



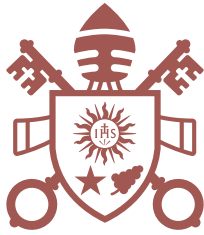
THE PONTIFICAL
ACADEMY OF SCIENCES

WORKSHOP ON

Astrophysics: The James Webb Space Telescope: from first light to new world views



27-29 February 2024
Casina Pio IV, Vatican City



We are amazed at the marvelous images sent from the new James Webb space telescope, and once the Vera Rubin Observatory becomes operative we expect to see how the universe continues to expand and change before our eyes. Above all, we are struck by the vastness of the universe, its enormous extent and the astonishing number of galaxies, stars and planets that have been identified. My hope is that you will not remain content with the results of your research until you have also had the experience of being surprised. And even though you are looking at reality through the window of astronomy, be sure not to neglect the other windows that can show you other important realities, like compassion and love, realities that you are no doubt encountering also in the friendships that you are forming in these days.-Synodal Apostolic Exhortation

Message of His Holiness Pope Francis
To Participants in The Summer School of Astrophysics
of The Vatican Observatory
15 June 2023

Concept note

The Pontifical Academy of Science of the Vatican (PAS) holds regular workshops to discuss issues at the frontiers of scientific knowledge and technological advances, including the ways in which such issues affect human life. An excellent contemporary example of such a theme is the James Webb Space Telescope (JWST) and the implications that its results have for the understanding of our place in the Universe.

This workshop is taking place at the seat of the Pontifical Academy of Sciences (Casina Pio IV) in the Vatican Gardens, on 27-29 February 2024.

The JWST data are revolutionizing many areas in astronomy, from the first galaxies to new worlds, thanks to its exquisite images and rich spectra that are orders of magnitude more sensitive and sharper than those of previous facilities. The aim of the

workshop is to cover the exciting new results from JWST on topics including:

- (i) earliest galaxies
- (ii) galaxy evolution
- (iii) lifecycle of stars and interstellar medium
- (iv) exoplanets and protoplanetary disks
- (v) our solar system

At the same time, the workshop will also reflect on what this new knowledge means for science and society, and on what we can learn about the outreach and the public engagement efforts from JWST and other major facilities that would also be applicable to other disciplines.

Programme

DAY 1 | TUESDAY FEBRUARY 27, 2024

09.00-09.40	<i>Welcome and General Introduction to the Workshop</i> Joachim von Braun President Cardinal Peter K.A. Turkson Chancellor Ewine van Dishoeck PAS Academician Marcia Rieke University of Arizona, USA How JWST came to be (20+5)
09.40-12.45	SESSION 1: Exoplanets, New worlds Chair: Ewine van Dishoeck Pas Academician
09.40-10.10	Jonathan Fortney University of California Santa Cruz, USA <i>New views on exoplanet composition and chemistry (25+5)</i>
10.10-10.25	Nikku Madhusudhan University of Cambridge, UK <i>The Hycean paradigm in the search for life elsewhere</i>
10.25-10.40	Nikole Lewis Cornell University, USA <i>Deep reconnaissance of exoplanet atmospheres through multi-instrument spectroscopy</i>
10.40-10.55	Michiel Min SRON Netherlands Institute for Space Research, Netherlands <i>The mid-IR view of exoplanet atmospheres</i>
10.55-11.30	Coffee break
11.30-11.45	Sasha Hinkley University of Exeter, UK <i>Snapshots of other worlds with JWST</i>
11.45-12.00	René Doyon University of Montreal, Canada <i>Do temperate rocky planets around M dwarfs have an atmosphere?</i>
12:00-12:45	Discussion
12.45-14.15	Lunch at Casina Pio IV
14.15-16:30	Session 2: High-redshift Universe Chair: Gillian Wright UK Astronomy Technology Centre
14.15-14.45	Sandro Tacchella University of Cambridge, UK <i>Star formation in cosmic-dawn galaxies (25+5)</i>
14.45-15.00	Takahiro Morishita IPAC California Institute of Technology, USA <i>Emergence of early large-scale structures of galaxies revealed by JWST</i>
15.00-15.15	Adriano Fontana Osservatorio Astronomico di Roma, Italy <i>The physics of the earliest galaxies: fresh results from JWST</i>
15.15-15.30	Steven Gillman University of Copenhagen, Denmark <i>Insights into the first galaxies with JWST</i>
15.30-15.45	Adam Riess Space Telescope Science Institute, USA (Remote) <i>JWST and the Hubble Tension</i>
15.45-16.30	Discussion
16.30-17.00	Coffee break

17:00-18.45	Session 3: Outreach and public engagement with JWST Chair: Pedro Russo Leiden Observatory, Netherlands
17.00-17.25	Klaus Pontoppidan Jet Propulsion Laboratory, USA <i>Creating the James Webb Space Telescope's first science images (20+5)</i>
17.25-18.45	JWST outreach and public engagement panel discussion Antonella Nota International Space Science Institute, Switzerland Nathalie Nguyen-Quoc Ouellette University of Montreal, Canada Marcia Rieke University of Arizona, USA Jeyhan Kartaltepe Rochester Institute of Technology, USA (Remote) Ewine van Dishoeck Leiden Observatory, Netherlands Examples of JWST outreach, lessons learned. How to engage diverse audiences, outreach material
19.00-21.00	Dinner at Casina Pio IV

DAY 2 | WEDNESDAY FEBRUARY 28, 2024

09.00-10.50	SESSION 4: Life cycle of stars and ISM Chair: Klaus Pontoppidan Jet Propulsion Laboratory, USA
09.00-09.15	Margaret Meixner Jet Propulsion Laboratory, USA <i>Star formation at low metallicity: JWST results from imaging and spectroscopy</i>
09.15-09.30	Olivier Berné CNRS Institute de Recherche Toulouse, France <i>Illuminating planet formation : the role of UV photons in physics and chemistry</i>
09.30-09.45	Melissa McClure Leiden Observatory, Netherlands <i>Early formation of planetary building blocks in icy molecular clouds</i>
09.45-10.00	Yao-Lun Yang RIKEN Institute, Japan <i>Icy origin of complex molecules in Sun-like protostars</i>
10.00-10.15	Łukasz Tychoniec Leiden Observatory, Netherlands <i>Formation of Sun-like stars in the JWST era</i>
10.15-10.50	Discussion
10.50-11.20	Coffee Break
11.20-13.00	SESSION 5: Societal impact of JWST and astronomy Chair: Massimo Stiavelli Space Telescope Science Institute, USA
11.20-12.25	Panel discussion Matt Mountain Association of Universities for Research in Astronomy, USA Gillian Wright UK Astronomy Technology Centre, UK Kevin Govender IAU Office of Astronomy for Development, South Africa (Remote) <i>Astronomy for a better world: the case of the African continent</i>
12.25-13.00	Piero Benvenuti International Astronomical Union <i>Preservation of the dark and quiet skies (15+20)</i>
13.00-14.30	Lunch at Casina Pio IV

14.30-16.15	SESSION 6: Protoplanetary disks Chair: Karin Öberg Harvard University, USA
14.30-15.00	Colette Salyk Vassar College, USA <i>JWST's view of planet formation (25+5)</i>
15.00-15.15	Inga Kamp University of Groningen, Netherlands <i>New insights into planet forming disks from JWST</i>
15.15-15.30	Andrea Banzatti Texas State University, USA <i>Using JWST to study the delivery of water and solids to rocky planets</i>
15.30-15.45	George Rieke University of Arizona, USA <i>Planetary debris disks, another perspective on exoplanetary systems</i>
15.45-16.15	Discussion
16.15-16.45	Coffee Break
16.45-17.30	SESSION 7: Outreach and public engagement in astronomy Chair: Nathalie Nguyen-Quoc Ouellette University of Montreal, Canada
16.45-17.30	Panel discussion Lars Lindberg Christensen NOIRLab, USA <i>Colorful cosmos: illuminating our worldview through astronomical imaging</i> Claudia Mignone INAF-Istituto Nazionale di Astrofisica, Italy <i>But are the colors real?</i> Teresa Paneque European Southern Observatory, Germany <i>Inspiring children and Hispanic/Latino communities</i>
17.30-19.00	Session 8: Philosophical perspectives, new world views Chair: Brother Guy Consolmagno Vatican Observatory
17.30-18.30	Karin Öberg Harvard University, USA <i>Astronomy and religion dialogue in the age of JWST</i> Thomas Hertog Katholieke Universiteit Leuven, Belgium <i>At home in the Universe?</i> Martin Rees University of Cambridge, UK (Remote) <i>Perspectives</i> Marjolijn van Heemstra Poet, Netherlands <i>A responsibility to awe</i>
18.30-19.00	Discussion
19.00-21.00	Dinner at Casina Pio IV

DAY 3 | THURSDAY FEBRUARY 29, 2024

09.00-11.30	SESSION 9: Galaxy evolution Chair: Roberto Maiolino University of Cambridge, UK
09.00-09.30	Stacey Alberts University of Arizona, USA <i>The first years: Galaxy evolution in the era of JWST (25+5)</i>
09.30-09.45	Janice Lee Space Telescope Science Institute, USA <i>New views of star formation, feedback, and dust in nearby galaxies with JWST</i>
09.45-10.00	Karina Caputi University of Groningen, Netherlands <i>Star formation in galaxies across cosmic times</i>
10.00-10.15	Anna de Graaff Max Planck Institute for Astronomy, Germany <i>A new view of galaxy assembly enabled by JWST spectroscopy</i>
10.15-10.30	Discussion
10.30-11.00	Coffee Break
11.00-11.15	Jeyhan Kartaltepe Rochester Institute of Technology, USA (Remote) <i>The structural evolution of galaxies in the early Universe</i>
11.15-11.30	Discussion
11.30-12.50	SESSION 10: Solar system Chair: Brother Guy Consolmagno Vatican Observatory
11:30-12.00	Stefanie Milam NASA Goddard Space Flight Center, USA <i>Solar science with JWST: Revealing the volatile ingredients for planet formation (25+5)</i>
12.00-12.15	Henrik Melin University of Leicester, UK <i>JWST: The giant planets in our solar system</i>
12.15-12.30	Jonathan Lunine Cornell University, US <i>Juno & JWST: a joint journey adjudicating Jovian genesis</i>
12.30-12.50	Discussion
12.50-13.15	SESSION 11: Concluding session Chair: Joachim von Braun PAS President
12.55-13.15	Draft statement on conference outcome including future research directions Ewine van Dishoeck + Brother Guy Consolmagno
13.15-13.50	Boxed Lunch
13.50-18.00	Visit to Castel Gandolfo
18.00-19.30	Public Outreach talk by Roberto Maiolino , moderated by Massimo Stiavelli at Sapienza University, Rome (in Italian)
19:30-21:00	Dinner at your hotel

List of Participants

Prof. Dr. Joachim von Braun

President

The Pontifical Academy of Sciences

Cardinal Peter K.A. Turkson

Chancellor

The Pontifical Academy of Sciences

Msgr. Dario E. Viganò

Vice Chancellor

The Pontifical Academy of Sciences

Prof. Ewine van Dishoeck

Leiden University

Rev. Brother Guy Consolmagno SJ

Director

Specola Vaticana

Dr. Stacey Alberts

Research Professor

University of Arizona

Prof. Andrea Banzatti

Assistant Professor

Texas State University

Prof. Piero Benvenuti

Interim General Secretary

International Astronomical Union

Dr. Olivier Berné

CNRS Research Scientist in Astrophysics

Institut de Recherche en Astrophysique et Planétologie

Prof. Karina Caputi

Professor

Kapteyn Astronomical Institute

Groningen

Dr. Anna de Graaff

Max Planck Institute for Astronomy

Heidelberg

Prof. Rene Doyon

Professor & Director

Université de Montréal - iREx

Dr. Adriana Fontana

INAF

Prof. Jonathan Fortney

University of California, Santa Cruz

Dr. Steven Gillman

DAWN - DTU Space

Mr. Kevin Govender

Director

IAU Office of Astronomy for Development

Mrs. Marjolijn van Heemstra

Space Poetry

Prof. Thomas Hertog

KU Leuven

Prof. Sasha Hinkley

Associate Professor

University of Exeter

Prof. Inga Kamp

Kapteyn Astronomical Institute

University of Groningen

Dr. Jeyhan Kartaltepe

Rochester Institute of Technology

Dr. Janice Lee

Project Scientist for Strategic Initiatives

Space Telescope Science Institute

Dr. Nikole Lewis

Associate Professor

Cornell University

Mr. Lars Lindberg Christensen

Director of Communication

NSF's NOIRLab/IAU

Prof. Jonathan Lunine

Professor and Department Chair

Cornell University

Dr. Melissa McClure

Leiden University

Prof. Nikku Madhusudhan

Professor

University of Cambridge

Prof. Roberto Maiolino

Professor
University of Cambridge

Dr. Margaret Meixner

Astrophysics and Space Sciences Section Manager
Jet Propulsion Lab/California Institute of Technology

Dr. Henrik Melin

STFC James Webb Fellow
University of Leicester

Dr. Stefanie Milam

JWST Deputy Project Scientist for Planetary Science
NASA Goddard Space Flight Center

Dr. Claudia Mignone

Public outreach specialist
INAF

Dr. Michiel Min

SRON

Dr. Matt Mountain

President, AURA

Dr. Takahiro Morishita

Caltech/IPAC

Dr. Nathalie Nguyen-Quoc Ouellette

JWST Outreach Scientist Université de Montréal

Dr. Antonella Nota

Executive Director ISSI

Prof. Karin Öberg

Harvard University

Ms. Teresa Paneque-Carreño

Leiden Observatory

Dr. Klaus Pontoppidan

Jet Propulsion Laboratory

Prof. Martin J. Rees

University of Cambridge
Institute of Astronomy - PAS Academician

Prof. George H. Rieke

Regents' Professor of Astronomy and Planetary Sciences
Steward Observatory; & Professor, Lunar and Planetary Lab
University of Arizona

Prof. Marcia Rieke

Principal Investigator for The Near-Infrared Camera (NIRCam)
Professor of Astronomy
University of Arizona

Prof. Adam Riess

Bloomberg Distinguished Professor
Thomas Barber Professor of Physics
Nobel Laureate

Dr. Pedro Russo

Leiden University

Dr. Colette Salyk

Associate Professor of Astronomy
Maria Mitchell Chair Vassar College

Dr. Massimo Stiavelli

Astronomer and Head, JWST Mission Office
Space Telescope Science Institute

Dr. Sandro Tacchella

University of Cambridge

Dr. Łukasz Tychoniec

Postdoctoral Researcher Leiden Observatory

Dr. Yao-Lun Yang

Research Scientist RIKEN

Prof. Gillian Wright

Director - UK Astronomy Technology Centre

Pickup schedule from and to the Hotels

General information

- Dress code is business attire. Invites are strictly personal. But accompanying persons are invited to the conference if meeting room space allows and to share the meals. Please remember to bring a valid ID.
- In case of any problems, please call the Academy on +39 0669883195 or +39 0669881441.
- On travel days, the mobile phone number +393420026216 will be available.
- Please refer to www.pas.va for further information on the Academy, the Academicians, and current and past events.

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SAPIENZA
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DI ASTROFISICA



THE PONTIFICAL ACADEMY OF SCIENCES

THE DISCOVERIES OF THE JAMES WEBB SPACE TELESCOPE



SPEAKER

Prof. Roberto Maiolino

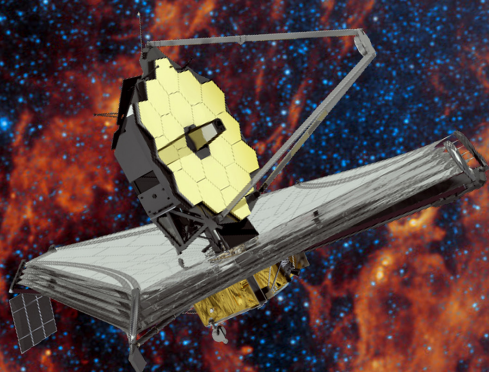
Kavli Institute for Cosmology, Cambridge



MODERATOR

Dr. Massimo Stiavelli

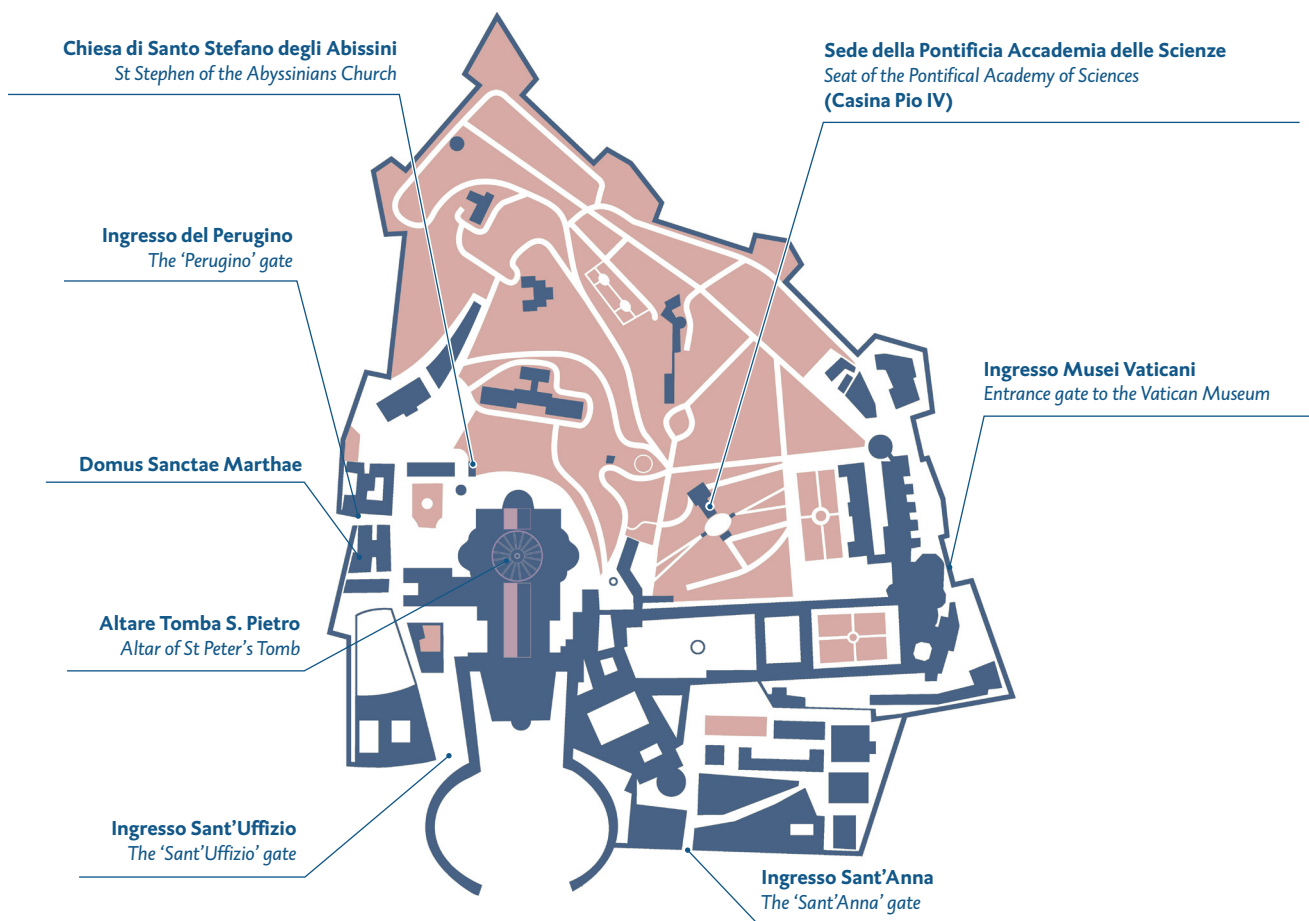
Space Telescope Science Institute



29th February 2024, 18:00

Almadi Hall
Marconi Building
Department of Physics
Sapienza University, Rome

Image credit: ESA/Webb, NASA & CSA, A. Adamo (Stockholm University) and the FEAST JWST team



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