



Strengthening Basic Sciences and Engineering Through Institutional and Human Capacity Building

Fostering Innovation for Sustainable Development



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Insights from the Physics Landscape Report

The **physics landscape report** highlights **significant gaps in research and development**, emphasizing the need for **strategic interventions**. It serves as a **roadmap** for enhancing physics education and infrastructure across Africa, ensuring that the scientific community can thrive and contribute meaningfully to global knowledge.

Africa's average R&D expenditure stands at a mere **0.59% of GDP**, significantly lower than the **global average** of **2.62%**. This **underfunding** stunts scientific innovation and hinders technological development, highlighting the urgent need for increased investment in research and development.



Positive Trends in Collaborations and Innovations

Despite challenges, there are **positive trends** in **international collaborations** and the establishment of local innovation hubs. These initiatives enhance resource sharing and **knowledge transfer**, fostering a collaborative environment conducive to scientific advancement.



United Nations Educational, Scientific and Cultural Organization

Established in 1946, the Organization currently has 194 Member States. The main objective is to contribute to peace and security in the world.

- 80 years experience in promoting international cooperation in science.**
- International science programmes for basic sciences, the oceans, freshwater, and biospheres.**



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01

Laboratory of ideas

02

Policy analysis and development

03

Standard-setter

04

Catalyst and motor for international cooperation

05

Capacity-builder



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UNESCO; Natural Science Sector

Global Challenges

- **Failure of climate change**, mitigation and adaptation; extreme weather events;
 - **Natural disasters**, man-made environmental disasters;
 - **Biodiversity loss** and ecosystem collapse water crises.
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- **pressure on natural resources**
 - **many conflicts and instances of violent extremism have their source in an uneven distribution of natural resources**
 - **people being displaced for lack of water, food and consequently job opportunities**





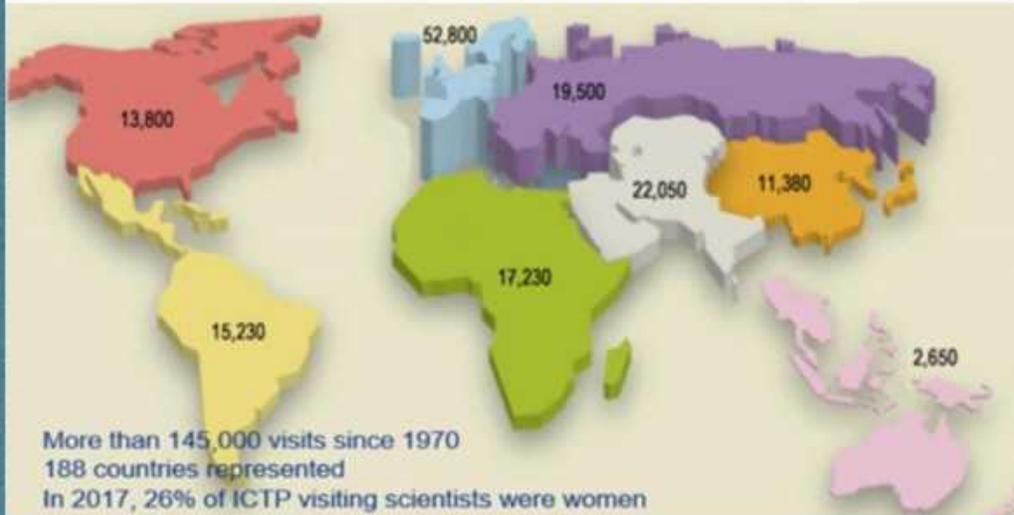
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UNESCO; Natural Science Sector



The Abdus Salam
International Centre
for Theoretical Physics

6000 scientists from 145
countries each year.



twas

The World Academy of Sciences

for the advancement of science in developing countries

twas

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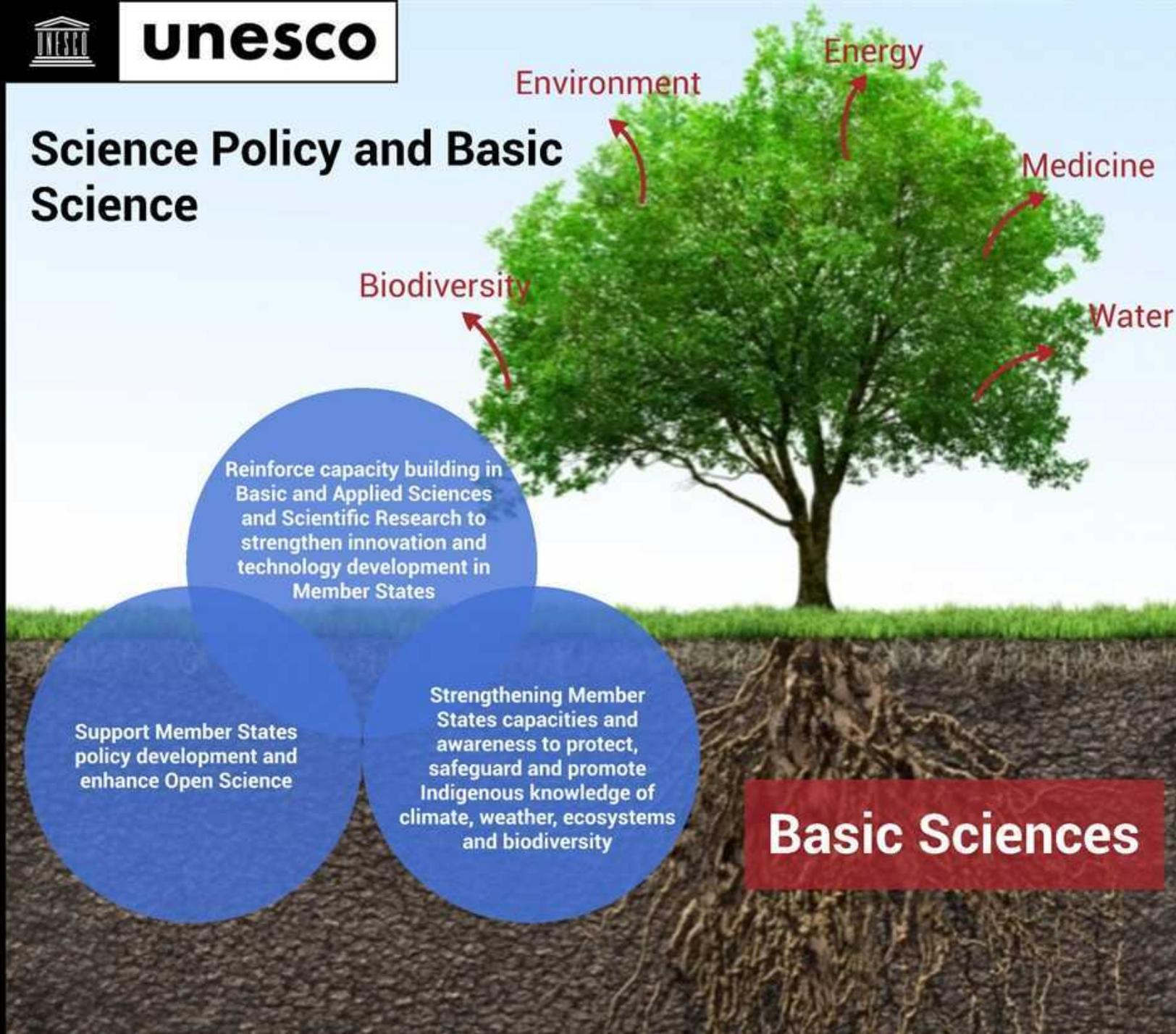
A voice for
science in
the South

- 1,249 elected Fellows
- 165 women
- 103 countries
- 14 Nobel laureates
- 279 Young Affiliates/alumni



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Science Policy and Basic Science



Basic Science, Research, Innovation and Engineering (RIE)

Work with Member States to:

Creating scientific networks and facilitate access to scientific information.

Build scientific, technological and engineering capacities to provide solutions to the sustainable development challenges such as health, agriculture, energy, industrial and infrastructure development,etc.

Invest in building capacity to carry out scientific research which means excellent science education at all levels, effective engineering education and quality universities and research Centres.



Basic Science, Research, Innovation and Engineering (RIE)

Three Major Programmes



Basic Science

Expands foundational knowledge through observation and experimentation, serving as the basis for developing practical solutions to global challenges.



Engineering

Applies scientific principles to design and implement efficient, safe, and effective solutions that address societal needs.



STEM

Focuses on developing critical thinking and problem-solving skills in science, technology, engineering, and mathematics to equip future leaders with the tools to tackle real-world problems.



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International Basic Science Programme (IBSP)

The programme supports national, regional and global programs in:

- **Pure and Applied mathematics**
- **Physics**
- **Chemistry**
- **Biological sciences**
- **Interdisciplinary Sciences**
- **Science education (STEM)**
- **Science Communication - as one of the most important tools to disseminate the value of science**





UNESCO Category 2 Centres (C2C)

Basic Science (12)

4 @ Europe and N. America
 3 @ Asia and Pacific
 2 @ S America
 3 @ Africa

Biotechnology (5)

4 @ Asia and Pacific
 1 @ Africa

Engineering (5)

2 @ Europe and N. America
 2 @ Asia (same country)
 1 @ Africa

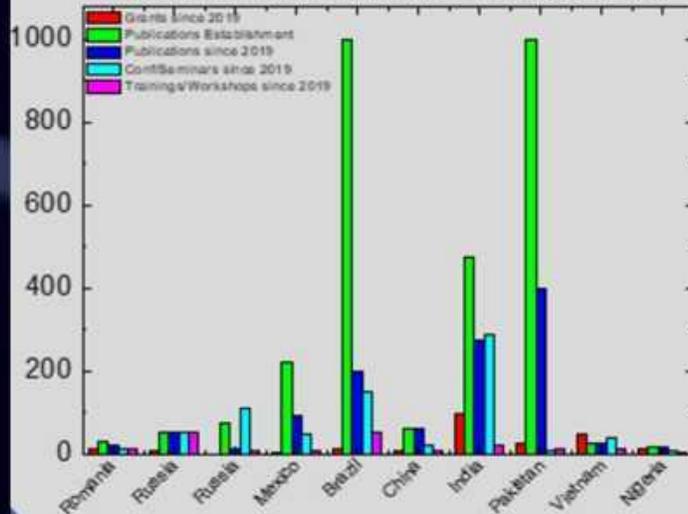
Renewable Energy (2)

1 @ Europe and N. America
 1 @ Arab Region

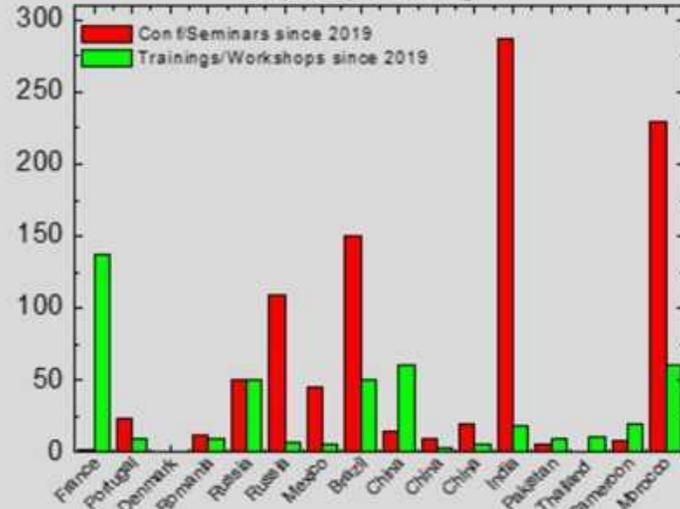
Space Technology (1)

1 @ Asia and Pacific

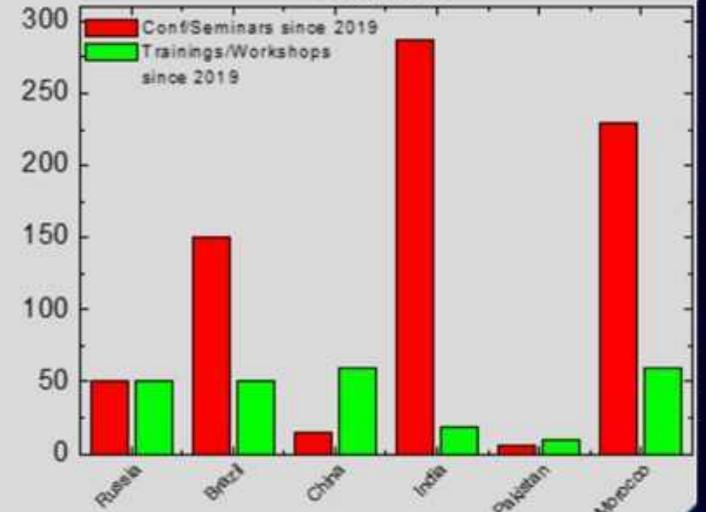
Research and Development/ Capacity Building



Capacity Building



Outreach





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UNESCO Chairs

Earthquake Engineering

Green Chemistry

Environmental Engineering

Engineering in Agriculture,

Mettalurgical, Medical

Higher Engineering Education and Industries

Energy

Pure and Applied Mathematics

Computer Sciences

Microbiology

Interdisciplinary Research in Diabetes

Health Science

Cryobiology

Seafood biotechnology

Bio-economy

Biochemistry and Biophysics

STEM

Microscience

Astronomy and Astrophysics



United Nations
Educational, Scientific and
Cultural Organization



• UNITWIN Network in
• Global Pharmacy
• Education Development

About 64 Chairs

Africa: 9

Arab States: 3

LAC: 10

Asia and Pacific: 12

Europe-North America:

26



United Nations
Educational, Scientific and
Cultural Organization



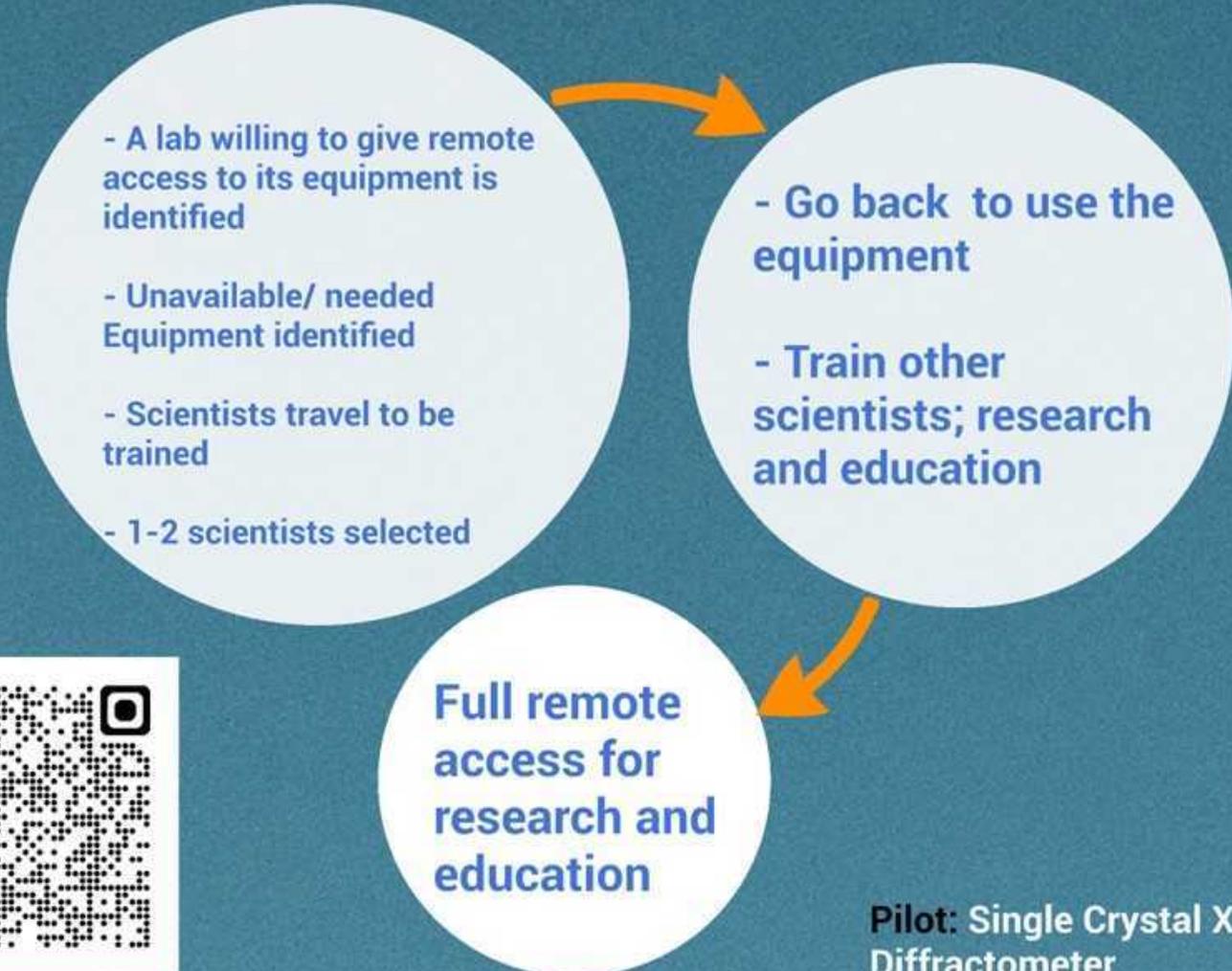
POLITECNICO
DI MELANO

• UNESCO Chair
• in Energy for
• Sustainable Development



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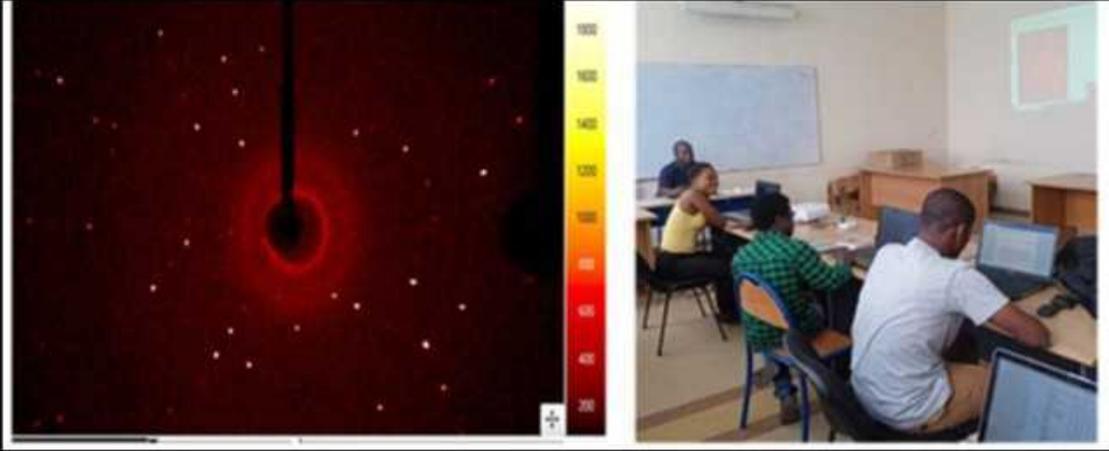
Remote Access to Scientific Equipment



Pilot: Single Crystal X-Ray Diffractometer



Remote Access to Scientific Equipment



Participation by researchers at home
institute (Côte d'Ivoire)
"Samples shipped to labs abroad"



Data analysis and interpretation,
significant contribution to publications,
knowledge transfer etc.

126 researchers and **118 students** benefited from 5
African countries benefited from this initiative



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Seeking partners to expand the initiative (include more African States & more regions)

Match beneficiaries and donors

Include more technical fields

Launch the Remote access webpage

Microscopy

Announce new calls

Imaging Analysis

Provide information

Computational methods

Share success stories

Metabolomic analysis Platforms

Subscription to declare

Facilitating donation of small equipment





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Science & Engineering - Entrepreneurship

The Science and Engineering entrepreneurship bootcamp series aims to equip early-career scientists and engineers with entrepreneurial skills to commercialize their scientific ideas.

Four bootcamps have been organized in Egypt, Panama, Mongolia and Angola since 2023, covering the fields of nanotechnology, science and engineering.



ETCube





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Prizes and Grant Programmes

UNESCO-Equatorial Guinea International Prize for Research in the Life Sciences



UNESCO-Equatorial Guinea International Prize



for Research in the Life Sciences 2020

UNESCO-Carlos J. Finlay Prize for Microbiology




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Al Fozan International Prize for the Promotion of Young Scientists in Science, Technology, Engineering and Mathematics

UNESCO-Al Fozan International Prize for the Promotion of Young Scientists in Science, Technology, Engineering and Mathematics (STEM)



Green Chemistry for Life



PhosAgro/ UNESCO/ IUPAC Partnership in Green Chemistry for Life



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2024 • 2033
International Decade of
Sciences for Sustainable
Development

International Decade of Sciences for Sustainable Development

Fostering Science for All

Lack of institutional support, recognition, and incentives for generation, use and dissemination of actionable knowledge.

Growing inequalities between and within nations in science.

The proliferation of misinformation and disinformation exacerbated.

The limited recognition of the importance of basic sciences hinders support and investment, ultimately impacting sustainable development.

On 25 August 2023, the 77th session of the United Nations General Assembly adopted the resolution (A/RES/77/326) to proclaim the period 2024-2033 the International Decade of Sciences for Sustainable Development and invited UNESCO to lead the implementation of the Decade.



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Vision: The sciences and a science culture required for a sustainable world developed and accessible to all.

Mission: To engage all societal actors to further advance science and equally benefit from it

Overall Objectives

1

To advance scientific knowledge by enhancing scientific endeavour to deepen our understanding of nature and humanity, as well as the intricate interplay between them, and to generate, use and leverage scientific knowledge to accelerate progress towards the Sustainable Development Goals (SDGs) and beyond.

2

To build a robust science culture in which everyone has the right to participate in science and enjoy the benefits of scientific progress and its applications in accordance with the Universal Declaration of Human Rights.



5 Outcomes

1. Global community empowered through scientific literacy.

3. Basic Sciences are advanced through global collaborative research initiatives.

5. National innovation systems are transformed to respond better to scientific and societal needs.

2. Actionable scientific knowledge is produced and used to advance the achievement of the Sustainable Development Goals in alignment with human rights.

4. Open science is widely and equitably used to democratise scientific processes and ensure access to scientific knowledge.



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2024 • 2033
International Decade of
Sciences for Sustainable
Development

Current Call

for Initiatives for the Implementation of
the IDSSD

An opportunity to be at the forefront of a
new era in science, making meaningful
impacts on society and our planet.



**Propose initiatives for the Decade
Submitted by 31 December 2024**





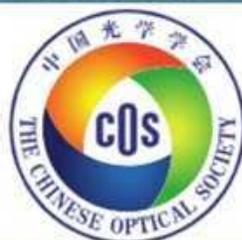
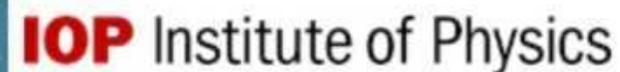
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Let's work together to celebrate 2025 as the International Year of Quantum Science and Technology!

Create an event in 2025 or spotlight a resource that helps others to learn about quantum.



Become a sponsor of IYQ by donating to the IYQ Global Fund that helps support events and activities.

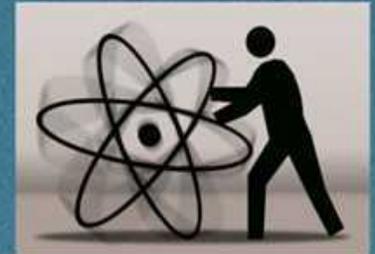


INTERNATIONAL YEAR OF Quantum Science and Technology



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On June 7, 2024, the United Nations proclaimed 2025 as the International Year of Quantum Science and Technology (IYQ). According to the proclamation, this year-long, worldwide initiative will "be observed through activities at all levels aimed at increasing public awareness of the importance of quantum science and applications."



The mission of the IYQ is to use the occasion of 100 years of quantum mechanics in 2025 to help raise public awareness of the importance and impact of quantum science and applications on all aspects of life. Anyone, anywhere can participate in IYQ by helping others to learn more about quantum on this centennial occasion or simply taking the time to learn more about it themselves.





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