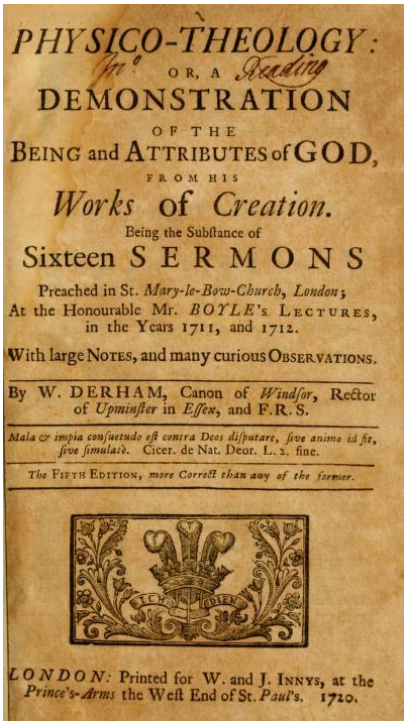
The Boyle Lecture 2017

Theological Influences in Scientific Research Programmes: Natural Theology 'in Reverse'

Robert J. Russell

Founder and Director of the Center for Theology and the Natural Sciences, and Ian G. Barbour Professor of Theology and Science at the Graduate Theological Union, Berkeley, California.



PHYSICO-THEOLOGY:
OR, A
DEMONSTRATION
OF THE
BEING and ATTRIBUTES of GOD,
FROM HIS
Works of *Creation.*
Being the Substance of
Sixteen SERMONS
Preached in St. *Mary-le-Bow-Church, London;*
At the Honourable Mr. *BOYLE's* LECTURES,
in the Years 1711, and 1712.
With large NOTES, and many curious OBSERVATIONS.
By W. DERHAM, Canon of *Windsor*, Rector of *Upminster* in *Essex*, and F.R.S.
Mala & impia consuetudo est contra Deos disputare, sive animo id sit, sive simulatè. Cicer. de Nat. Deor. L. 2. fine.
The FIFTH EDITION, *more Correct than any of the former.*
LONDON: Printed for W. and J. INNYS, at the *Prince's-Arms* the West End of St. *Paul's.* 1720.

A Vote of Thanks to the Lecturer will be proposed by

Rowan Williams

The Master, Magdalene College, Cambridge

St Mary-le-Bow, Cheapside, London – Wednesday 29th March 2017

Background to The Boyle Lectures

The original series of Boyle Lectures ran from 1692 until the early 1730s. Funded by a bequest from Robert Boyle, the celebrated seventeenth-century natural philosopher, the lectureship was re-established at St Mary-le-Bow in 2004. It now provides an annual platform for a distinguished scientist or theologian to explore the contemporary relationship between the two disciplines. The lectures aim to be faithful to the intention of their founder, who viewed religious faith and experimental science as mutually enriching.

The new Boyle Lectures are guided by an Advisory Board chaired by the Earl of Cork and Orrery (the 1st Earl of Cork (1566-1643) was Robert Boyle's father). The Lectures are convened by Michael Byrne and have received significant support and encouragement – both financial and in-kind – from a number of parties, to whom the Advisory Board remains deeply grateful. These include the Worshipful Company of Grocers, the Worshipful Company of Mercers, Gresham College, the Convener, the Boyle family, the discretionary funds of the Bishop of London and the Rector of St Mary-le-Bow, and individual members of the Advisory Board.

The Boyle Lectures are now an integral part of St Mary-le-Bow's pastoral programme, particularly in its aim to foster dialogue between theology and other disciplines.

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Theological Influences in Scientific Research Programmes: Natural Theology 'in Reverse'

Robert J. Russell

Robert J. Russell is Founder and Director of the Center for Theology and the Natural Sciences (CTNS). He is also Ian G. Barbour Professor of Theology and Science in Residence at the Graduate Theological Union (GTU) in Berkeley, California.

Professor Russell is an ordained minister in the United Church of Christ. He received his Ph.D. in physics from the University of California, Santa Cruz; a B.S. in physics from Stanford University; an M.S. in physics from UCLA; and an M.A. in Theology and an M.Div. from Pacific School of Religion. He taught physics at Carleton College and science and religion with Ian Barbour for several years before joining the GTU in 1981. His wife, Charlotte, who is happily with us at this evening's lecture, is an associate minister at First Congregational Church, Berkeley, California.

Introduction

I am blessed to live in the San Francisco Bay Area in a townhome with a panoramic "three bridges" view. From our living room Charlotte and I can see the Bay Bridge, newly reconstructed from a single cantilever double span to twin causeways and a majestic tower; the iconic Golden Gate bridge moving traffic from San Francisco in the south to Marin County in the north and serving as the door to the Pacific cultures for dozens of tankers each day; and the San Rafael Bridge which leads families and travelers to parts north of us, stretching from Marin County to Oregon and Washington, and on to Canada.

In 1981 when I created the Center for Theology and the Natural Sciences (CTNS) at the Graduate Theological Union in Berkeley and near to the University of California, I chose the Golden Gate Bridge to serve as a visual metaphor for the developing field of

theology and science. The metaphor of the Golden Gate Bridge depicts the many paths between science and theology. The lanes heading north from San Francisco to Marin County represent the paths from science to theology, including both natural theology and the theology of nature, to use Ian G. Barbour's term. Contemporary natural theology focuses on reasons for belief in God in light of science and its philosophical interpretation. The theology of nature emphasizes how theology should be revised and made vibrant for today's world in light of the discoveries of science and their philosophical interpretation. These paths, like the northward-heading lanes of the Bridge, start off going in the same direction but with different outcomes, one turning off to the bustling waterside city of Sausalito (natural theology) and the other heading northwest to the sparkling Pacific Ocean (theology of nature).

Over the ensuing decades I have been engaged in developing a theology of nature. More recently, however, I have also attended to the much less explored path which, as the Bridge metaphor portrays, takes one on the southerly journey from Marin to San Francisco. This is the relatively unacknowledged path from theology to science. This path explores the way theological intuitions, convictions, insights, and worldviews, as well as philosophical arguments, are present in the conversations and debates scientists have about their theories. Here theology and philosophy can have a creative influence in the construction of new theories in science as well as in the choice by scientists between competing scientific theories when the empirical evidence supports both sides. This is the path I will take us on today and which I playfully dub "natural theology 'in reverse'."

Let me be clear at the outset about what I mean here by "theology". I am using this term in a very general sense as including assertions about the existence of God as found in the sacred texts of the Western monotheisms, as well as assertions referring to concepts such as the One, the Unknowable, ultimate reality, the ground of being, and so on as found in philosophical and mystical theologies East and West. In this sense there is Christian theology, but there are also Jewish and Moslem theologies, all with

their assertions about the existence of God, and there is Hindu theology, often considered either as a form of polytheism, or pantheism, or panentheism, or even theism, and Buddhist theology which is mostly non-theistic. I even include atheism here since in denying the existence of God it takes a stand on a cognitive truthfulness of the theological concept of God. So, for example, later tonight when I refer to cosmologist Fred Hoyle's atheistic beliefs as his "theology" I am in no way claiming that he believed in God, which he obviously didn't, but instead I take his rejection of the existence of God as his theology, or perhaps "anti-theology." It is this kind of general meaning of theology that I will employ here when I explore the role of theology in the discussions by scientists about cosmology and quantum mechanics.

Let me also acknowledge at the outset that these northbound and southbound paths are actually quite different in the way theological and philosophical convictions, insights, and worldviews are acknowledged and inspected. Scholars who do natural theology, such as the recent Boyle lecturers John Polkinghorne (2013), Alister McGrath (2014), Russell Re Manning (2015), and Sarah Coakley (2016), pay scrupulous attention to the sciences they are exploring, and bring to its analysis the best in philosophical inquiry. Only then do they incorporate these results within central topics in theology, such as the doctrine of creation, human nature, redemption, eschatology, and so on. On the other hand, when we turn to the path from theology to science we enter a world of anecdotal evidence and personal instincts often expressed in pungent ways, such as Albert Einstein's famous quip that God doesn't 'play dice,' a remark he used to express in a somewhat derisive tone his profound concerns about quantum mechanics. The challenge will be to sort out how distinguished scientists often rely intuitively on their implicit personal religious and philosophical views when pursuing a contested research agenda, in persuading others to join them, and in arguing against their competitors. Nevertheless I sincerely believe this is a task worth undertaking if it brings credibility to the claim that ideas rooted in philosophy and theology can have a creative influence in scientific research.

I have coined the term "creative mutual interaction" (CMI) to stand for the bridge between science and theology with paths moving in both ways between them. I hope that tonight CMI will do honor to the original intent of the Boyle lectures, dating back to 1691, by adding to the call for natural theology enshrined in Boyle's mandate a complementary path starting from theology and philosophy and then moving back to science.

My lecture will focus in some detail on cosmology in the 1950s and 1960s, and on quantum physics circa 1900-1930. These are prime domains where scientists explicitly invoked philosophical and theological points of view in support of their research and in challenging their competitors. Even when the language so used might seem superficial, as in Einstein's remark about God and dice, I believe it alludes to the views they actually held, often subliminal but occasionally explicit. It also alludes to the way these views guided their own journey through research science, often for decades, and, in turn, how they influence contemporary research programs flowing out of them, programs which are still active today.

Examples from cosmology: Big Bang versus Steady State

Of the many examples of philosophical and theological influences on scientists, perhaps my favorite is that of cosmologist Fred Hoyle, who together with Hermann Bondi and Tommy Gold constructed the "steady state cosmology" in the late 1940s to oppose Einstein's Big Bang cosmology.

As many of you know, Big Bang Cosmology depicts the universe as having an absolute beginning in time, the famous event designated as "t=0," approximately 13.8 billion years ago. This cosmology is rooted in Einstein's general theory of relativity which he published in 1916. Big Bang cosmology combines mathematical solutions to Einstein's relativity by Alexander Friedmann, Georges Lemaître, Howard Robertson, and

Arthur Walker and astronomical evidence for the motion of distant galaxies receding from earth by Erwin Hubble and colleagues.

While Hoyle had a number of objections to Einstein's cosmology, one of the most important ones was that it portrayed the universe as having had an absolute beginning in time. Now as I mentioned above Hoyle was an outspoken atheist and he was outraged that Big Bang cosmology was being used by Christians as support for the existence of God. A widely-discussed instance arose in an address by Pope Pius XII to the Pontifical Academy of Sciences in 1951. Here the Pope claimed that Big Bang cosmology "has confirmed the contingency of the universe and also the well-founded deduction as to the epoch when the world came forth from the hands of the Creator (i.e., t=0). Hence, creation took place. We say: therefore, there is a Creator. Therefore, God exists!"

Hoyle, Bondi and Gold, constructed what they called steady state cosmology. In this cosmology, the universe has no beginning in time. Instead it is eternally old and expanding forever. In order to construct the steady state cosmology Hoyle had to step back from Einstein's general relativity and create a theory that was in several important ways quite different from Einstein's theory. In perhaps the most important difference, Hoyle assumed that the fundamental masses of elementary particles increase in time; they are not constant, as we would normally presuppose. The implications were huge. For example, if particle masses increase in time then measuring rods will shrink under the increased gravitational attraction between them, and this, in turn, means that the distance between objects will appear to increase in time. The stunning result is to dismiss the problem of t=0: according to the steady state theory, the geometry of the universe is constant in time even though it appears to be expanding, and this in turn means that the universe no longer has the absolute beginning in time.

So how then should one decide which cosmology to support: steady state or Big Bang? Of course the decision would ultimately be based on the discovery of new

empirical data, and this happened when, in 1964, Arno Penzias and Robert Wilson detected what we now call the cosmic microwave background radiation. But until then scientists could not use empirical evidence to definitively choose between the Big Bang model and the steady state model. Instead in the debates over which cosmology to adopt, scientists often appealed to philosophical, and even to theological arguments, some of which were implicit and others explicit. As historian of science Hulge Kragh notes:

In the absence of crucial observational data, much interest was directed toward the philosophical foundations and implications of the theories. The one which showed the stronger philosophical basis would attract new support and appeal to more scientists. On the other hand, if one of the theories turned out to be less scientific than its rival --- judged by criteria which necessarily must be philosophical --- it would be likely to lose support.

With this as background we may now look first in some detail at such philosophical arguments used in the debate over cosmology, and then at additional theological arguments.

Philosophical arguments used in the debate over cosmology

Hoyle repeatedly objected to the idea that a universe could simply begin at a finite time in the past. "(I)t is against the spirit of scientific enquiry to regard observable effects (i.e., the current state of the universe) as arising from 'causes unknown to science', and this is in principle what creation-in-the-past implies." He believed that t=0 was an "irrational process that cannot be described in scientific terms … (I)t seems to me in the philosophical sense to be a distinctly unsatisfactory notion, since it puts the basic assumption (i.e., of an absolute origin of the universe) out of sight where it can never be challenged by a direct appeal to observation." In contrast, Hoyle's steady-state

theory portrayed the universe as infinitely old and expanding forever with no absolute beginning. For Hoyle this was the only truly rational scientific picture of the universe.

But the steady state model had its own problems. For example, it required the continuous creation of matter in order to keep the mass-energy density of the universe constant in time as the universe expanded and this raised philosophical concerns of its own. For example, George McVittie and Edward Milne argued that the continuous creation of matter in the steady state model violated Occam's razor, namely that the simplest of the competing models should be preferred. They preferred the Big Bang model, with its single creation of matter at t=0, over Hoyle's continuous creation of matter.

Theological arguments used in the debate over cosmology

Next let's turn to the role of theology, generically understood, within cosmology. Here Milne and Edmund Whittaker opted for the Big Bang because it seemed to them to support Christian theism. Whittaker suggested that a Thomistic-style proof of God could be based on Big Bang cosmology, particularly the temporal beginning of the universe at t=0, although "the Creation itself being a unique event is of course outside science altogether." This is a particularly explicit example of what Robert Boyle must have had in mind for his lectures! Even more explicitly theological was Milne's goal to construct a cosmology that accords with his Christian theism. For Milne such a cosmology had to include a cosmic beginning point, a "t=0" and thus creation by a transcendent cause. Here indeed is an example of theology influencing theory construction in science. W. H. McCrea defended Big Bang cosmology against steady state cosmology because it seemed to him to support Christian theism. But Bernard Lovell, a staunch Christian, argued that both Big Bang and Steady State models were in accord with Christian theology because the creation of matter, whether at the absolute beginning, t=0, in Big Bang cosmology or continuously in the steady state models, was ultimately an act of God.

At the same time, and not surprisingly, a number of atheist scientists, along with Hoyle, supported the steady state cosmology.

In sum the world of scientific cosmology during the late1940s through the mid-1960s was ripe with conflicting philosophical and theological arguments some of which supported Hoyle's steady state cosmology while others supported Einstein's Big Bang cosmology. My overall point, again, is that when scientists debate the reasons guiding their research, both when constructing a specific theory and when choosing between competing theories, philosophical and theological views and insights routinely fund their reasons.

Of course the 'cosmic stand-off' would eventually be resolved. As I mentioned above, this happened dramatically with the discovery of the cosmic microwave background radiation by Penzias and Wilson in 1964. It was followed by several other astronomical discoveries, such as the ratio of cosmic hydrogen to helium and the structure of ancient galaxies. These and other discoveries seemed, cumulatively, to settle the matter in favor of Einstein for most scientists and philosophers. But did it conclusively? We'll return to the very surprising answer to this question at the end of today's lecture.

Quantum mechanics

The history of quantum mechanics starts with the discovery of energy quantization by Max Planck in 1900, namely that energy comes in discrete packets, continues through the derivation of the Schrödinger equation in1926 and culminates in the unification of the diverse formulations of quantum mechanics by David Hilbert, Paul Dirac, and John van Neumann in 1930. This history offers yet another example of the roles of both theology and philosophy as they enter subtly and indirectly into the conversations by scientists about which theories to create, adopt, develop, support and challenge. It is

my belief that their creative role in the history of contemporary physics might be an encouragement to making their roles more explicit today in the scientific academy.

Philosophical and theological arguments in the debate over quantum mechanics

We now turn directly to examples of the influence of philosophical and theological arguments on the development of quantum mechanics, where again I am taking "theology" in the generic sense embedded in world religions. In general the influence is both pervasive and diffuse, and any attempt to gauge it is often like trying to see through a mist over a complex and darkened landscape: what we have is often sketchy, indirect, and anecdotal. But there are a few examples in which the influence is quite clear.

A key example is Erwin Schrödinger's fascination with Vedanta. According to Schrödinger "the multiplicity (of nature) is only apparent. This is the doctrine of the Upanishads. And not of the Upanishads only. The mystical experience of the union with God regularly leads to this view, unless strong prejudices stand in the way." It was this view that led Schrödinger to describe quantum processes as fundamentally wavelike.

Niels Bohr, though an atheist, was deeply influenced by the existentialist philosophy of Søren Kierkegaard. He adopted the yin yang for his coat of arms with the logo *contraria sunt complementa*, "opposites are complementary."

And Albert Einstein was heavily influenced by the pantheism of Baruch Spinoza. Although he rejected a personal God as he moved away from the Judaism of his youth, he came to speak about a "cosmic religion" that was "necessary" for science.

With that in mind, I want to drill down on one particularly well know part of the philosophical debate over quantum mechanics, namely those in the 1927 and 1930 Solvay Conferences. I will focus on the interchange between Niels Bohr defended the

majority view called "the Copenhagen interpretation of quantum mechanics", and Albert Einstein who challenged it. Bohr had been a key contributor to the development of quantum mechanics for over two decades. Einstein was awarded the Nobel Prize for his explanation of the "photo-electric effect", which demonstrated the particle-like character of light. As is well known, Bohr accepted the statistics of quantum mechanics as indicative of an underlying indeterminism in the properties of quantum systems, even when the indeterminism played out 'instantaneously' over large distances in what we now describe as "quantum non-locality" and "quantum entanglement." Einstein disdained both indeterminism and non-local action-at-a-distance in quantum mechanics. Einstein and Bohr debated these issues at the Solvay conferences in 1927 and 1930, and most of the audience felt Bohr's views took the upper hand. Einstein then shifted his philosophical position. Initially he had claimed that the presence of statistical predictions, particularly as reflected in Heisenberg's uncertainty principle, must mean that quantum mechanics is incorrect. Later in the 1930s he moved to the claim that quantum mechanics is incomplete since there must be sufficient natural causes to explain the apparent indeterminism in the data. He spent the rest of his career searching for a new and more adequate theory of atomic processes that was based on the causal closure of nature

The uptake for tonight's lecture is this: a) Even a theory as well validated empirically as quantum mechanics can be subject to competing interpretations. b) These competing interpretations are often shaped, in part, by philosophical and even theological assumptions. c) These competing interpretations influenced the decisions by quantum scientists about how to respond to quantum mechanics. They drove one group of scientists, Bohr and his supporters, to accept quantum mechanics as a complete theory even when it challenges a realist philosophy of science. They led another group of scientists, Einstein and his followers, to search for a new quantum theory that would include and yet transcend the existing quantum theory and remove its indeterministic character, thus satisfying Einstein's philosophical commitment to determinism in nature.

On the one hand, for Bohr it made no sense to ask what caused the statistical measurements on an elementary particle as reflected in Heisenberg's principle of indeterminacy. Bohr accepted the limitations of quantum mechanics on what we can measure and declared that quantum mechanics was a complete theory, one which told all that we can know about elementary physical processes. On the other hand, Einstein, influenced by his early roots in Judaism even while moving into a Spinozistic view of nature in his mature years, believed that a valid scientific theory should give a realist explanation of nature without a trace of chance, and quantum mechanics obviously failed to do this.

The upshot: these differences in the decisions about the scientific status of quantum mechanics by Bohr and Einstein were based in large measure on philosophical grounds and partially influenced by theology as well. The key is that in neither case were the conflicts between these interpretations of quantum mechanics, nor the different research programs these scientists subsequently pursued, resolvable by an appeal to empirical data.

In my view, then, the conclusion is clear: when the data cannot adjudicate between competing interpretations, such as we have here, it is entirely reasonable to rely on "extra-scientific" factors, namely philosophical, theological, and aesthetic factors to act as criteria of theory choice between competing interpretations as Einstein and Bohr did about quantum mechanics. This is in fact how theoretical science works. We only need to acknowledge this fact and work with it, even if it challenges our presuppositions that science is rationally neutral to such "extra-scientific" factors. Science's actual, though complex, history dispels this foreshortened, overly rationalistic view. In essence, actual research science includes the influences of philosophical, theological and aesthetic elements in the formation of new theories and as criteria of theory choice between existing theories.

Conclusions and reflections

The two examples I have given of philosophical and theological influences in research science are admittedly historical examples. One might respond that they are little more than oddities of history. According to the conventional wisdom taught me in my undergraduate and graduate courses in physics, and reiterated by my seminary faculty in theology, the influences of philosophy and theology in scientific research inevitably fade out as competition between paradigm are settled, and as winning theories become established and their ramifications become what Kuhn called "normal science." So, as the conventional story goes, the debates over Big Bang and Steady State cosmology died out in the 1960s with the discovery of the background microwave radiation as overwhelming evidence favoring Big Bang. In a similar way the debates over Einstein's and Bohr's interpretations of quantum mechanics died out as a single formulation of QM, one centered on the Schrödinger equation and Copenhagen indeterminism, came to predominance in the1930s. It was given additional support by Bell's theorem, its implications for quantum non-locality, and its tests in the 1960s, and has been taught in introductory physics courses around the world over the past century.

But did the debates, and their philosophical interpretations and their occasional theological underpinnings, really die out? Or can we still find traces of them in the conflicting models physicists create and deploy today? And should Christian theologians be game to enter into the dialogue and work with physicists who might be open to this wider conversation, hoping to make suggestions that might have some positive influence in research science which reflect their deepest held theological commitments?

Perhaps the best response to this question is to turn once again, but very briefly, to what is actually taking place in contemporary research. We saw above the routine claim that the discovery of the cosmic microwave background radiation and other astronomical and astrophysical evidence ended the debate in favor of Big Bang cosmology in the 1960s, and that by the 1930s quantum mechanics was given not only

a single mathematical formulation but also a standard interpretation. But is that really the whole story? Actually, no.

First, cosmology: it turns out that contemporary research stemming from Hoyle's steady state program can still be found. In the 1960s, Jayant V. Narlikar began working with Hoyle on a new theory of gravity. Like the original steady state cosmology, the Hoyle-Narlikar theory does away with the problematic "t=0" that is rooted in Einstein's Big Bang cosmology. Moreover it addresses several problems with the initial steady state model, the most important of which is that is that it provides an explanation of the microwave background radiation discovered by Penzias and Wilson.

Similarly the debates in fundamental physics between the standard model of elementary particles and string theory reflect ongoing unsettled philosophical issues dating back to the early years of quantum mechanics. So for example one of the debated question is whether elementary particles are discrete entities in space-time or whether they are relations between entities that are extended in space-time (i.e., "strings"), a philosophical debate with roots in Aristotle versus Leibnitz.

Are there Christian theologians willing to enter into conversations with research scientists and explore whether theological commitments might be of interest to their research? A clear example can be found in the writings of John Polkinghorne. As early as 1989, when discussing a non-interventionist account of divine action, Polkinghorne argued that such an account requires a domain of genuine openness in nature, i.e., ontological indeterminism in nature. At first Polkinghorne seemed to argue that chaotic processes provide such indeterminism: chaotic systems "reflect an intrinsic openness in the behavior of these systems." But since the theory which accounts for them, standard chaos theory, is fully deterministic, it seemed like this move from physics to philosophy and then to theology couldn't work.

But in light of his Gifford Lectures I am convinced that Polkinghorne is actually moving in the opposite direction: not from science through philosophy to a theology of nature, but from a set of theological convictions about the world being open to divine and to human action back to science where "the deterministic equations (of standard chaos theory) … are then deemed to be *emergent downward* approximations to the true, supple, physical reality." This move from theology to science represents beautifully what I am calling for in this Boyle Lecture. I see John as stipulating, based on his theological convictions, that nature must be intrinsically open; he is not concluding that it is so from existing chaos theory. In essence he can be seen as calling for a new scientific research program dealing with chaotic and complex systems in nature, one which points to ontological indeterminism in reality. Here I can only heartily say: "Bravo!" I applaud this approach and encourage its pursuit. A successful move from theology to new research in science would provide a powerful vindication of the cognitive capability of theology and an excellent example of one part of what I am calling "creative mutual interaction" (CMI).

In my own writings over the past decade I have analyzed a series of specific research programs in current science which I believe are what one might adopt as a Christian scientist if one believes the natural world is the creation of the Trinitarian God. I have focused specifically on an understanding of the relation between time in nature and the eternity of God based on Pannenberg's development of the Trinity and eschatology. This relation leads to the idea that physical time is more complex than the view of linear time we find throughout science. Instead time in nature should be viewed as highly non-linear and multiply connected, reflecting the theological belief that the Easter event is the manifestation in history of the future eschatological New Creation. I have then found dozens of research programs in physics which embody such a more complex view of time. I see this then as another example of CMI.

CMI, in turn, is an important part, although by no means the only part, of the mission of the Center for Theology and the Natural Sciences, located at the Graduate

Theological Union in Berkeley. Its research and teaching programs involve a multitude of conversations between Christian theology, in an explicitly ecumenical and inter-faith context, and the sweep of contemporary natural science, ranging from physics and cosmology to evolutionary and molecular biology, to genetics, and extending into the neurosciences and the cognitive sciences. I see these conversations as going, at least potentially, in both directions, following my metaphor of two-way traffic on the Golden Gate Bridge. I believe they can be of tremendous potential not only for the credibility and relevance of Christianity in our secular age but for all world religions whose scholars are committed to participating in conversations about science. They offer an invitation to discover things about nature which are of ultimate concern to our personal lives, to our global cultures, and to our most profound experiences of the divine. I believe these conversations are immensely enhanced when they flow in both directions between the theological and the scientific communities, as I hope I have suggested in this presentation.

On that note please let me thank you once again for your gracious invitation to address you tonight on the occasion of the 2017 Boyle Lecture.

The Boyle Lecture 2018

The fifteenth Boyle Lecture will be given early in 2018 by

Dr Mark Harris
Senior Lecturer in Science and Religion, University of Edinburgh.

Dr Harris writes about his work in the science-and-theology field as follows:

“As a physicist working in a theological environment, I'm interested in the complex ways that science and religion relate to each other. Active in physics for many years, I'm known (with Steve Bramwell of University College London) as the discoverer of 'spin ice', a counter-intuitive model that has revolutionised research in magnetism.

“Midway through my scientific career I discovered theology, a moment of awakening not unlike that provided by my first chemistry set at the age of ten. After ordination as an Anglican priest, and spells in university chaplaincy at Oxford and cathedral ministry in Edinburgh, I now combine my academic interests in physics and theology by running the Science and Religion programme of study and research at Edinburgh.

“I am currently working on a project to create online distance learning programmes in Philosophy, Science, and Religion (funded by the John Templeton Foundation), along with my colleagues Dr Jamie Collin (Divinity), and Prof Duncan Pritchard (Philosophy).

“My research interests include the relationship between the physical sciences and theology, and the impact of science on modern views of the Bible, especially in thinking on miracles and divine action. I am currently working on a book project on naturalism (the philosophical basis for the natural sciences), and the ways that historical debates on naturalism in geology provide a new way of looking at miracles.”

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