



THE PONTIFICAL ACADEMY OF SCIENCES

*Plenary Session on*

# **BASIC SCIENCE FOR HUMAN DEVELOPMENT, PEACE, AND PLANETARY HEALTH**



**8-10 September 2022 | Casina Pio IV | Vatican City**



*"... greater attention should be paid to the values and fundamental goods that are at the basis of the relationship between peoples, society and science. This relationship demands a rethinking aimed at promoting the integral advancement of each human being and of the common good. Open dialogue and attentive discernment are indispensable, especially as science becomes more complex and the horizons that it opens up bring decisive challenges for the future of humanity. For today, both the evolution of society and scientific changes are taking place ever more rapidly, each following the other. It is important that the Pontifical Academy of Sciences consider how these interconnected changes require a wise and responsible commitment on the part of the entire scientific community."*

Pope Francis, Address to Participants in the Plenary Session of the Pontifical Academy of Sciences, 12 November 2018

<https://www.pas.va/en/magisterium/francis/2018-12-november.html>

# Concept of the Conference

**T**he Pontifical Academy of Sciences has held conferences and issued science-based statements urging to address, among others, the massive health problems caused by the pandemic and by inadequate health systems, the large-scale destruction of nature and the climate crises, artificial intelligence, rising inequalities, hunger and poverty, and increasing local and global conflicts. We identified specific science opportunities to address each of these problems.

The Academy has a strong track record of seeking scientific solutions and engaging with political and societal actors to implement innovative actions to overcome the most serious problems facing humanity.<sup>1</sup> The 2022 Plenary does not abandon this perspective. Actually, the emphasis on basic science in this conference with a thought-perspective “from basic science to problem solving”, is in the long run not in contradiction to the perspective “from noting problem to search for science”. Both perspectives serve human advancement and our planet, yet the former is at risk of being somewhat marginalized. This is especially true when crises, wars, and growing risks trouble people and planet, as is currently the case.

There are, for instance, key areas where basic science is going to improve human welfare, such as medicine, food systems, and energy and more. Many of the main disciplines of science are involved in those areas. The progress and prospects of basic science relating to those areas are hugely important and clearly timely. Moreover, basic science is of intrinsic value. Obtained insights lead to deeper understanding, knowledge and possibly wisdom. While keeping human development, peace and planetary health problems in perspective, the 2022 Biannual Plenary of the Pontifical Academy of Sciences aims to explore and highlight the driving forces and opportunities relating to basic science for human development, peace and planetary health. We will be addressing the following questions:

1. What are new and emerging breakthroughs in sciences?
2. How did science breakthroughs come about? And then ask
3. How can they influence new, better and more effective ways to reduce the threats and problems for people, peace, and planet?

The first two questions are fundamental to science processes. The third one is a challenge which we must engage in, too.

It is ever more important for **science to have peace as a goal**. The Pontifical Academy of Sciences has actively engaged in support of this goal at critical junctures before, such as addressing threats of nuclear war, and

more recently, risks of Artificial Intelligence and robotics in warfare. The many ongoing armed conflicts are of grave concern to us. The accelerated and even global risks that emerge from threatened or actual attacks by powerful countries on neighbors are putting political order and human civilization at risk. At a time when science is so dominant in culture, all science disciplines should consider their potential contributions to peace. Peace is a precondition for sustainable development. Divisiveness, for instance related to race – not just absence of war – undermines both peace and planetary health. This is the rationale of our theme “Basic science for human development, peace, and planetary health”.

The time horizon of science for certain issues such as climate, biodiversity, genetics and robotics must be very long term, even decades or centuries. Emphasis on basic sciences with a humanity and planetary health perspective is very much in line with the Academy’s Statute, “The aim of the Pontifical Academy of Sciences is to promote the progress of the mathematical, physical and natural sciences and the study of epistemological problems related thereto” and PAS “...promote(s) the progress of sciences and the solution of important scientific-technical problems, which are fundamental for the development of mankind”. When taking long-term views philosophical questions and epistemological problems must also be considered. An obvious one may be the ambit of science, what can be known, and how many problems there are beyond its consideration. This PAS Plenary Session features **a session in honor of H.E. Msgr. Marcelo Sánchez Sorondo**, our admired and esteemed former Chancellor, on the occasion of his 80th birthday and his emerging shift to emeritus. We can relate to Aristotle, who at the beginning of his *Metaphysics*, said “It is through wonder (τὸ θαυμάζειν) that men now begin and originally began to philosophize; wondering in the first place at obvious perplexities, and then by gradual progression raising questions about the greater matters too, e.g. about the changes of the moon and of the sun, about the stars and about the origin of the universe”. Admiration even leads one to wonder about the very origin of the whole universe, which some said was produced by chance, others by an intelligence, and others by love. “Now he who wonders – continues Aristotle – and is perplexed feels that he is ignorant (thus the myth-lover (ὁ φιλόμυθος) is in a sense a philosopher, since myths are composed of wonders); therefore, if it was to escape ignorance that men studied philosophy, it is obvious that they pursued science for the sake of knowledge, and not for any practical utility” (Aristot. *Met.* 1.982 b 11-20). The fact that important discoveries didn’t come about because of a goal, but because of **curiosity** as a result of wonder and admiration, raises philosophical, ethical, religious, as well as science policy questions. All knowledge, whether scientific, philosophical, or theological, is concerned with discovering the origin and cause of wonder and goes from wonder to wonder. Thus, Aristotle can show another es-

<sup>1</sup> See events and conferences at <https://www.pas.va/en/events/plenary-session.html> and <https://www.pas.va/en/events/workshop.html>

sential attribute of disinterested knowledge which is that of being liberal or free: “Clearly then it is for no extrinsic advantage that we seek this knowledge; for just as we call a man free (ἐλεύθερος) who exists for himself and not for another, so we call this the only free science, since it alone exists for itself” (Aristot. Met. 1.982b 28-30).

This Plenary is driven by the expectation that strong support for curiosity-driven science has huge payoffs that often come about in unpredictable ways, mostly in the long term, but increasingly even in the short term. A fine example of what basic science can achieve, as it happened, is the rapid development of the COVID vaccine thanks to developments in the decade-long studies of messenger RNA, which were planned for completely different purposes. Moving beyond anecdotes we want to explore systematic patterns in the progress of basic science insights in different disciplines and their interdisciplinary linkages. The conference discourse shall include voices of scientists about the challenges they faced, in order to understand the very basic aspects of the problem regarding, for instance, cutting-edge science like CRISPR-cas, Quantum Physics, Laser innovations, atmospheric science, mathematical algorithm innovations or Astrophysics.

The theme of the 2022 PAS Plenary is timely also in view of the **United Nations’ “International Year of Basic Sciences for Sustainable Development”** that will be developed on the basis of themes identified as priorities by UNESCO and the United Nations. <https://www.iybssd2022.org/en/home/>

The Pontifical Academy of Sciences had already addressed issues of **beliefs and science skepticism** in the

public at large, and the ability to adhere to false beliefs instead of rational arguments. These issues have further emerged in recent years. It is thus necessary to further consider at the Plenary 2022 the determinants of these tendencies, the role that religion may play in both adherence to science skepticism and openness to science, and the opportunities of science education to make a difference. Science discourse at PAS is transparent to the global public.

The **narratives on basic sciences** among PAS Academicians might be of interest to a broad community to see how science is done, and what can come out of it, not neglecting risks of misuse of science. We encourage scientists at the conference to speak from the bottom of their hearts about all aspect of curiosity-driven science, which has at times ended up unintentionally changing the world. Academicians may share their diverse narratives on what brought them to the invention and how curiosity and great efforts drove their work, but also how they connect to the big issues mentioned above, i.e. human development, peace, and planetary health.

### Organizational aspects

- We ask speakers to give **presentations of 15 minutes** max. For the presentations, PPTs are welcome.
- The conference sessions will be **recorded and made public** on the Academy’s YouTube channel [www.youtube.com/c/CasinaPioIV](http://www.youtube.com/c/CasinaPioIV)
- Speakers and chairs indicated with “tbc” are to **still be confirmed**.

# Program



| THURSDAY, SEPTEMBER 8th 2022   |   |
|--|---|
| 9:00   | <b>Chair: Joachim von Braun</b> <i>PAS President, Bonn University</i><br><b>Joachim von Braun</b> <i>PAS President</i>   Welcome and Concept of the Plenary<br><b>Card. Peter Turkson</b> <i>PAS Chancellor</i>   Words of Welcome  |
| SESSION I – Astronomy for human development, peace, and planetary health               |   |
| 9:15   | <b>Co-Chairs: Ewine van Dishoeck</b> <i>PAS Academician, Professor of Molecular Astrophysics, Leiden University, The Netherlands</i> and <b>Martin Rees</b> <i>PAS Academician, University of Cambridge, Institute of Astronomy, UK</i>  by Zoom <ul style="list-style-type: none"> <li>➤ <b>Reinhard Genzel</b> <i>PAS Academician, Director, Max Planck Institute for Extraterrestrial Physics, Germany</i><br/><i>Black hole at galactic center</i>  by Zoom</li> <li>➤ <b>Michael Kramer</b> <i>Director, Max Planck Institute for Radio Astronomy, Germany</i><br/><i>Testing relativistic gravity with radio astronomy</i></li> <li>➤ <b>Amina Helmi</b> <i>Full Professor, Kapteyn Astronomical Institute, University of Groningen, The Netherlands</i><br/><i>How was our Milky Way formed?</i></li> <li>➤ <b>Karin Öberg</b> <i>Professor of Astronomy, Harvard University, USA</i><br/><i>How to make a habitable planet</i></li> </ul>   |
| 10:15  | Discussion of the presentations (30 minutes)  |
| 10:45  | Coffee Break  |
| SESSION II – Physics and biophysics for human development, peace, and planetary health |   |
| 11:15  | <b>Co-Chairs: Fabiola Gianotti</b> <i>PAS Academician, Director-General at CERN (European Organization for Nuclear Research), Switzerland</i> and <b>William D. Phillips</b> <i>PAS Academician, Distinguished University Professor &amp; College Park Professor of Physics, University of Maryland, USA</i>  by Zoom <ul style="list-style-type: none"> <li>➤ <b>Francisca Nneke Okeke</b> <i>Professor of Physics, University of Nigeria, Nsukka</i><br/><i>Solar activity and earth phenomena</i>  by Zoom</li> <li>➤ <b>Stefan W. Hell</b> <i>PAS Academician, Director, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany</i><br/><i>Molecular-scale resolution in fluorescence</i></li> <li>➤ <b>José Nelson Onuchic</b> <i>PAS Academician, Professor of Physics, Co-Director, Center for Theoretical Biological Physics, Rice University, USA</i><br/><i>Using physics to improve human health: From protein folding to understanding Covid-19 and designing new vaccines</i></li> </ul> |
| 12:15  | Discussion of the presentations (30 minutes)  |
| 12:45  | Lunch at the Casina Pio IV  |



### SESSION III – Mathematics and AI for human development, peace, and planetary health

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|-------|--|
| 14:30 | <p><b>Co-Chairs: Mohamed H.A. Hassan</b> <i>PAS Academician, President of The World Academy of Sciences, Sudan and Stanislas Dehaene</i> <i>PAS Academician, Professor, Experimental Cognitive Psychology, Collège de France, Cognitive Neuroimaging Unit, CEA, INSERM, Université Paris-Sud, Université Paris-Saclay, NeuroSpin Center, Gif/Yvette, France</i></p> <ul style="list-style-type: none"> <li>➤ <b>Demis Hassabis</b> <i>Founder and CEO of DeepMind (Pius XI Medalist 2020)</i><br/><i>Using AI to accelerate scientific discovery. Followed by presentation of the Medal</i></li> <li>➤ <b>Peter Scholze</b> <i>Managing Director, Max Planck Institute for Mathematics (Pius XI Medalist 2020)</i><br/><i>On Platonism in Mathematics. Followed by presentation of the Medal</i>  by Zoom</li> <li>➤ <b>Batmanathan Dayanand Reddy</b> <i>Professor Emeritus of Applied Mathematics University of Cape Town, South Africa</i><br/><i>Africa's brightest young minds: The African Institute for Mathematical Sciences (AIMS) and its impact on development on the continent</i></li> <li>➤ <b>Mérrouane Debbah</b> <i>Chief, Research at the Technology Innovation Institute, Abu Dhabi, Professor at CentraleSupélec, Paris, France</i><br/><i>Mathematics at heart of technological breakthroughs</i>  by Zoom</li> </ul> |
| 15:30 | <b>Discussion of the presentations (30 minutes)</b>  |
| 16:00 | <b>Coffee Break</b>  |



### SESSION IV – Chemistry / Bio-Chemistry for human development, peace, and planetary health

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| 16:30 | <p><b>Co-Chairs: Edward M. De Robertis</b> <i>PAS Academician, Norman Sprague Professor of Biological Chemistry, David Geffen School of Medicine, University of California Los Angeles (UCLA), USA and Ada E. Yonath</i> <i>PAS Academician, Martin S. and Helen Kimmel Professor of Structural Biology and Director, The Helen and Milton A. Kimmelman Center for Biomolecular Structure and Assembly, Weizmann Institute, Israel</i>  by Zoom</p> <ul style="list-style-type: none"> <li>➤ <b>Frances Hamilton Arnold</b> <i>PAS Academician, Linus Pauling Professor of Chemical Engineering, Bioengineering and Biochemistry, California Institute of Technology. Pasadena, California, USA</i><br/><i>Innovation by evolution: bringing new chemistry to life</i></li> <li>➤ <b>Jürgen A. Knoblich</b> <i>PAS Academician, Scientific Director, Institute of Molecular Biotechnology (IMBA), Vienna, Austria</i><br/><i>Brain organoids: Stem cell derived 3D cell culture models for human brain development and neurological disorders</i></li> <li>➤ <b>Rafael Radi</b> <i>Professor and Chair, Department of Biochemistry, Faculty of Medicine and Director of the Center for Biomedical Research (CEINBIO), Universidad de la República, Uruguay</i><br/><i>Science during the pandemic: a journey from basic redox biochemistry to Covid-19 national public health advice</i></li> <li>➤ <b>Werner Arber</b> <i>Emeritus President for Life, Pontifical Academy of Sciences and Emeritus Professor of Molecular Microbiology, Biozentrum, University of Basel, Switzerland</i><br/><i>Horizontal gene transfer in the context of a rich biodiversity</i>  by Zoom</li> </ul> |
| 18:30 | <b>Discussion of the presentations (30 minutes)</b>   |
| 19:00 | <b>Dinner at the Casina Pio IV</b>  |

## SESSION V – Life Sciences and Medical science for human development, peace, and planetary health

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| 9:00  | <p><b>Co-Chairs: Chien-Jen Chen</b> <i>PAS Academician, Professor, Graduate Institute of Epidemiology, National Taiwan University College of Public Health</i> and <b>Francis L. Delmonico</b> <i>PAS Academician, Professor of Surgery, Harvard Medical School, Massachusetts General Hospital, Chief Medical Officer, New England Donor Services, USA</i></p> <ul style="list-style-type: none"> <li>▶ <b>Helen M. Blau</b> <i>PAS Academician, Donald E. and Delia B. Baxter Foundation Professor and Director of the Baxter Laboratory for Stem Cell Biology at Stanford University School of Medicine, USA</i><br/><i>Regenerating and rejuvenating aged tissues by targeting gerogenes</i></li> <li>▶ <b>James F. Markmann MD, PhD</b> <i>Chief of the Division of Transplant Surgery and Director of Clinical Operations at the Transplant Center at Massachusetts General Hospital, and the Claude Welch Professor of Surgery at the Harvard Medical School, USA</i><br/><i>The current state of organ transplantation and the science of immunity</i></li> <li>▶ <b>Stanley B. Prusiner</b> <i>PAS Academician, Director of the Institute for Neurodegenerative Diseases and Professor of Neurology and Biochemistry at the University of California San Francisco (UCSF), USA</i><br/><i><math>\alpha</math>-synuclein prion strains as the causes of dementia with Lewy bodies and multiple system atrophy</i> (incl. 5 min. self-presentation)  by Zoom</li> </ul> |
| 10:00 | <b>Discussion of the presentations (30 minutes)</b>   |
| 10:30 | <b>Coffee Break</b>   |

## SESSION VI – Atmospheric Science, and Climate Science for human development, peace, and planetary health

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| 11:00 | <p><b>Chair: Veerabhadran Ramanathan</b> <i>PAS Academician, Distinguished Professor Emeritus, Scripps Institution of Oceanography, Univ of California at San Diego; Climate Solutions Scholar, Cornell University, Ithaca, NY, USA</i> (Chair also briefs on PAS workshop “Resilience of People and Ecosystems under Climate Stress”)  by Zoom</p> <ul style="list-style-type: none"> <li>▶ <b>Susan Solomon</b> <i>PAS Academician, Lee and Geraldine Martin Professor of Environmental Studies, Department of Earth, Atmospheric and Planetary Sciences, MIT, USA</i><br/><i>Variability and prediction related to climate change</i>  by Zoom</li> <li>▶ <b>Hans J. Schellnhuber</b> <i>PAS Academician, Director Emeritus of the Potsdam Institute for Climate Impact Research (PIK), Germany</i><br/><i>Climate sensitive construction and building sectors</i></li> </ul> |
| 12:00 | <b>Discussion of the presentations (30 minutes)</b>  |
| 12:30 | <b>Lunch at the Casina Pio IV</b>  |

**SESSION VII – Session for commemoration of deceased Academicians  
and self-presentations of new Academicians**

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| <b>14:00</b> | <p><b>Co-Chairs: Joachim von Braun</b> <i>PAS President</i> and <b>H.E. Msgr. Marcelo Sánchez Sorondo</b> <i>Fmr PAS Chancellor</i></p> <p><b>Commemorations</b></p> <ul style="list-style-type: none"> <li>➤ <b>Yves Coppens</b> (by Zeresenay Alemseged)</li> <li>➤ <b>Paul Crutzen</b> (by Veerabhadran Ramanathan)  by Zoom</li> <li>➤ <b>Beatriz Mintz</b> (by Helen Blau)</li> <li>➤ <b>Enrico Berti</b> (by Marcelo Sánchez Sorondo)</li> <li>➤ <b>Michael Sela</b> (by Aaron Ciechanover)  by Zoom</li> </ul> <p><b>Self-Presentations of new Academicians (5 minutes each)</b></p> <ul style="list-style-type: none"> <li>➤ <b>Zeresenay Alemseged</b> <i>Donald N. Pritzker Professor of Organismal Biology and Anatomy, University of Chicago, USA</i></li> <li>➤ <b>Chien-Jen Chen</b> <i>Professor, Graduate Institute of Epidemiology, National Taiwan University College of Public Health</i></li> <li>➤ <b>Ewine F. van Dishoeck</b> <i>Professor of Molecular Astrophysics, Leiden University, The Netherlands</i></li> <li>➤ <b>Jennifer A. Doudna</b> <i>Professor of Biochemistry, Biophysics and Structural Biology, Dept. of Chemistry, University of California, Berkeley, USA</i>  by Zoom</li> <li>➤ <b>Elaine Fuchs</b> <i>Investigator of the Howard Hughes Medical Institute and Rebecca C. Lancefield Professor of the Rockefeller University, USA</i></li> <li>➤ <b>Edith Heard</b> <i>Director General of European Molecular Biology Laboratory (EMBL), Heidelberg, Germany and Professor at Collège de France</i>  by Zoom</li> <li>➤ <b>Jane Lubchenco</b> <i>Distinguished University Professor, Oregon State University, Corvallis OR, and Deputy Director for Climate and Environment at the White House Office of Science and Technology Policy, USA</i></li> <li>➤ <b>Susan Solomon</b> <i>Lee and Geraldine Martin Professor of Environmental Studies, Department of Earth, Atmospheric and Planetary Sciences, MIT, USA</i>  by Zoom</li> </ul> |
| <b>15:30</b> | <b>Coffee Break</b>  |



**SESSION VIII – Science in philosophical and religious perspectives**  
**Session in Honor of H.E. Msgr. Marcelo Sánchez Sorondo, Former Chancellor, The Pontifical Academy of Sciences**

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|--------------|--|
| <b>16:00</b> | <p><b>Co-Chairs:</b> <b>Jürgen Mittelstraß</b> <i>PAS Academician, Director, Konstanzer Wissenschaftsforum, University of Constance, Germany</i> and <b>Joachim von Braun</b> <i>PAS President</i></p> <ul style="list-style-type: none"> <li>➤ <b>Jürgen Mittelstraß</b> <i>PAS Academician, Director, Konstanzer Wissenschaftsforum, University of Constance, Germany</i><br/><i>Introductory remarks</i></li> <li>➤ <b>Flavia Marcacci</b> <i>Professor of History of Scientific Thought, Pontifical Lateran University, Rome, Italy</i><br/><i>Beyond Galileo: facts, values, and historical joints</i></li> <li>➤ <b>H.E. Bishop Robert Barron</b> <i>Diocese of Winona-Rochester, Minnesota, USA</i><br/><i>Three philosophical paths beyond scientism</i></li> <li>➤ <b>Rev. Antje Jackelén</b> <i>The Lutheran Archbishop of Uppsala in Sweden and Primate, Church of Sweden</i><br/><i>Science in philosophical and religious perspectives</i></li> <li>➤ <b>Address: H.E. Archbishop Paul Richard Gallagher</b> <i>Secretary for Relations with States within the Holy See's Secretariat of State   On sciences for human development, peace, and planetary health – Perspectives from the Holy See</i></li> <li>➤ <b>H.Em. Cardinal Giovanni Battista Re</b> <i>Dean of the College of Cardinals</i></li> </ul> <p><b>Reflections by Academicians</b></p> |
| <b>17:30</b> | <b>Reflections by H.E. Msgr. Marcelo Sánchez Sorondo</b>   |
| <b>18:00</b> | <p>Closing session</p> <p><b>Chair: Joachim von Braun</b> <i>PAS President</i></p> <p><i>Introduction of draft conference statement: initial comments by conference participants</i></p>   |
| <b>19:00</b> | <b>Dinner at the Casina Pio IV</b>   |

**SATURDAY, SEPTEMBER 10th 2022**

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|-------------|---|
| <b>9:30</b> | <b>Papal Audience for PAS Academicians and Guests</b> |
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# List of Participants



## **Zeresenay Alemseged**

*Donald N. Pritzker Professor of Organismal Biology and Anatomy, University of Chicago, USA. PAS Academician*



## **David Baulcombe**

*University of Cambridge, Department Plant Sciences, UK. PAS Academician*



## **Werner Arber**

*Microbiology, Biological Evolution. Emeritus Professor, Biozentrum, University of Basel, Switzerland. Nobel laureate in Physiology or Medicine. PAS Emeritus President for Life*

by Zoom



## **Helen M. Blau**

*Donald E. and Delia B. Baxter Foundation Professor and Director of the Baxter Laboratory for Stem Cell Biology at Stanford University School of Medicine, USA. PAS Academician*



## **Frances Hamilton Arnold**

*Linus Pauling Professor of Chemical Engineering, Bioengineering and Biochemistry, California Institute of Technology. Pasadena, California, USA. Nobel laureate in Chemistry. PAS Academician*



## **Joachim von Braun**

*Food, Nutrition and Agricultural Research, Development and Poverty. Distinguished Professor, Economic and Technological Change, University of Bonn, Germany. PAS President*



## **Vanderlei S. Bagnato**

*University of Sao Paulo, Department IFSC - Physics, Brazil. PAS Academician*



## **Chien-Jen Chen**

*Professor, Graduate Institute of Epidemiology, National Taiwan University College of Public Health. PAS Academician*



## **David Baltimore**

*California Institute of Technology Pasadena, CA, USA. Nobel laureate in Physiology or Medicine. PAS Academician*

by Zoom



## **Aaron Ciechanover**

*Principal Investigator, Distinguished Technion Research Professor, The Rappaport Family Technion Integrated Cancer Center (R-TICC), The Rappaport Faculty of Medicine and Research Institute, Israel. Nobel laureate in Chemistry. PAS Academician*

by Zoom



## **H.E. Bishop Robert Barron**

*Diocese of Winona-Rochester, Minnesota, USA*



## **Brother Guy Joseph Consolmagno SJ**

*Director of the Vatican Observatory, Vatican City. PAS Academician "Perdurante Munere"*



## **Antonio Battro**

*Academia Nacional de Educación, Buenos Aires, Argentina. PAS Academician*

by Zoom



## **Mérouane Debbah**

*Chief, Research at the Technology Innovation Institute, Abu Dhabi, Professor at CentraleSupélec, Paris, France*

by Zoom

**Stanislas Dehaene**

Professor, Experimental Cognitive Psychology, Collège de France, Cognitive Neuroimaging Unit, CEA, INSERM, Université Paris-Sud, Université Paris-Saclay, NeuroSpin Center, Gif/Yvette, France. PAS Academician

**Francis L. Delmonico**

Professor of Surgery, Harvard Medical School, Massachusetts General Hospital, Chief Medical Officer, New England Donor Services, USA. PAS Academician

**Edward M. De Robertis**

Norman Sprague Professor of Biological Chemistry, David Geffen School of Medicine, University of California Los Angeles (UCLA), USA. PAS Academician

**Ewine F. van Dishoeck**

Professor of Molecular Astrophysics, Leiden University, The Netherlands. PAS Academician

**Jennifer A. Doudna**

Professor of Biochemistry, Biophysics and Structural Biology, Dept. of Chemistry, University of California, Berkeley, USA. Nobel laureate in Chemistry. PAS Academician

**Elaine Fuchs**

Investigator of the Howard Hughes Medical Institute and Rebecca C. Lancefield Professor of the Rockefeller University, USA. PAS Academician

**H.E. Archbishop Paul Richard Gallagher**

Secretary for Relations with States within the Holy See's Secretariat of State

**Reinhard Genzel**

Director, Max Planck Institute for Extraterrestrial Physics, Germany. Nobel laureate in Physics. PAS Academician

**Fabiola Gianotti**

Director-General at CERN (European Organization for Nuclear Research), Switzerland. PAS Academician

**Takashi Gojobori**

King Abdullah University of Science and Technology, Kingdom of Saudi Arabia. PAS Academician

**Theodor W. Hänsch**

Max-Planck-Institut für Quantenoptik, Garching, Germany. PAS Academician

**Demis Hassabis**

Founder and CEO of DeepMind (Pius XI Medalist 2020)

**Mohamed H.A. Hassan**

President of The World Academy of Sciences, Sudan. PAS Academician

**Edith Heard**

Director General of European Molecular Biology Laboratory (EMBL), Heidelberg, Germany and Professor at Collège de France. PAS Academician

**Stefan W. Hell**

Director, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany. Nobel laureate in Chemistry. PAS Academician

**Amina Helmi**

Full Professor, Kapteyn Astronomical Institute, University of Groningen, The Netherlands

**Rev. Antje Jackelén**

The Lutheran Archbishop of Uppsala in Sweden and Primate, Church of Sweden



by Zoom

**Klaus von Klitzing**

Max-Planck-Institute for Solid State Research, Stuttgart, Germany. Nobel laureate in Physics. PAS Academician

**Jürgen A. Knoblich**

Scientific Director, Institute of Molecular Biotechnology (IMBA), Vienna, Austria. PAS Academician

**Michael Kramer**

Director, Max Planck Institute for Radio Astronomy, Germany

**Pierre J. Léna**

Université Paris VII Denis Diderot, Observatoire de Paris, Département de Recherche Spatiale, Meudon, France. PAS Academician

**Jane Lubchenco**

Distinguished University Professor, Oregon State University, Corvallis OR, and Deputy Director for Climate and Environment at the White House Office of Science and Technology Policy, USA. PAS Academician

**Flavia Marcacci**

Professor of History of Scientific Thought, Pontifical Lateran University, Rome, Italy

**James F. Markmann**

MD, PhD Chief of the Division of Transplant Surgery and Director of Clinical Operations at the Transplant Center at Massachusetts General Hospital, and the Claude Welch Professor of Surgery at the Harvard Medical School, USA

**Jürgen Mittelstraß**

Director, Konstanzer Wissenschaftsforum, University of Constance, Germany. PAS Academician

**Salvador Moncada**

Research Domain Director Faculty of Biology, Medicine and Health, University of Manchester, UK. PAS Academician

**Karin Öberg**

Professor of Astronomy, Harvard University, USA



by Zoom

**Francisca Nneke Okeke**

Professor of Physics, University of Nigeria, Nsukka

**José Nelson Onuchic**

Professor of Physics, Co-Director, Center for Theoretical Biological Physics, Rice University, USA. PAS Academician



by Zoom

**William D. Phillips**

Distinguished University Professor & College Park Professor of Physics, University of Maryland, USA. Nobel laureate in Physics. PAS Academician

**Stefano Piccolo**

Dipartimento di Medicina Molecolare Università di Padova, Italy. PAS Academician



**Ingo Potrykus**

Professor emeritus  
ETH, Zürich, Switzerland.  
PAS Academician

by Zoom

**Stanley B. Prusiner**

Director of the Institute for  
Neurodegenerative Diseases  
and Professor of Neurology and  
Biochemistry at the University of  
California San Francisco (UCSF),  
USA. Nobel laureate in Physiology or  
Medicine. PAS Academician

by Zoom

**Didier Patrick Queloz**

Jacksonian Professor of Natural  
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Cambridge, and professor at the  
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