne becomes a curate at St Michael and All Angels, Windmill Hill, Bristol.

**1984:** Polkinghorne is appointed as vicar of St Cosmas and St Damian in Blean near Canterbury.

**1989-96:** Polkinghorne becomes President of Queens' College, Cambridge.

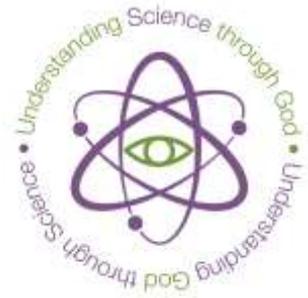
**1997:** Polkinghorne is knighted for distinguished service to science, religion, learning and medical ethics.

**2002:** Polkinghorne is the recipient of the prestigious Templeton Prize: “John C Polkinghorne is a mathematical physicist and Anglican priest whose treatment of theology as a natural science invigorated the search for interface between science and religion and made him a leading figure in this emerging field. Dr Polkinghorne resigned a prestigious position as Professor of Mathematical Physics at the University of Cambridge in 1979 to pursue theological studies, becoming a priest in 1982. Since then, his extensive writings and lectures have consistently applied scientific habits to Christianity, resulting in a modern and compelling, new exploration of the faith. His approach to the fundamentals of Christian orthodoxy creation, using the habits of a rigorous scientific mind have brought him international recognition as a unique voice for understanding the Bible as well as evolving doctrine” (extract from the citation). In the same year Polkinghorne becomes the Founding President of the International Society for Science and Religion.

Polkinghorne is a renowned author of many highly successful books in physics first and then the relationship between physics and theology of which he is a very strong advocate. Polkinghorne believes his move from science to religion has given him “binocular vision” of reality. He believes that science and religion address aspects of the same reality because both seek the Truth about reality using different but after all



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complementary (and even similar at times as clearly stated by Polkinghorne in his famous book: "Quantum Physics and Theology: An Unexpected Kinship") tools. According to Polkinghorne, the acceptance of the existence of God can enable the scientist to fully and truly understand reality.

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