Canyon Institute for Advanced Studies

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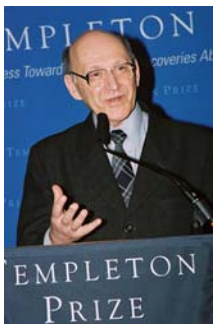
IN THIS ISSUE

Polish Cosmologist and Catholic Priest Wins 2008 Templeton Prize



Michael (Michał) Heller, a Polish cosmologist and Catholic priest who for more than 40 years has developed sharply focused and strikingly original concepts on the origin and cause of the universe, often under intense governmental repression, has won the 2008 Templeton Prize.

The Templeton Prize, valued at £820,000, more than $1.6 million, was announced on March 12, 2008 at a news conference at the Church Center for the United Nations in New York by the John Templeton Foundation, which has awarded the prize since 1973. The Templeton Prize is the world's largest annual monetary award given to an individual.

Heller, 72, Professor in the Faculty of Philosophy at the Pontifical Academy of Theology in Cracow, toiled for years beneath the stifling strictures of Soviet era repression. He has become a compelling figure in the realms of physics and cosmology, theology, and philosophy with his cogent and provocative concepts on issues that all of these disciplines pursue, albeit from often vastly different perspectives. With an academic and religious background that enables him to comfortably and credibly move within each of these domains, Heller's extensive writings have evoked new and important consideration of some of humankind's most profound concepts.

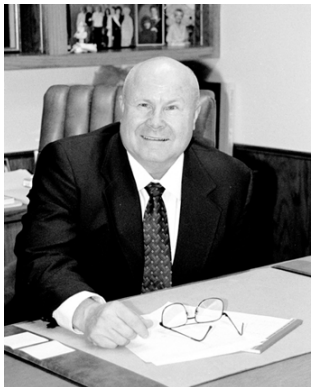
Heller's examination of fundamental questions such as "Does the universe need to have a cause?" engages a wide range of sources who might otherwise find little in common. By drawing together mathematicians, philosophers, cosmologists and theologians who pursue these topics, he also allows each to share insights that may edify the other without any violence to their respective methodologies.

Despite the active anti-intellectualism of the Communist regime that controlled Poland for the majority of his life, Heller established himself as an international figure among cosmologists and physicists through his prolific writings–he has more than 30 books and nearly 400 papers to his credit–on such topics as the unification of general relativity and quantum mechanics, multiverse theories and their limitations, geometric methods in relativistic physics such as noncommutative geometry, and the philosophy and history of science.

Simultaneously, as a Catholic priest, Heller surmounted the anti-religious dictates of Polish authorities, opening new vistas for the faithful by positioning the traditional Christian way of viewing the universe within a broader cosmological context and by initiating what can be justly termed the "theology of science."

Inside this newsletter, you can read more about the relationships, influences, adversities, and accomplishments that shaped the life of Reverend Professor Dr. Michael Heller.

From the Director's Desk



One of the most rewarding aspects of my work with Canyon Institute for Advanced Studies is to be in the midst of relationships that are being woven together for the purpose of creating something where there once was nothing. In this newsletter, I have the privilege of telling you about relationships that connect a college student named Richard, his university professor, a community college administrator, a Canadian physicist and quantum cosmologist, a Polish cosmologist and Catholic priest, and a global investor and philanthropist—Sir John Templeton— whose vision and commitment have connected them across disciplinary, institutional, and geographic boundaries.

The Templeton Prize is a cornerstone of the John Templeton Foundation's international efforts to serve as a philanthropic catalyst for discovery in areas engaging life's biggest questions, ranging from explorations into the laws of nature and the universe to questions on love, gratitude, forgiveness, and creativity. The Prize was created to underscore Templeton's belief that benefits from advances in spiritual discoveries can be quantifiably more vast than those from other worthy human endeavors.

As for Richard Ricketts, he is a student of Dr. Lynda Stryker, a professor at Arizona State University-West Campus. Dr. Stryker is the recipient of two Templeton Foundation awards for her Science and Religion course. Dr. Stryker, Richard, and 26 other ASU students enrolled in the course recently attended Dr. Don Page's lecture in Phoenix, "Does God So Love the Multiverse?" This was the first time Dr. Page presented this lecture in the U.S. With the support of the Templeton Foundation, he developed and first delivered the lecture this past October to Chinese students at Shandong University in Jinan, China.

Dr. Page's Phoenix lecture was hosted by Paradise Valley Community College (PVCC). Robert Bendotti, PVCC's Vice President of Academic Affairs, recognized the connections between his institution's goal to provide quality educational offerings to the community and our goal to situate our annual public lecture series within community-based venues. Here in this newsletter, you will be introduced to Richard and Robert through their letters to the editor. You will also be introduced to another person who is connected through the efforts of the Templeton Foundation—Reverend Professor Dr. Michał Heller.

Dr. Heller, a Polish cosmologist and Catholic priest is the recipient of the 2008 Templeton Prize for Progress Toward Research or Discoveries about Spiritual Realities. John M. Templeton, Jr., M.D., Chairman and President of the John Templeton Foundation and son of Sir John, noted that Dr. Heller's scholarship has exposed the global community to a wider understanding of purpose in life. "Michael Heller's quest for deeper understanding has led to pioneering breakthroughs in religious concepts and knowledge as well as expanding the horizons of science."

Heller plans on expanding horizons further by dedicating the Templeton Prize money to help create the Copernicus Center in conjunction with Jagiellonian University and the Pontifical Academy of Theology in Cracow to further research and education in science and theology as an academic discipline.

The possibilities contained within the lives of the individuals presented in this newsletter and the relationships brought about by the Templeton Foundation give me cause to wonder about Richard and his peers at ASU and PVCC. Might they, like Sir John Templeton and Dr. Heller, one day create something where there once was nothing?

Bill R. Williams

Director

Letters to the Editor

Dear Editor:

On February 7, 2008 I attended a lecture by physicist Dr. Don N. Page titled "Does God so Love the Multiverse?" Dr. Page presented the probability and possible reality of the multiverse as an explanation for the fine tuning of the universe. I especially noted how Dr. Page believes that this idea is not at all incompatible with his own theistic beliefs. He does not perceive the multiverse theory as any more of a threat to his theistic beliefs than the theory of evolution; for him, both theories are compatible with theism. Dr. Page argued that the idea of a multiverse is not something to be feared but rather a theory that could possibly reveal greater insight into the workings of God.

Dr. Page refrained from addressing proofs or arguments for or against the existence of God. His main focus was to introduce the idea that the multiverse theory is not beyond probability and is, in fact, quite plausible. As an introduction to a theory that is gaining momentum within the scientific community, this lecture did not promote any of the specific versions of the multiverse theory. Dr. Page also stated that this developing theory should not be blindly accepted. He advised the audience to let the evidence and science unfold in time while keeping an open mind and not shutting out possibilities due to religious beliefs.

Having never attended one of your public lectures before, I was unsure of what to expect. I am a dual-major in applied ethics and religious studies at Arizona State University. The applied ethics area focuses more on philosophy and the application of religions and how they influence the interpretations of things from everyday activities to intense religious experiences to major scientific

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Letters to the Editor

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discoveries. Complementing the emphasis on ethics, the religious studies degree provides a solid historical foundation for understanding the development of the religions themselves. I am by no means a physicist or any other kind of scientist in a formal sense, but I try to keep up on scientific research due to the possible metaphysical and epistemological implications. I also have a natural curiosity about the workings of the universe.

My academic focus and my curiosity are what compelled me to attend the lecture. I was interested in how Dr. Page would reconcile his theological beliefs with his physics perspectives. I also wanted to gain a basic understanding of the multiverse theory. As for Dr. Page's reconciliation of theology and science, his type of dialogue is vital. As ever-expanding technologies allow us to generate new knowledge about the universe, there is a need to understand the implications this new knowledge may have as we re-examine the philosophical and religious foundations upon which various people groups construct their worldviews. It is important to understand that the conflict between science and religion is a pseudo-argument; the true conflict is between competing worldviews and the distinction between data and fact (the influence of individuals' worldviews on their interpretation of data). Dr. Page's lecture was a small step in the right direction—toward progressing an age-old discussion that is imperative for the advancement of humanity.

Sincerely,

Richard Ricketts

Photo by Brian Hermann

Students from Dr. Lynda Stryker's Arizona State University-West Campus course "Science and Religion" attended Dr. Don Page's lecture "Does God So Love the Multiverse?" Standing in the back row are: Nicholas Erwin, Joe Hubbard, Dr. Don Page, and George Holland; middle row includes Stephanie Hubbard and Dr. Linda Stryker, and kneeling in the front row are Richard Ricketts, Leslie Grill, and Adam Norwood. Noteworthy is that Dr. Stryker's ASU course has received two Templeton Foundation Science & Religion Course awards.

Photo by Brian Hermann

Robert Bendotti, Vice President of Academic Affairs for Paradise Valley Community College; Barbara Small, Executive Manager, Canyon Institute for Advanced Studies; Dr. Don N. Page, Professor of Physics, University of Alberta, and Dr. Bill Williams, Director of Canyon Institute for Advanced Studies visit following Dr. Page's lecture at Paradise Valley Community College on February 7, 2008.

Dear Editor,

As learning organizations dedicated to supporting transformative learning—learning that causes students to question their assumptions, beliefs, values and perspectives—Canyon Institute for Advanced Students (CIAS) and Paradise Valley Community College (PVCC) recently entered into a "pilot partnership." The partnership formed around a rich opportunity to bring the cutting-edge thinking and provocative perspectives of internationally recognized physicist Dr. Don Page to residents of the North Valley. With well over 150 students, faculty, community members, and members of the Phoenix Astronomical Society in attendance, Dr. Page inspired and encouraged the audience to think in new and creative ways as he discussed the "multiverse" theory and the many questions that emerge when a fundamental assumption of our world and our place in it is brought into question.

Paradise Valley Community College was pleased to host Dr. Page, Canyon Institute for Advanced Studies, and the Phoenix Astronomical Society for this quality educational offering. We look forward to future collaborations with CIAS as our college continues to actualize our vision as it relates to effecting "positive social change" both in our students and in the community we serve.

Sincerely,

Robert A. Bendotti
Vice President of Academic Affairs
Paradise Valley Community College

Science is but a Collective Effort of the Human Mind to Read the Mind of God

By Professor Michael (Michał) Heller

The 17th-century German mathematician and philosopher, Gottfried Wilhelm Leibniz, is my philosophical hero. I am proud (but not quite happy) that I share with this great philosopher at least one feature. He was a master in spreading, not to say dissipating, his genius into too many fields of interest. If he had a greater ability to concentrate on fewer problems, he would have become not only a precursor but also a real creator of several momentous scientific achievements. But in such a case, the history of philosophy would be poorer by one of its greatest thinkers. This is not to say that in my case the history of philosophy would lose anything. This is only to stress the fact that I am interested in too many things.

Amongst my numerous fascinations, two have most imposed themselves and proven more time resistant than others: science and religion. I am also too ambitious. I always wanted to do the most important things, and what can be more important than science and religion? Science gives us Knowledge, and religion gives us Meaning. Both are prerequisites of the decent existence. The paradox is that these two great values seem often to be in conflict. I am frequently asked how I could reconcile them with each other. When such a question is posed by a scientist or a philosopher, I invariably wonder how educated people could be so blind not to see that science does nothing else but exploits God's creation. To see what I mean, let us go to Leibniz.

In one of his essays, entitled *Dialogus*, in the margin we find a short sentence written by Leibniz's hand. It reads: "When God calculates and thinks things through, the world is made." Everybody has some experience in dealing with numbers, and everybody, at least sometimes, experiences a feeling of necessity involved in the process of calculating. We can easily be led astray when thinking about everyday matters or pondering all pros and cons when facing an important decision, but when we have to add or multiply even big numbers everything goes almost mechanically. This is a routine work, and if we are cautious enough there is no doubt as far as the final result is concerned. However, the true mathematical thinking begins when one has to solve a real problem, that is to say, to identify a mathematical structure that would match the conditions of the problem, to understand principles of its functioning, to grasp connections with other mathematical structures, and to deduce the consequences implied by the logic of the problem. Such manipulations of structures are always immersed into various calculations since calculations form a natural language of mathematical structures.

It is more or less such an image that we should associate with Leibniz's metaphor of calculating God. Things thought through by God should be identified with mathematical structures interpreted as structures of the world. Since for God to plan is the same as to implement the plan, when "God calculates and thinks things through," the world is created.

We have mastered a lot of calculation techniques. We are able to think things through in our human way. Can we imitate God in His creating activity?

In 1915 Albert Einstein wrote down his famous equations of gravitational field. The road leading to them was painful and laborious—a combination of deep thinking and tedious work of doing calculations. From the beginning Einstein saw an inadequacy of time-honored Newton's theory of gravity: it did not fit into a spatio-temporal pattern of special relativity, a synthesis of classical mechanics and Maxwell's electrodynamical theory. He was hunting for some empirical clues that would narrow the field of possibilities. He found some in the question: Why is inertial mass equal to gravitational mass in spite of the fact that, in Newton's theory, they are completely independent concepts? He tried to implement his ideas into a mathematical model. Several attempts failed. At a certain stage, he understood that he could not go further without studying tensorial calculus and Riemannian geometry. It is the matter distribution that generates space-time geometry, and the space-time geometry that determines motions of matter. How to express this illuminating idea in the form of mathematical equations? When finally, after many weeks of exhausting work, the equations emerged before his astonished eyes, the new world has been created.

In the beginning, only three, numerically small, empirical effects corroborated Einstein's new theory. But the world, newly created by Einstein, has soon become an independent reality. Yet in his early work, the field equations suggested to Einstein the existence of solutions describing an expanding universe. He discarded them by modifying his original equations, but in less than two decades it turned out that the equations were wiser than Einstein himself: measurements of galactic spectra have revealed that, indeed, the universe is expanding. In the subsequent period, lasting until now, theoretical physicists and mathematicians have found a host of new solutions to Einstein's equations and interpreted them as representing gravitational waves, cosmic strings, neutron stars, stationary and rotating black holes, gravitational lensing, dark matter and dark energy, late stages of life of massive stars, and various aspects of cosmic evolution. In Einstein's time nobody would have even suspected the existence of such objects and processes, but all of them have been found by astronomers in the real universe.

Perhaps now we better understand Leibniz's idea of God creating the universe by thinking mathematical structures through. We should only free the above sketched image of creating physical theories from all human constraints and limitations, and take into account a theological truth that for God to intend is to obtain the result, and to obtain the result is to instantiate it. Einstein was not far from Leibniz's idea when he was saying

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that the only goal of science is to decode the Mind of God present in the structure of the universe.

And what about chancy or random events? Do they destroy mathematical harmony of the universe and introduce into it elements of chaos and disorder? Is chance a rival force of God's creative Mind, a sort of manichean principle fighting against goals of creation? But what is chance? It is an event of low probability which happens in spite of the fact that it is of low probability. If one wants to determine whether an event is of low or high probability, one must use the calculus of probability, and the calculus of probability is a mathematical theory as good as any other mathematical theory. Chance and random processes are elements of the mathematical blueprint of the universe in the same way as other aspects of the world architecture.

Mathematical structures that are parts of the composition determining the functioning of the universe are called laws of physics. It is a very subtle composition indeed. Like in any masterly symphony, elements of chance and necessity are interwoven with each other and together span the structure of the whole. Elements of necessity determine the pattern of possibilities and dynamical paths of becoming, but they leave enough room for chancy events to make this becoming rich and individual.

Adherents of the so-called intelligent design ideology commit a grave theological error. They claim that scientific theories, which ascribe the great role to chance and random events in the evolutionary processes, should be replaced, or supplemented, by theories acknowledging the thread of intelligent design in the universe. Such views are theologically erroneous. They implicitly revive the old manichean error postulating the existence of two forces acting against each other: God and an inert matter; in this case, chance and intelligent design. There is no opposition here. Within the all-comprising Mind of God, what we call chance and random events are well composed into the symphony of creation.

When contemplating the universe, the question imposes itself: Does the universe need to have a cause? It is clear that causal explanations are a vital part of the scientific method. Various processes in the universe can be displayed as a succession of states in such a way that the preceding state is a cause of the succeeding one. If we look deeper at such processes, we see that there is always a dynamical law prescribing how one state should generate another state. But dynamical laws are expressed in the form of mathematical equations, and if we ask about the cause of the universe we should ask about a cause of mathematical laws. By doing so we are back in the Great Blueprint of God's thinking the universe. The question on ultimate causality is translated into another of Leibniz's questions: "Why is there something rather than nothing?" (from his *Principles of Nature and Grace*). When asking this question, we are not asking about a cause like all other causes. We are asking about the root of all possible causes.

When thinking about science as deciphering the Mind of God, we should not forget that science is also a collective product of human brains, and the human brain is itself the most complex and sophisticated product of the universe. It is in the human brain that the world's structure has reached its focal point—the ability to reflect upon itself. Science is but a collective effort of the Human Mind to read the Mind of God from question marks out of which we and the world around us seem to be made. To place ourselves in this double entanglement is to experience that we are a part of the Great Mystery. Another name for this Mystery is the Humble Approach to reality—the motto of all John Templeton Foundation activities. The true humility does not consist in pretending that we are feeble and insignificant, but in the audacious acknowledgement that we are an essential part of the Greatest Mystery of all—of the entanglement of the Human Mind with the Mind of God.

Reverend Professor Dr. Michał Heller: Determined to Pursue Two Disciplines that Represent the Important Things

Editors Note: *The following timeline provides an overview of the relationships, influences, adversities, and accomplishments that shaped the life of Reverend Professor Dr. Michał Heller. As a 10-year-old boy, having gained insights into religion as well as mathematics and physics, Michał Heller was determined to pursue the important things in his life. The young Heller concluded that the two disciplines of religion and science were among those important things and that both would be part of his life. Ultimately, his decision and determination set a path that led to the priesthood and academia.*

March 12, 1936: Michał Heller is born in Tarnow, Poland, to Zofia, a teacher, and Kaziemierz Heller, an electrical and mechanical engineer who is also a painter and is well-versed in several languages. The Heller home includes Michał Heller's four sisters.

September 1939: With the help of colleagues, Kaziemierz Heller, who holds a critical position in a chemical factory near Tarnow, sabotages the factory to keep it out of the hands of approaching German troops. He escapes with his family to Lvov, now part of Ukraine, but then a former part of Poland within the control of the Soviet Union.

1940: After a few months in Lvov, the Heller family is awakened one morning and taken to a "special train" by Soviet soldiers. Acting under orders of Stalin, the authorities deport approximately one million Poles–including the Heller family–to Siberia to serve as a labor force to log the forests. A deeply religious family, the Hellers rely on the strength and solace of religion to help survive the extreme conditions.

1944: As German soldiers enter deep into Soviet territory,

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Dr. Michał Heller: Determined to Pursue Two Disciplines

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Stalin fears that Germans who had lived along the Volga River since the time of Catherine the Great in the late 18th century might link forces with invading troops. To thwart any such possibility, Stalin forces the "Volga Germans" to Siberia. As a counterweight, some exiled to Siberia earlier–including the Heller family–are taken to the Volga region. The Hellers settle near the city of Saratov in southern Russia.

1946: Among the spoils of war, Poland becomes a satellite of the Soviet Union, the eastern part of Poland (including Lvov) belongs to Russia, and part of eastern Germany becomes Poland. Many Poles–including the Heller family–deported previously to various parts of Russia now are transferred to western Poland in an effort to enhance the Polish population of the former German territory. The family resettles back in Tarnow.

Michał Heller, now ten years old, gains insights into religion as well as mathematics and physics listening to conversations of his father, family friends, and other guests in the Heller home. His father often speaks of a great need to combine religion and science. Determined to pursue important things in his life, the young Heller draws a natural conclusion that these two disciplines are among those important things and that both will be part of his life. This sets his path to both the priesthood and academia.

1946-53: Heller attends primary and secondary schools in Tarnow, enjoying studies and his classmates, but has an aversion to schools.

1953: Upon completion of secondary school, he enters the diocesan seminary in Tarnow. This step toward priesthood leaves his father less than happy as Michał is the last male heir of the family name.

1959: Completing philosophy and theology studies, he earns a master of theology degree from the Catholic University of Lublin in Poland. He is ordained a priest in April.

1959-60: Following ordination, he is assigned to a large parish centered in the small town of Ropczyce, about 30 miles east of Tarnow. Communist authorities, whose main tasks include making life hard for Christian believers, ensure that the new priest's time in the parish is painful. Following one Sunday sermon, local authorities interrogate him at length in a Communist Party building. Ironically, the building was once the family home of his grandfather, a high Austrian official in the region prior to World War I; the interrogation room was his parlour.

1960: Heller begins further studies at Catholic University in Lublin, at the time the only university in Poland at which a priest could study openly. Although he had long desired to study physics, his plans are thwarted when communist authorities withdraw the permission to open a physics section there. As an alternative, he starts studies in what was called "philosophy of nature." Fortunately for him, the physics and mathematics courses which had been prepared for the now shuttered physics section were incorporated into this area of study, allowing access to the subjects that so intrigued him. From the time he is a young priest, he begins meeting with various intellectuals, especially physicists and astronomers, through common excursions such as skiing and sailing.

1963: Karol Wojtyla, the future Pope John Paul II, becomes Archibishop of Cracow, a year after the first sessions of the Second Vatican Council.

1965: Obtains master of philosophy degree from the Catholic University of Lublin with a thesis on the philosophical aspects of relativity theory.

1966: Receives Ph.D. from the Catholic University of Lublin with a thesis in relativistic cosmology. Because the university is denied the right to grant degrees in physics, the Ph.D. is in philosophy. Heller begins teaching at the diocesan seminary in Tarnow and also in Cracow, in what would become the Pontifical Academy of Theology. The ongoing interference of the Communist regime continues to bear on his academic parameters. The Jagiellonian University–Poland's oldest university, founded in 1364–had expelled its theological faculty in 1954, but the faculty, now including Heller, continued its activities unofficially.

1969: Receives docent degree (assistant professorship) from the Catholic University of Lublin. A non-teaching degree, though it carries the rights to teach, it represents an academic achievement above and much more demanding than that of doctorate. His thesis covers Mach's Principle in relativistic cosmology.

This is a heady time as Karol Wojtyla, then Archbishop of Cracow, begins inviting scientists, philosophers and theologians to his residence to discuss topics at the interfaces of science and philosophy, science and theology, and science and general culture. Joseph Życiński (later Archbishop of Lublin) and Heller are part of this group, which starts calling itself the Center for Interdisciplinary Studies (CIS). Życiński and Heller are part of the Theological Faculty in Cracow, and CIS comes to be regarded as part of it.

1970: Heller's first book, *Wobec Wszechświata* (Facing the Universe) is published (Wyd. Znak, Cracow). He goes on to write and publish more than 30 books in Polish, roughly divided into three classes: (1) popularization of science, especially cosmology and its philosophical aspects; (2) philosophy of nature and philosophy of physics; and (3) science and religion.

1974: While he is with the Theological Faculty in Cracow, the Sacred Congregation of Seminaries and Universities in Rome bestows upon it the title of "Pontifical" at the initiative of Wojtyla. Under Wojtyla's tutelage, the single faculty develops into three: theology, philosophy and history.

1977: Named Visiting Professor, George Lemaitre Chair, at the Institute of Astrophysics and Geophysics at Catholic University of Louvain, Belgium. After years of refusal by authorities to grant him a passport, he finally receives permission to travel

outside of Poland. Still, obstacles remain, including obtaining visas from countries he wishes to visit, since many nations considered any traveller from Poland to be a Communist. Waits for visas at some consulates could stretch for days.

1978: After Wojtyla is elected Pope John Paul II, Heller and Zycinski continue the informal CIS seminars begun as Wojtyla's scientific-philosophic meetings

1980s: The rise of the Solidarity trade union movement ushers in an era of long-suppressed freedom across Poland that leads to weakened constraints from Communist authorities, and the freedom to publish and to travel.

Heller is among the physicists and astronomers interested in cosmology who start to gather in private houses, from which the Cracow Group of Cosmology emerges. They do common research and publish several papers advancing their scientific interests.

1981: John Paul II creates the Pontifical Academy of Theology from the former theology, philosophy, and history faculties at the Pontifical Theological Faculties in Cracow.

1982: Conducts research at the Institute of Astrophysics at Oxford University, U.K. and at the Physics and Astronomy Department of Leicester University, U.K. Returns to the Catholic University of Louvain, Belgium, where he again holds the George Lemaitre Chair at the Institute of Astrophysics and Geophysics**.**

1985: Appointed Associate Professor (*professor extraordinarius*) at the Pontifical Academy of Theology in the Faculty of Philosophy, Cracow, Poland.

1986: Conducts research in the Department of Philosophy, Catholic University of America, Washington, D.C., and at the Vatican Observatory in Castel Gandolfo, Italy. One of the oldest astronomical research institutions in the world, the Observatory's dependent research center, the Vatican Observatory Research Group, is hosted by the Steward Observatory at the University of Arizona in Tucson, where it operates a new generation telescope, known as the Vatican Advanced Technology Telescope at the Mount Graham International Observatory in southeastern Arizona.

During this time Heller and colleagues begin meeting with scholars from the West who visit as private guests, including Carl Friedrich von Weizsäcker, Charles Misner, Olaf Pedersen and others. As social transformations inspired by the rise of Solidarity facilitate international contacts, especially after 1989, many prominent scholars from the West are invited to take part in the interdisciplinary seminars sponsored by CIS in Cracow, including Arthur Peacocke (Oxford), John Polkinghorne (Cambridge) and Robert Russell (Berkeley).

1990: Appointed Full Professor (*professor ordinarius*) at the Pontifical Academy of Theology in the Faculty of Philosophy, Cracow.

1991: Elected (ordinary member) to the Pontifical Academy of Sciences, Rome. An independent body within the Vatican with full freedom of research, the Academy promotes scientific investigation and interdisciplinary co-operation. A continuation of the Lincei Academy founded in 1603, it was later renamed Nuovo Lincei by Pope Pius IX. Since its current renaming in 1936 by Pope Pius XI, the Academy has broadened its membership to include men and women from around the world and from a wide range of religions and academic positions. New members, elected by the Academy based on the scientific value of their research and high moral profile, are appointed by the Pope for life (80 members) or to one of a limited number of honorary academy memberships.

1992: *Theoretical Foundations of Cosmology: Introduction to the Global Structure of Space-Time* published (World Scientific, Singapore and London). The book is a technical study of the Universe as a structure.

1994: Influenced by Alain Connes' book, *Noncommutative Geometry* (Academic Press, 1994), Heller's interests gradually shift from cosmology proper to mathematical methods in cosmology and physics. Along with two other mathematicians, Leszek Pysiak and Wieslaw Sasin from Warsaw Technical University, he forms a second informal seminar group to work on the application of noncommutative geometry to cosmology and physics. The group remains active today.

1996: *The New Physics and a New Theology* published (Vatican Observatory Publications, Rome). It explores the historical fact that, in spite of their methodological differences, science and theology always interacted with each other.

1996: Receives Doctor Honoris Causa from the University of Science and Technology, Cracow.

Begins research at the Liège Astronomical Observatory at Liège University in Belgium and returns there over a period of several years.

2003: *Creative Tension: Essays on Science and Religion* published (Templeton Foundation Press, Philadelphia and London, and translations). A collection of essays, originally written in English, the book begins with a methodological analysis of theological interpretation of scientific theories, and culminates in a proposal of a "theology of science."

2004: Teaches mathematical physics as a visiting professor at Gregorian University in Rome.

2005: *Some Mathematical Physics for Philosophers* published (Pontifical Council for Culture, Gregorian University). The book is an attempt to explain mathematical methods in physics to students of philosophy. The paper, "Can the Universe Explain Itself?" published in *Wissen und Glauben* (Knowledge and Belief) (Öbvahpt, Vienna).

2006: Returns to Gregorian University in Rome as a visiting professor.

2008: *A Comprehensible Universe: The Interplay of Science and Theology* scheduled for publication (Springer Verlag, July). Written with George Coyne, S.J., the book explores the deep roots of the mystery of rationality. *Ultimate Explanations of the Universe* scheduled for publication (Universitas, in Polish). This book examines the crucial philosophical question concerning cosmology, "Can the Universe explain itself?"

Awarded the Templeton Prize.

Canyon Institute for Advanced Studies is

A Christian interdisciplinary research center, bringing together minds and resources to:

- Investigate and research issues emerging from new discoveries and advances—particularly those that redefine the boundaries of our knowledge and of its limits—to better understand their implications for us in the common ground of faith and discipline;
- Develop insights that lead to a more integrated view and understanding of the world around us, and of our stewardship of its emergent challenges;
- Disseminate information and perspectives to assist people of faith in the global community in developing sound, coherent, and informed foundations for engaging the exciting opportunities that lie before us.

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