ISLAMIC WORLD ACADEMY OF SCIENCES

Newsletter

January - April 2023 *Volume 31* *Number 50*

UNDER THE HIGH PATRONAGE OF HIS MAJESTY KING MOHAMMED VI IAS CONVENED ITS 23RD INTERNATIONAL SCIENTIFIC CONFERENCE UNDER THE THEME

Science, Technology and Innovation Under Ever Changing Global Events

Under the High Patronage of His Majesty King Mohammed VI, King of Morocco, the IAS in collaboration with Hassan II Academy of Science and Technology in Rabat, Morocco, held its 23rd Scientific Conference on *Science, Technology and Innovation Under Ever Changing Global Events* during 18-19 October 2022. The conference was held at the headquarters of the Academy of the Kingdom of Morocco and tackled several topics, including new therapeutic approaches to personalized cancer care, bionanotechnologies in agriculture and nanotechnology. Participants in this conference also discussed water resources management, post-COVlD higher education, energy security, vaccine manufacturing in OIC countries, agro-biodiversity, food security in a changing climate and the role of antioxidants in promoting health.

The conference was co-sponsored by; The Higher Council for Science and Technology (HCST), Amman, Jordan; Kuwait Foundation for the Advancement of Sciences (KFAS), Kuwait; OIC Standing Ministerial Committee on Scientific and Technological Co-operation (COMSTECH), Pakistan and Pakistan Academy of Sciences (PAS).

Fellows of the Islamic World Academy of Sciences attended the conference, as well as world-renowned lecturers and experts, invited speakers, academics, decision-makers, scientists, researchers as well as presidents and representatives of academies of sciences from different countries in the world.

The Permanent Secretary of the Hassan II Academy of Science and Technology, Prof. Omar Fassi-Fehri started the conference by welcoming the attendees and expressed his happiness for the presence of eminent professors who came from different regions and from different

scientific disciplines to exchange views.

The Minister of Higher Education, Scientific Research and Innovation, Mr. Abdellatif Mirawi, pointed-out that this changing context clearly highlights the central role of science and technology as powerful levers to enhance the resilience of our economies and societies, by

shaping the foundations of sovereignty in a plurality of vital areas, such as health, water, food security & energy.

Message from HE Prof. Abdel Salam Majali, President, IAS, Jordan was delivered by Prof. Abdullah Al Musa, Director General, IAS where he highlighted that the changes that will be the focus of the discussions of this conference are very clear and focus on a number of topics of interest to societies in the Arab-Islamic region.

The message of the President of Pakistan, Dr. Arif Alvi, IAS Patron was delivered by HE Prof. Iqbal Choudhary, Coordinator General, COMSTECH, Pakistan, joining the conference virtually via ZOOM. He stressed the importance of cooperation in the development of Islamic societies, pointing out that good cooperation in scientific and technological fields would enhance the living framework of citizens. He also expressed his desire for this conference to culminate with recommendations that would have an impact on the lives of citizens of Islamic countries.

His Royal Highness Prince El-Hassan bin Talal, Founding Patron of the IAS sent a message to address the conference participants and was delivered by HE Prof. Adnan Badran, Treasurer, IAS. In his message, Prince El Hassan highlighted that climate change is a serious threat to our planet and may cause 1 billion refugees to leave their livelihood by 2050 and malnutrition of 2 billion people. HRH also stated that an examination of the current world situation clearly demonstrates a divergence between the commonly shared aspiration for a world ruled by peace and justice and the existing reality, where power rules and the politics of "fait accompli" dominate.

He emphasized that the Islamic world needs to join forces in building peace and justice, and create an inducing environment for releasing the potential of the minds of men and women for inquiry and research oriented to solve our problems and diversify our industry, and increase productivity and convert scientific research toward technology, innovation and startups companies, to generate jobs and wealth. He also mentioned that universities and research centers should be pioneers in graduating startups, in addition to graduating students.

The inaugural session concluded with a recorded message from Sir Peter Gluckman, President of the International Science Council (ISC).

After the inaugural session, newly elected IAS Fellows were inducted and handed Fellowship certificates.

Induction of new IAS Fellows.
Left to right, Dr. Dilfuza Egamerdieva, Dr. Elias Baydoun, Dr. Adnan Badran, Dr. Farhann Jalees, Dr. Abdullah Al Musa.

Prof. Badran awarding Prof. Fassi-Fehri a plaque from IAS.

The first academic session of the conference included the keynote presentations starting with a presentation by **Prof. Bulent Aydogan**, Associate Professor and Director of Medical Physics at the University of Chicago Pritzker School of Medicine, USA entitled *Novel Theragnostic Approaches for Personalized Cancer Care.*

Next was **Prof**. **Irfan Ahmad**, Executive Director for Interdisciplinary Initiatives at the Grainger College of Engineering; and Executive Director for the Health Maker Lab at the Carle Illinois College of Medicine, University of Illinois at Urbana-Champaign, USA on *Bionanotechnology toward Environment-friendly Agriculture*; followed by a presentation by **Prof. Munir Nayfeh** FIAS, Professor, Department of Physics, University of Illinois at Urbana-Champaign, USA on *Energy Security between Nuclear, Renewable and Nanotechnologies.*

Left to right, Dr. Irfan Ahmad, Dr. Munir Nayfeh, Dr. Adnan Badran, Dr. Bulent Aydogan.

Session 1 was concluded by a presentation on *Bricklaying at Nanoscale* by **Prof. Mostapha Bousmina**, President, Euromed University of Fes and Chancellor, Hassan II Academy of Science and Technology, Rabat, Morocco.

The second working session of the conference included a presentation on *Water for Development and Development for Water: Realizing the Sustainable Development Goals (SDGs) Vision* by **Prof. Mohamed Aït Kadi**, President of the General Council of Agricultural Development and Resident Member of Academy Hassan II of Science and Technology, Rabat, Morocco.

The session was concluded with a presentation by **HE Prof. Adnan Badran** FIAS, Chancellor of the University of Petra and the Chairman of the Board of Trustees of the University of Jordan, on *Higher Education in the Post COVID-19: Lessons from a Pandemic.*

On the second day of the conference, the last session started with a presentation by **Prof. Abdullah Al Musa**, Director General, IAS, Jordan, on *Joint Vaccines Development and Manufacturing Potential in OIC Countries.*

Following was a presentation by **Prof. Elmostafa El Fahime**, Professor at National Center for Scientific and Technical Research (CNRST) and Head of Functional Genomic platform, Rabat, Morocco on *Genomic Surveillance of SARS-CoV2 in Morocco: A Major Component of the Integrative Approach Adopted by the Hassan II Academy of Sciences and Techniques to Support Biomedical Research on COVID-19.*

Prof. Mohammad Abdollahi FIAS, Faculty of Pharmacy and the Pharmaceutical Sciences Research Center (PSRC), Tehran University of Medical Sciences, Iran, through a prerecorded video presented a paper on *On the Epigenetics as a Toxicological Mechanism Causing Human Degenerative Diseases.*

Last in the session, **Prof. Ali Moosavi-Movahedi** FIAS, Institute of Biochemistry and Biophysics, University of Tehran, Iran joined virtually via ZOOM and presented a paper on *The Role of Antioxidants and Nutraceuticals in Promotion of Lifestyle and Health.*

At the conclusion of the Conference, Prof. Hamza Kettani made some closing remarks and read the adopted IAS 2022 Rabat Declaration on Science, Technology and Innovation (STI) Under Ever Changing Global Events.

23RD ISLAMIC WORLD ACADEMY OF SCIENCES CONFERENCE ON

Science, Technology and Innovation (STI) Under Ever Changing Global Events.

CONFERENCE DECLARATION

Adopted at Rabat, Morocco
On 19 October 2022

Firstly, the Islamic World Academy of Sciences and the Hassan II Academy of Science and Technology extend their appreciation and gratitude to His Majesty King Mohammad VI of the Kingdom of Morocco for his patronage of the 23rd IAS scientific conference. A letter of appreciation and gratitude will be dispatched to His Majesty for patronizing the conference on behalf of the conference participants.

1) Whereas Islamic teachings and values encourage pursuit of knowledge and upheld it as an obligation for Muslims.
2) Whereas knowledge is assimilated from data generated from observation and research output.
3) Whereas research and development output could flourish and generate technology and incite innovation under viable science, technology and innovation (STI) ecosystem.
4) Whereas STI is a major instrument capable of inducing positive change on social well-being augmenting human, environmental and economical dimensions.
5) Whereas most of OIC member states do not have delineated STI framework and agenda to consolidate their scientific base contribution to development efforts. *(Continued on page 5).*

Some Participants of the Conference.

Group Photo.

(Continued from page 4).

6) Whereas OIC member states in their declared Vision 1441 recognized the importance of education, science and technology as a vehicle for socio-economic transformation. A stance that had been reiterated in the 2021 O1C Summit Conference.
7) Whereas the adoption of STI policy and implementing articulated action plan within sound environmental context or activation of these instruments can increase productivity and sustain ecosystem ability to provide vital provisional, aesthetic and regulatory services.
8) Whereas freely accessible data of research output, production practices and inputs across the food supply chain can help in networking, symmetry of information dissemination, job creation and sustainable production.
9) Whereas OIC member states and humanity in general are faced with cross-border challenges in food and health security, climate change and biodiversity loss.
10) Whereas OIC member states exhibit variable levels in STI capacity and capability.
11) Whereas the sudden emergence of COVID 19 presents harsh realities specially with regard to disparity in vaccine roll-out between developed and developing countries due to insufficient vaccine supply or inadequate financial resource at the disposition of most developing countries.

We the Fellows of the IAS and participants in the IAS 23rd Conference entitled *"Science, Technology and Innovation (STI) Under Ever Changing Global Events"* held in Rabat during 18-19 October 2022 in partnership with Hassan II Academy of Science and Technology herein:

1) Call for OIC member states to introduce into their educational curricula principles of critical thinking that can nurture curiosity.
2) Urge our governments to increase allocations for research funding in their annual budget to arrive to tangible ratio of at least 1% of their GDP.
3) Urge OIC member states with no STI policy to draft such a policy that can identify national priorities, and orchestrate physical, human and financial resources as part of a master developmental plan.
4) Urge OIC governments to enact legislation outlining STI management structure supported by advisory body and empowered to perform its duties that can coordinate, streamline national resources and support to sustain research output and achieve smooth transition from research into technology and innovation into commercialization.
5) We emphasize the importance of creating and adopting an effective functional STI ecosystem that sustains and improves human resource, research and educational institutions, establishes science parks and incubators and provides funding. Of particular importance, the system should induce networking and outreach activities that aim at creating a vibrant scientific community.
6) Acknowledge the vital role the private sector can play in the transition pathway from research to commercialization. Governments are to entice and incentivize its involvement and participation in the process.
7) Emphasize the importance of government commitment to improve education system, provide pertinent infrastructure and build capacity and enhance the capability of their country's STI domain.
8) We call for OIC Secretariat to form intergovernmental scientific panels to deal with cross-border challenges of interest to OIC member states and humanity in general.
9) We call for OIC member states to adopt a framework enabling mobility of science across member states. Such mobility schemes will facilitate knowledge sharing, networking and technology transfer. In this context, we commend COMSTECH and IAS for their joint initiative that intends to provide small mobility grants that enable scientists from least developed countries to do research in predetermined centers of excellence in the Muslim world.
10) Acknowledge that the OIC member states collectively have scientific, financial and economy of scale, we call upon them to embark on establishing a joint enterprise for developing and manufacturing vaccines for recurrent and emerging diseases.

LASTLY, THE ISLAMIC WORLD ACADEMY OF SCIENCES (IAS):

Extends its appreciation and gratitude to all organizations and institutes that extended sponsorship for this conference, these are; Hassan II Academy of Science and Technology (Morocco), Kuwait Foundation for the Advancement of Science (KFAS) (Kuwait), Higher Council for Sciences and Technology (HCST) (Jordan) and OIC Standing Committee on Scientific and Technological Cooperation (COMSTECH) (Pakistan).

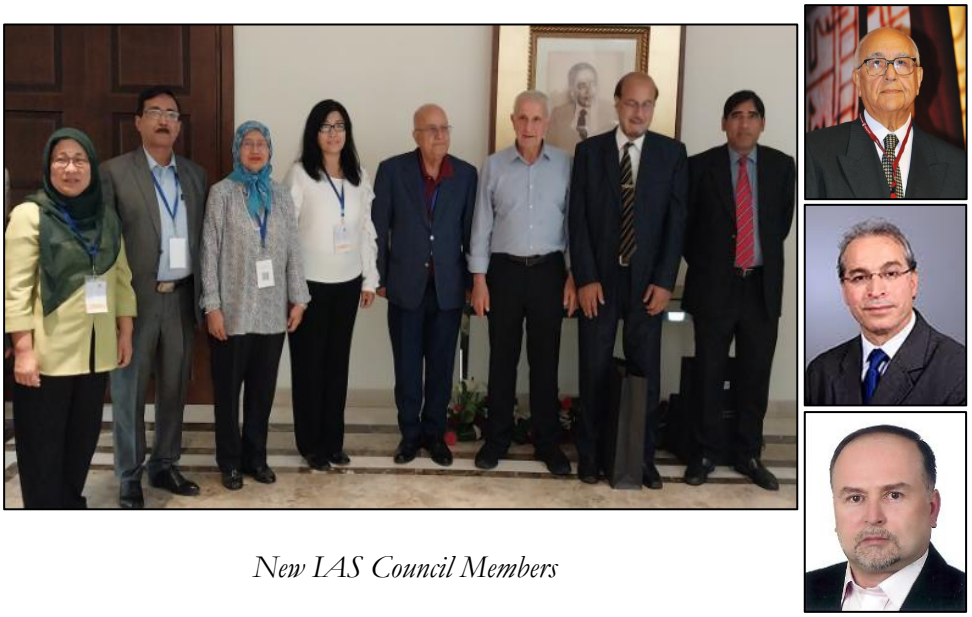
IAS General Assembly holds its 24th Meeting in Rabat, Morocco

After the conclusion of the IAS 23rd Conference, the General Assembly of the Islamic World Academy of Sciences held its 24th regular meeting at the Hassan II Academy of Science and Technology in Rabat, Morocco. The meeting was attended by a number of IAS Fellows as well as the Director General and IAS staff.

The General Assembly after approving the minutes of the previous meeting took note of the very detailed report presented by the IAS Director General on the various activities implemented by the IAS from its headquarters in Amman. It went on to discuss an extensive agenda that included a review of financial statements, IAS programs, as well as a number of organizational matters related to the IAS. Dr. Badran, Treasurer, IAS, talked in brief about the finances of the IAS in 2022. During this meeting, a new council was elected for the term (2023-2027).

IAS Council Members (2023-2027)

Position	Name	Country
President Emeritus:	**Abdel Salam Majali**	Jordan
President:	**Adnan Badran**	Jordan
Vice-President:	**Khatijah Yusoff**	Malaysia
Vice-President:	**Abdelhafid Lahlaidi**	Morocco
Vice-President:	**Zabta Shinwari**	Pakistan
Treasurer:	**Elias Baydoun**	Jordan
Secretary General:	**Tasawar Hayat**	Pakistan
Member:	**Malik Maaza**	Algeria
Member:	**Farhan Jalees Ahmad**	India
Member:	**Mohammad Abdollahi**	Iran
Member:	**Aini Ideris**	Malaysia
Member:	**Dilfuza Egamberdieva**	Uzbekistan



New IAS Council Members

Left to right: Khatijah Yusoff, Farhan Jalees Ahmad, Aini Ideris, Dilfuza Egamberdieva, Adnan Badran, Elias Baydoud, Zabta Shinwari, Tasawar Hayat, Abdel Salam Majali, Malik Maaza and Mohammad Abdollahi.

IAS Council holds its 44th Meeting in Rabat, Morocco (October 2022)

The 44th Meeting of the IAS Council was held in Rabat, Morocco on 19 October 2022, after the conclusion of the IAS 23rd Conference with the participation of IAS Council Members including IAS-DG who - during the meeting - outlined the activities undertaken by the IAS during 2022. In his report to the Council, the DG talked about the various activities that the IAS has been involved in including organizing the 23rd Conference and maintaining the IAS's Medical Journal. The IAS Council undertook a thorough review of the activities of the IAS during 2022 and discussed a number of possible activities that could be implemented.

MESSAGE FROM DR. ARIF ALVI
PRESIDENT OF THE ISLAMIC REPUBLIC OF PAKISTAN[1]

On the occasion of the 23rd International Scientific Conference on Science, Technology, and Innovation (STI)

It is a matter of great satisfaction that the Organization of Islamic Cooperation Standing Committee on Scientific and Technological Cooperation (COMSTECH) and the Islamic World Academy of Sciences (lAS) are organizing the 23rd International Scientific Conference on the rapidly changing ecosystem of Science Technology and Innovation (STI) at the global scale. The exponential nature of changes happening in this field has put tremendous pressure on governments and society everywhere. All these developments are profoundly affecting our collective as well as our personal lives and pose multifarious challenges for governments, academia, and industry. I am glad that IAS is organizing this conference to deliberate on the implications of these rapid changes, devise mechanisms and come up with recommendations for the leadership of the Muslim Ummah to effectively harness the potential of science and technology for the benefit of the entire Muslim Ummah.

I note with great satisfaction that COMSTECH, after careful consideration, has figured out that the solution to this issue is to set aside a minimum level of resources by the member states to spur the development of STI in Islamic countries and to have a permanent set up within the OIC system to effectively deal with the rapidly changing scenario of STI. COMSTECH has rightly conceived the idea of the Science Technology and Innovation Organization (STIO) to contemplate the ever-changing frontiers of STI development. Its core concept is "member states, money for member states, development of STI infrastructure'. I am glad that eighteen founding member states joined the STIO and four member states made a commitment to contribute USD 20 million to make it operational. I would urge the Fellows of the IAS to deliberate on its revival strategy and formulate recommendations for making it functional. Another important suggestion from COMSTECH was the creation of a Pan-Islamic Fund to strongly push the agenda of STI forward to make meaningful progress under the current circumstances.

Both these concepts require the establishment of a body to regularly meet, analyze and set directions in the rapidly changing environment of the STI infrastructure development of the

OIC countries. Fortunately, Kazakhstan has already proposed the formation of such a body under the name "OIC-IS". The Fellows may also look into it during this meeting and propose a set of rules to make it operational.

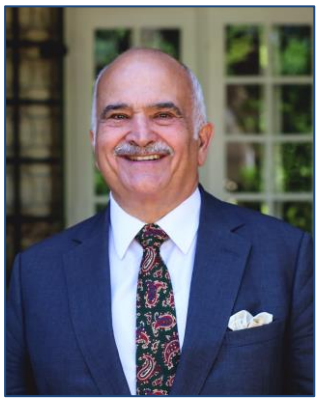
In the end, I would also like to wish unbound success to your deliberations and wholeheartedly thank His Majesty King Mahammad VI of Morocco for his patronage, and to His Majesty's government for hosting the 23rd International Scientific Conference of the Islamic World Academy of Sciences in Rabat.

Prof. Choudhary delivering the message from Dr. Arif Alvi, President of Pakistan.

[1] *Presented by Prof. Iqbal Choudhary.*

STI FOR DIGITAL TRANSFORMATION TOWARD SUSTAINABLE HUMAN DEVELOPMENT IN AN EVER-CHANGING WORLD[2]

Statement by His Royal Highness Prince El-Hasan bin Talal at the 23rd Conference of the Islamic World Academy of Sciences (IAS) "Science, Technology and Innovation Under the Changing Global Events"
18-19 October 2022
Rabat-Morocco



My thanks and gratitude to His Majesty King Mohammed VI, King of Morocco for his high patronage of this conference.

May I thank, the Hassan II Academy of Sciences and Technology for organizing this conference.

Also, I wish to thank sponsors: the Islamic World Academy of Sciences (IAS), the Higher Council for Science and Technology (HCST) in Jordan, The Kuwait Foundation for the advancement of Sciences (KFAS), the OIC and COMSTECH in Islamabad.

According to the World Economic Forum 2021, Humanity is facing the following risks in the next decade:

1. Human-induced environmental damage including loss of biodiversity and spread of infectious virus.
2. Poverty, human displacement and widening gap between rich and poor, 1% of the world population has 50% of world wealth.
3. Cyber security.
4. Digital inequality.

These risks create further challenge in an ever-changing world by 2050, of food security, water scarcity, biodiversity, energy, environmental imbalance and degradation, and human health.
We're facing globally, natural disasters and climate change and turmoil of man-made disasters. By 2050, we have to feed 9 billion people with 60% increase of access to food. The question here, can our planet resources carry out such **responsibility**. Do we have the space for sustainable environment?

Talking about **responsibility**, it was Edward Gibbon, who once said that Athenians called for all forms of freedom, but when Athenians chose freedom from responsibility, Athenians ceased **to be free**.

Developing critical thinking and logics among ***the free*** in our learning institutions to educate the ***Liber*** to share **responsibility** and **participatory** in governance and private sectors and civil society have to meet the challenges to future crisis, to give solutions that matters, to save humanity on our planet and develop a culture of peace and coexistence among all.

I do not represent government, nor do I do business, but being an NGO "humane" I was associated in 1988 with *independent commission on International Humanitarian Issues* in calling on the UN general assembly for the *New International Humanitarian Order* and I thanked Sweden for appealing for the creation of *Fundamental Rights of Humanity*. In Dennis Meadow, the club of Rome which I was associated with, *thirty years update of limits to Growth*, we were told that humanity today is burdening the "carrying capacity" of Mother Earth by the factor of 1.2. Also, 85% of consumption and depletion of natural capital is caused by the "rich minority" of the 20% of the world population.

Climate change (Paris agreement and COP26) is a serious threat to our planet which may cause of 1 billion refugees leaving their livelihood by 2050, and malnutrition of 2 billion people.
Global energy demand is expected to increase 56%. Nowadays, we see countries are back to burning coal to meet their energy crisis, because of conflicts affecting the chain of energy supplies. So, reducing emission targets of the Paris agreement is already evaporating. Soil, the world largest carbon-sink due to climate heterotopic change is becoming an emitter of carbon due to respiration. So, we are witnessing frequent hurricanes, flood, tornados, heat waves and droughts affecting millions to become homeless. Science, technology and innovation, (STI) are crucial in decarbonizing the economy and removing excess CO2 from the atmosphere.

When Al Gore and I, together with five others received the UNEP prize, Al Gore spoke of **global warming** and I spoke of **human warning**. The problem is not with the imprisonment of heat but in the imprisonment of thought.

The crisis today in our region is the sectarian fragmentation, unemployment and conflict, between the rich and the poor.

[2] *Presented by Prof. Adnan Badran.*

The challenge for us today, do we meet the SDGs (the UN sustainable development goals) by 2030 and leave our conflicts and differences aside, to cooperate and share on our **global commons**: world hunger, access to clean water, economic deprivation, resource depletion, species loss, global warming, pollution, cross-cultural conflicts, terrorism, weapons trading, conflicts and wars.

The report on "*winning the human race"* is a global common of how to put human well-being at the center of our policy-making. I always ask "**In the modern economic, social and political environment, is it possible for human beings to become more humane**". How we strike a balance in the framework of globalization for a **social civil contract vs economic development contract.**
At this juncture, how STI, would become the main driving force in achieving the SDGs 17.

It is becoming clear, that the specific goals, we are pursuing-whether they involve food, water, clean air, environmental protection, energy, free flow of information, human rights, indigenous people rights, or other social concern are essentially **global common goods**, which cannot be allocated optimally as long as they remain enclosed, overused, or degraded.

People around the world are realizing that our common goods is not a matter of sovereign claims or private ownership, but a matter of survival. Our common resources should sustain local population and ensure human security.

Therefore, the challenge is not whether the SDGs are realistic targets but the challenge is whether the public-private framework itself is the most realistic way of meeting the SDGs.

It should be no surprise, them, that national expenditures for global common goods are not at the level needed to meet our SDG targets by 2030. I would like at the UN to see **a synergy** between a regional ECOSOC, to think and act, regionally and globally.

We need urgently, to enter a new era of multilateralism by building a cooperative framework across borders for the governance of our commons, where most of the SDG will ultimately be realized.

At the 36th session of the UN assembly in 1981, I stated that an examination of the current world situation clearly demonstrates a divergence between the **commonly shared aspiration** for a world ruled by peace and justice and **the existing reality**, where power rules and the politics of "fait accompli" dominate. The world clearly needs new ways of thinking about old problems. I do hope that we foresee the SDGs as a mean to end our global problems, rather than an end in themselves.

Dear colleagues, fellows of the academy.

Science, Technology and Innovation (STI) are crucial for managing our natural resources and building our human capital of rich human resources, and move forward into the digital economy, for self-reliance and a sustainable productive quality of life for all citizens. The Islamic world needs to join forces in building peace and justice, and create an inducing environment for releasing the potential of the minds of men and women for enquiry and research oriented to solve our problems and diversify our industry, and increase productivity and convert scientific research toward technology, innovation and startups companies, to generate jobs and wealth. The gap between academia and industry is widening. We have to bridge the gap between teaching, training, research with academia for economic and social development. The ivory tower of university concept is no more acceptable. We have to bridge higher education and research delivery with the marketplace, and with the needs of the community.

Where do we start:

1st from education: we start from early childhood to build an enquiry-based education to develop the mind of logics, the analytical mind who is able to investigate, analyze and solve problems. This is where we plant the seeds of building ethics, thinking skills, and creativity. Teaching less but learning more. This is where we create smart schools and induce, love to teamwork, and learning how to live with others and respect other values and traditions and appreciate other cultures and diversity.

2nd we have to modernize our overall education to develop thinking skills, for new knowledge to meet the emerging needs of an-everchanging world. We have to reeducate our teachers through life-long education, out-service and in-service training, and the use of modern packages of smart materials to upgrade technical training. We have to divert our schools and class-rooms from to modern learning sites, environmentally friendly campus.

3rd our universities should adapt quickly to fast changing world with new demands in providing frontier areas of disciplines, and interdisciplins to be able to deliver graduates, to meet the challenges of climate change, water scarcity, energy, food security, artificial intelligence (AI), digital economy, health care, unemployment and poverty, and modern infrastructure. Universities have to be resilient and

flexible in teaching and research to undertake a change. Our campuses should be an inviting place for learners. Our method of teaching should shift to blended learning, to produce the critical thinkers and problem-solvers.

Research should not end up only in peer-reviewed journals. This is not enough. Research outputs should be incubated to new technology and innovation. Therefore, incubators should be provided in departments and faculties, to turn research outputs, into business science parks for startup companies.

Universities and research centers should be pioneers in graduating startups, in addition to graduating students. This way we will lead in the Islamic world in building innovation and entrepreneurship by translating knowledge into business to produce employment and wealth.

For South-South scientific cooperation, we should try to create a network among higher learning institutions in the Islamic world to cooperate in research and exchange of knowledge and information.

In addition of bridging our higher learning institutions and research centers, we should bridge it also, with industry, to close the gap between academia and society.

At the end, I wish to add little humor to you fellows as scientists of the academy.

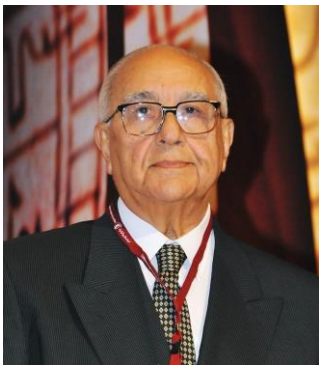
A Princeton plasma physicist, at a sandbeach, discovers an ancient oil lantern (Aladdin lamp), he started to rub it clean, when a giant genie pops out, the genie *granted the physicist one wish to realize*, the physicist runs to his car, bringing the map of the world and circles the Middle East, asking the genie *to bring peace to the region*, the genie looked "*oh, Gee, this is so much complexed issue there*, *with Iraq, Syria, Lebanon, Yemen, Libya, Iran, the Israel-Palestinian conflict and others"*, then the genie asked the physicist "*could you have please, another wish"*. "*Ok fine"*, said the physicist, my other wish is that the "*Princeton Tokamak when would achieve scientific fusion energy breaking*", after few minutes of silence, the genie asked the physicist "*Sir, could I see the map again*".

If the wish was given to me, I will ask the genie "*can we create a fusion of ideas to serve human dignity*".

Thank you, fellow members, thank you ladies and gentlemen.

MESSAGE FROM PROF. ABDUL SALAM MAJALI[3]

President, IAS



It is my pleasure and indeed a privilege to welcome you all this morning and to greet you and communicate my deep appreciation for your interest in this conference which hopefully will outline the *Science, Technology and Innovation under Ever Changing Global Events.*

Science, technology and innovation is of paramount importance in driving socioeconomic development for our nations. For this trio to be effective, a total national STI capacity trifecta should be achieved namely: a government commitment to providing STI physical and soft infrastructure, a vibrant, ethical scientific community with enabled and efficient governance, and a private sector capable and willing to invest in product development.

The efficacy of this STI ecosystem is dependent on the intricate and smooth interactions among all stakeholders in the state and a functional international outreach. An effort that should be culminated in a solid STI policy entailing an action plan to galvanize the efforts and delineate priorities.

The Islamic World of Sciences (IAS) is holding its 23 conference to provide a platform for fruitful discussions and deliberations and enhance networking and exchange of STI experience in OIC Countries, especially with regard to proper governance, partnership framework that accommodate all STI Stakeholders.

We at the IAS are grateful and honored to His Majesty King Mohammed VI for patronizing the IAS 23rd Scientific Conference in Rabat.

I take this opportunity to extend appreciation and gratitude to Hassan II Academy of Science and Technology for hosting and organizing this conference and to all organizations and institutions that extend or pledged sponsorship for this conference including Kuwait Foundation for the Advancement of Science (KFAS), the Higher Council for Sciences and Technology (HCST), The Ministerial Standing Committee on Scientific and Technological Cooperation of the OIC (COMSTECH), and Pakistan Academy of Sciences (PAS). Thanks, are also extended to the speakers who spared no effort to put forward their contributions in this scientific activity.

[3] *Presented by Prof. Abdullah Al Musa.*

RESEARCH DEVELOPMENT AND INNOVATION IN THE ARAB REGION

Adnan Badran[4] FIAS
Director General, Islamic World Academy of Sciences

Investing in research and higher education is a priority for building a knowledge-based economy dependent on human capital. Knowledge is gained from basic research to stimulate innovation, introduce new technologies in industry and agriculture, and develop new goods and services to overcome unemployment and poverty. Problem-oriented research by universities and research centers would lead to the creation of startups that are closely related to the development of wealth, as well as increased domestic production and income per capita.

Indicators show that the United Arab Emirates (UAE) leads the Arab countries in the **Global Competitiveness Index**. In addition, **indicators show** that investment in research is mostly made by governments in the Arab region compared to member countries of the Organization for Economic Cooperation and Development (OECD), where **investment in scientific research** is made mostly by the private sector. The United States continues to lead the world in science and scientific **research funding** by investing 2.8% of GDP ($465 billion a year) in the fields of scientific research and technological development, noting that 50% of Nobel laureates in science and medicine are American scientists.

UAE leads the Arab world (with 1.3% of GDP) followed by Jordan, Egypt, and Tunisia. The UAE ranks first in **the number of researchers as FTEs** (full-time equivalents) per million people followed by Tunisia, Morocco, Egypt, Jordan, Kuwait, and Oman.

As for the number of **scientific papers** reviewed by counterparts, China leads the world, followed by Unites States, India, Germany and Japan, while in the Arab world Egypt ranks first, followed by Saudi Arabia, and Tunisia. Turkey tops the density of indexed publications (Scopus in the Middle East) followed by Iran, Egypt, Saudi Arabia, Tunisia, Morocco, United Arab Emirates and Jordan.

As an **indicator of technology** in terms of percentage of **total exports**, UAE leads the export of high technology, followed by Tunisia, Morocco, Lebanon, Egypt and Jordan. In patents, China, the United States, and Japan lead the world in filed patents while, Saudi Arabia leads the Arab World in filed patents followed by Egypt, Sudan, Morocco, Tunisia, UAE and Jordan. As for **patent applications** for every $100 billion of GDP, South Korea leads the world, followed by China, Japan, and Germany as pioneers of global science.

In summary, there is a growing gap in R&D, inventions and innovations between the Arab world and the developed world, and there is growing gap between rich and poor in most countries of the world. Arab countries need to increase their investments in R&D in the field of science to reach a goal of 1% of their GDP by 2023. They need to build knowledge and transfer technology in order to develop self-reliance, create wealth, increase per capita income, and overcome poverty and unemployment, especially among the youth.

The Arab world needs to develop the **inquisitive minds** of men and women through **quality education** and develop **critical thinking, problem solving**, logic, as well as empowering graduates to become **creative thinkers** and leaders in the field of research. Arab scientists need to **communicate with the industry** to gain their trust and provide technological solutions in a competitive market. They also need to **bridge with other scientists** abroad and learn how to coexist with other cultures and other civilizations.

Capital investments in R&D alone cannot perform the task without a stimulating environment that **unleashes the minds of men and women** to leap forward to new horizons of technologies and innovations. To unleash the minds, Arab countries must provide a **creative environment** of freedom of expression and thought, justice and equal opportunities for all, good governance, and full participation of all segments of society to maximize the potential of everyone.

Governments cannot do everything, and the private sector should take its share of the initiative in carrying out this task, with **governments becoming regulators** by issuing appropriate legislations, that promote the private sector to grow and employ the masses of unemployed, and therefore contribute in overcoming poverty.

Arab countries have failed to use the income generated from their vast natural resources, especially oil, to build the human capital through quality education and investments in R&D for self-reliance by building technological goods and services. Instead, they have become large consumers of others' technologies. They also failed to produce the entrepreneurs needed for innovation and for transforming Arab societies into a productive knowledge economy for a better future.

[4] *Biologist, Professor and Chancellor of University of Petra, Amman Jordan. Chairman, Board of Trustees, University of Jordan.*

COMMENTARY: NATURAL GAS: PRODUCERS, MARKETS AND GEOPOLITICS

Abdullah Al-Musa
Secretary General, Higher Council for Science and Technology, Jordan

Introduction.

1.1. Since 1990 up to 2018, the global natural gas demand has dramatically increased reaching 3,849 bcm at annual growth rate of 2.5% compared to an average growth rate of 1.9% for coal and 1.3% for oil over the same period. The share of oil in total energy demand dropped from 40% in 1990 to 33.6% in 2018. The share of coal still represents 27% mainly due to China's consumption. The share of gas has jumped from 20% in 1990 to 24% in 2020.

1.2. Demand on natural gas as projected by OPEC from 2020 to 2045 seems to enjoy the highest average growth rate/year compared to other sources including oil, nuclear, hydro and biomass. Demand on coal is expected to register negative annual growth (-11.7) over the same period (Table 1.)

Table 1
Global Primary Demand by Fuel (2020-2045)*
(In thousands of barrels of oil equivalent/day)

	2020	2025	2030	2045	Growth % Per annum
Oil	**82.5**	**94.5**	**97.3**	**99.5**	**16.5**
Coal	**72.9**	**74.4**	**71.7**	**61.3**	**-11.7**
Gas	**64.2**	**69.8**	**74.8**	**85.7**	**21.6**
Nuclear	**14.3**	**16.0**	**17.5**	**22.0**	**7.6**
Hydro	**7.5**	**8.2**	**8.9**	**10.5**	**3.0**
Biomass	**27.2**	**29.4**	**31.7**	**37.0**	**9.7**

**Source OPEC 2021*

It is noteworthy that renewable energy production will be on the rise over time as production cost decreases (New Innovative technologies) and policy incentives push towards further adoption to meet emission limits and climate change goals. A situation that bolster gas role in the transition.

1.3. The fastest growing economies in the world (emphasis on China and India) are projected to shift their energy mix towards natural gas in coming decades. The Common feature across geographies will be to employ natural gas as a bridge to cleaner less fossil dependent energy sources (Table 2).

Table 2
Natural Gas Demand Outlook (2020-2045)*
(in thousands of barrels of oil equivalents/ day)

	2020	2025	2030	2045	Growth % Per annum
OECD	28.6	29.9	30.0	29.7	0.1
China	5.0	6.7	8.1	10.1	2.8
India	1.0	1.5	2.0	3.8	5.4
OPEC	8.5	9.4	10.5	12.4	1.5
Other DCs	10.0	11.3	13.2	18.8	2.5

**Source: OPEC, world oil outlook 2021*

2. Why Natural Gas is important in the Energy Mix?

2.1. The growing environmental concerns over climate change due to Anthropogenic carbon emission has led to increase demand for natural-gas; natural gas is environment – friendly energy source since it consists mainly of methane, ethane and propane where methane is widely used in various applications due to its less carbon footprint.

Methane emits half CO_2 and $\frac{1}{10}$ th of the air pollutants (nitrogen oxide and Sulfur oxide) produced by burning coal.

It is an energy source option that constitutes a safe transition towards high–efficiency energy systems that will balance environmental, social cost, risks and benefits.

2.2. In the view of current global industrialization and urbanization; environmental and climate change activists are lobbying and pushing for insurers to abandon insuring fossil fuels and thus enhancing adoption of natural gas as significant component of the overall energy mix.

2.3. Natural gas is abundant and widely available for export in gaseous through pipes or liquefied forms. Liquefied Natural Gas (LNG) is the form that could be exported by special tankers to faraway places where pipe network cost is prohibitive. LNG is also important during short time supply disruption through pipe network. The case of Fukushima disaster in Japan attests to this fact, where Japan relied on LNG to make up for shortage of electricity supply due to the disaster. LNG mainly plays the same role in the case of gas interrupted supply to Europe due to Russian-Ukrainian war.

2.4. Natural gas is abundant with reserves estimated to last 140-230 years. It carries light cost efficiency and needs less capital investments.

3.1. Geopolitics and market Dynamics of Natural Gas.

Gas produced in any country can be exported only in gaseous form through pipes or in liquefied form "Liquefied Natural Gas (LNG)" by tankers. Countries opt to import LNG have to develop LNG regasification capacity.

3.2. Major pipeline exporters.

3.2.1. Qatar: Exports gas to UAE via Dolphin pipeline. However, UAE is expected to become self-sufficient by 2030. UAE is believed to have the 7th largest oil and gas reserve globally. It accelerates exploration recently mainly as a result of the political standoff between SA, USA and Egypt on one side and Qatar on the other side.

3.2.2. Iran: has the second largest gas reserves in the world and potentially will become a major LNG exporter.

Iran exports gas to Turkey. The gas industry in Iran is slowed down by the current bellicose attitude between USA and SA on one side and Iran on the other side.

3.2.3. Algeria export gas to Europe through Maghreb-Europe pipeline.

3.2.4. Russia: is a major player in the world gas market. It is the world's second-largest producer of natural gas and it is the world's largest gas exporter. Europe satisfies 40% of its gas needs from Russia (2021). It also exports gas to Turkey. Export is done via pipeline network (Nord Stream, Blue Stream and Turk Stream).

Recently Russia exported gas to China and India.

3.2.5. Potential significant producers

Israel from Karish field.

Lebanon from Qana field.

3.3. LNG exporters

LNG form enables countries to export gas to faraway countries where piping network is absent or cost may be prohibitive.

3.3.1. The major LNG exporters now are Qatar, USA and Australia.

Iran and Russia are developing infrastructure to enter this market.

3.3.2. Egypt: exports gas in pipeline to Jordan and Israel and has gas liquefication facility. Total export using the gaseous form and LNG earned revenue amounted to $8 bn in 2020.

Egypt's ability to export gas in LNG form attracted European and Eastern Mediterranean countries markets. To increase its output of LNG, Egypt imports gas from Israel. This specially was enhanced by signing an agreement with Eni that will allow maximum gas production for LNG export to Europe (especially ITALY).

3.4. Europe constitutes the major worldwide gas market. The continent satisfies its demand mainly from Russia, Scandinavian countries and to lesser extent from Algeria through pipelines. Such routes could be interrupted for whatever political, technical or due to conflicts reasons. The alternative then will be only LNG coming either from USA, Qatar, Australia or Algeria and later from Egypt or from all of the above. Importing LNG necessitates establishing huge regasification capacity that may take time.

In such situation, Russia can no longer play as dominant role in gas supply to Europe.

U.S.A and probably other LNG suppliers can meet Europe's demand assuring supply security although LNG is more expensive.

In other words, USA natural gas industry will benefit from the opportunity created by Europe gas supply interruption, since it will be well positioned to take advantage of such situation.

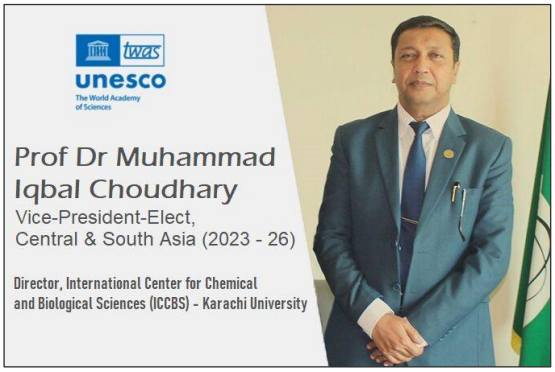
PROF. EROL GELENBE, HONORARY IAS FELLOW, AWARDED THE HIGH HONOR OF THE BELGIAN "COMMANDER OF THE ORDER OF THE CROWN"

IAS Honorary Fellow, Professor Erol Gelenbe, Prof at the Institute of Theoretical and Applied Informatics of the Polish Academy of Sciences has been awarded the high honor of "Commander of the Order of the Crown" by H. M. the King of Belgium, by Royal Decree dated 28th of October 2022. The nomination for this honor was made by the Fond National de la Recherche Scientifique which is the Belgian national research agency.

Prof. Gelenbe has conducted computer science research based on Quality of Service Analysis and Artificial Neural Systems, with patented innovations and publications in leading journals, that has enabled real-time energy-efficient multi-party human communications over the Internet. He also received many awards and prizes in addition to the Mustafa Prize (2017). He is an Honorary Fellow of the Hungarian Academy of Sciences (2010) and of the Islamic World Academy of Sciences (2022). He was elected a Foreign Fellow of the Royal Belgian Academy of Sciences and the Polish Academy of Sciences. He is a Fellow of the French National Academy of Technologies and of the Science Academy of Turkey.

PROF. CHOUDHARY FIAS ELECTED AS TWAS VICE PRESIDENT

The World Academy of Sciences (TWAS) has recently elected the internationally famous Pakistani scientist Prof Dr M Iqbal Choudhary as TWAS Vice President for Central and South Asia for the four-year term from 2023 to 2026.



In a statement, the spokesman of the International Center for Chemical and Biological Sciences (ICCBS), University of Karachi (KU) said that the council and the members of the TWAS intended to take benefit from the wide experience of Prof. Iqbal Choudhary, Director of ICCBS, and COMSTECH Coordinator General, in promoting science in the developing world.
It is pertinent to mention here that the World Academy of Sciences for the advancement of science in developing countries, known worldwide by its acronym, TWAS, supports sustainable prosperity through research, education, policy and diplomacy. The Academy is based in Trieste, Italy.

It is also worth mentioning here that Prof Iqbal Choudhary has recently received the 2021 Mustafa (PBUH) Prize, the most prestigious prize of the Muslim World, for his services in the field of bio-organic chemistry. He has published 1,175 research papers in the fields of organic and bio-organic chemistry in international journals, 76 books, and 40 chapters in books published by major US and European press. He has secured 40 US patents so far. He has established several new centers for the support of industries and government organizations.

Dr Iqbal has been awarded by different Pakistani governments with the Hilal-e-Imtiaz, Sitara-e-Imtiaz, and Tamgha-e-Imtiaz. He has been elected a fellow by renowned academies, including the Academy of Sciences for the Developing World, Islamic World Academy of Sciences (IAS), Pakistan Academy of Sciences (PAS), Royal Society of Chemistry (RSC), and Chemical Society of Pakistan (CSP).

Prof Iqbal has previously been honored by the president of Iran with the Khwarizmi International Award; president of Azerbaijan with the ECO Award in Education; and the prime minister of Pakistan with COMSTECH Award in Chemistry.

Source: The Academia - Pakistan's Premier Education Magazine

WORKSHOP ON GOVERNMENT, RESEARCH AND INDUSTRY FOR SUSTAINABLE DEVELOPMENT

The Islamic World Academy of Sciences (IAS) in collaboration with the Industrial Research and Development Fund (IRDF)/HCST, Jordan organized a workshop on **Government, Research and Industry for Sustainable Development**. Session 2 was entitled **Technopreneurship Leading Sustainable Development** and was held on 20 December 2022.

The session was moderated by **Prof. Fouad Mrad,** *Science Advisor and Lead Judge, Stars of Science – Qatar Foundation.*

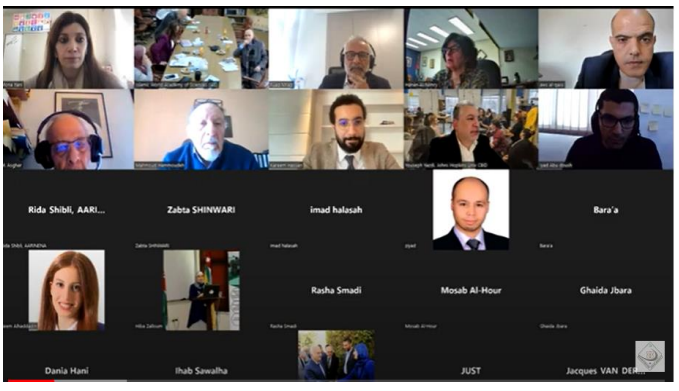
The Session started with **Prof. Youseph Yazdi,** *Director of Johns Hopkins Centre for Bioengineering Innovation and Design, USA who presented on* **Humanizing Innovation.**

Prof. Mona Itani, *Assistant Professor, Management, Marketing & Entrepreneurship American University of Lebanon talked about* **Entrepreneurship Curricula for Universities.**

Mr. Kareem Hassan, *Executive Director, ESCWA Technology Centre, Jordan presented on* **SME Summit ESCWA Nov 2022: Key Outcomes.**

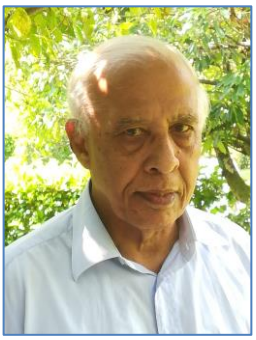
The recording of the workshop along with other activities can be found on the IAS YouTube Channel:

https://www.youtube.com/user/TheIASworld/videos



MASSES OF ELEMENTARY PARTICLES AND THEIR ORIGIN

M. Asghar FIAS



Abstract: This document is an effort to deal with the possible origins of masses of different elementary particles.
The mass of a body is defined as the inertial mass m of a body through the Newton's second law of inertial force F as

$$F = m\,a, \quad (1)$$

where a is the resultant acceleration of the mass m.

The very old enigma of the fundamental particle physics is: what is the origin of the observed masses of the elementary particles such as the electroweak bosons W^+, W^- , Z^0, electrons, neutrinos and the quarks?

In the Standard Model of particles, the spontaneous breaking of the electroweak symmetry SU(2) U(1) is caused by the Higgs field whose value V is obtained from the Fermi constant G^0_F determined from the muon decay as

$$V = ((21/2)\ G0F)\ -1/2) = ((21/2)\ (21/2/8)\ (g2/\ M2W)\ (1/\ c4))\ -1/2 = 246\ GeV \quad (2)$$

From the relation of (2) one gets for the mass of the W^+ and W^- bosons in terms of V as

$$MW = (g/2)\ V, \quad (3)$$

where g is the weak isospin coupling constant of W to the Higgs field.

One can write for the mass of the Z^0 as

$$MZ0 = (1/2)\ (g2 + g'2)\ V \quad (4),$$

where g' is the weak hypercharge coupling constant to the Higgs field.

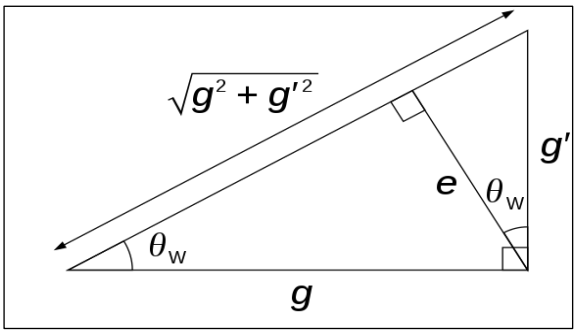


Fig.1, Shows the relation between the coupling constants g and g' and the Weinberg angle θ_W and the electric charge e, (1).

Using Fig.1, one gets the values of these coupling constants as a function of the Weinberg's weak mixing angle θ_W and the electric charge e:

$$g = e\ /\ \sin\theta W \quad (5) \quad \text{and}$$
$$g' = e\ /\cos\theta W \quad (6)$$

With $\boldsymbol{\theta_W = 30\ °}$, fixed through the experimental work, the predicted masses of these weak gauge bosons from relations (3) and (4), were confirmed by the experimental values from the CERN, Geneva, Nobel Prize-winning experimental work:

$W^+ = 80.4\ GeV/\ c^2$; $W^- = 80.4\ GeV/\ c^2$; $Z^0 = 91.187\ GeV/\ c^2$.

However, the self-induced mass of the Higgs scalar boson as

$$M_H = (\lambda/2)^{1/2}\,V \quad (7)$$

cannot be fixed, because one cannot determine theoretically the value of the self-coupling constant λ. Due to this basic lacuna, a lot of experimental groping was needed to pin down the mass of the Higgs scalar boson to 125 GeV with the work at LHC, CERN, Geneva, in 2012.

The matter in Nature consists of protons and neutrons composed of two up and one down quarks, and one up and two down quarks respectively. However, the intrinsic mass of these quarks contributes only about 1 to 2 % to the mass of these nucleons, and the remaining 98 % mass is in the form of energy of the gluon cloud surrounding them and the kinetic energy via the Uncertainty Principle, of these confined quarks due the strong interaction operated by gluons - the strong interaction bosons.

One often claims that the intrinsic masses of these quarks, and other particles such as neutrinos and electrons are also due to their coupling to the Higgs field with their respective coupling constants. This could be the case. However, at present, one has no theoretical means to fix their values and the idea is nothing more than a running speculation. Independently, it has been claimed **(2)** that the masses of these elementary particles could be due to the self-interaction of the fields such as strong electric and weak forces, associated with these particles; this work claims that even the gluons due to their color charge, should have some mass sometimes referred to as the effective mass of gluons.

Conclusion: This write-up is an attempt to look into the possible origins of masses of different elementary particles.

I am grateful to Jean-Marc Richard for valuable comments on the text.

References

1. Lee, T. D. (1981) "Particle physics and introduction to field theory".
2. "Physical origin of elementary particle masses", Johan Hansson, arXiv:1402.7033v1 [physics. gen - ph] 4 Feb 2014.

SCIENCE FOR A BALANCED ECOSPHERE

Adnan Badran[5] FIAS
Director General, Islamic World Academy of Sciences

From the pandemic, new venues of learning surfaced and have driven up online and distance education and e-learning to new horizon of digital transformation and blended learning, where instructors became facilitators rather than disseminators.

Thanks to the Physicists of CERN in Switzerland, which was created by UNESCO, who invented the internet free of charge, so Physicists can talk to other scientists globally, and undergo collaborative research. Without the network, scientists in various labs on Earth will never be able to collaborate to uncover the complexity of human genome.

Science is universal and should flow freely across the globe, for the benefit of humanity to enhance the quality of life, but problems and challenges we are facing today, need to break down the rigid boundaries of silos between sciences to integrate them for solving today's problems, without interdisciplinarity of hard and soft sciences, problems of water scarcity, energy, food security, climate change and other environmental problems cannot be addressed in our ecosphere.

Basic Science is crucial for mankind, and if there is no basic research, then there will be no science to apply. Application of science leads to technology-transfer and innovation.

Climate change has been discussed at the World Summit in Sharm Al-Shaikh COP27. Climate change is threatening our planet. Nature is revolting and yelling against man-made disasters through severe hurricanes, tornadoes, cyclones, floods, droughts, and probably by mutant pandemic.

The imbalance of our natural eco-system cannot go on un-noticed. United States and China are the major polluters of our planet and, Europe to lesser extent. There will be no more business as usual, and countries who are dumping their garbage to our ecosphere should pay for it. Every ton of carbon emitted to the atmosphere should be taxed for "**Loss and Damages**", as a substitution for developing countries.

Acidification of oceans eroded our corals and marine life particularly at coastal zones. One third of our biodiversity has been lost, coastal cities will be submerged, poverty and hunger which is now exceeding 768 million will continue rising.

The challenge to us all, how to speed up research and the contribution of science to shift development toward green economy. For example: **How to decarbonize** ecosphere and turning excess carbon to chains of carbohydrates for food by recycling carbons.

How to convert our energy to renewables and make use for desalination and increase the protected agri-business vertically and horizontally for food security and how to deal with the **nexus of water, energy and food for a Sustainable Triangle.** Science has always been the answer and the key to finding solutions. There is no limit to the discovery of frontier areas of science through **releasing the potentials of the minds, through blended learning, for a well-balanced ecosystem.**

[5] *Biologist, Professor and Chancellor of University of Petra, Amman Jordan and Chairman, Board of Trustees, University of Jordan.*

IAS TO HOLD ITS 24TH INTERNATIONAL CONFERENCE IN KARACHI, PAKISTAN DURING MARCH 2023

The IAS has been invited by COMSTECH and the International Center for Chemical and Biological Sciences (ICCBS), University of Karachi, to convene its 24th international science conference in Karachi, Pakistan during **7 - 8 March 2023**.

The conference will be under the High Patronage of The President of Pakistan and will address the theme of *Challenges to Promote Science & Technology for Socio-Economic Development in OIC Countries.*

In addition to the organizers, the conference will be co-sponsored by the Higher Council for Science and Technology (HCST), Amman, Jordan and the Pakistan Academy of Sciences (PAS), Islamabad, Pakistan.

The conference will host many renowned international speakers as well as IAS Fellows and will address current issues related to STI including Climate Emergency & Innovative Science, Design and Synthesis of Nanomaterials for Biomedical and Energy Applications, Nanotechnology, Digital transformation, The Random Neural Network, Biodiversity Economics and Drug Development among other topics.

TUMS Promoted to Second-Best University in Iran

A 100-step promotion of Tehran University of Medical Sciences (TUMS) in the Shanghai World Ranking System with the scientific efforts of Prof Mohammad Abdollahi FIAS, the faculty of TUMS, who helps CINVU in the Research Committee to recognize the world research priorities. The good news is that TUMS has been promoted to the second-best university in Iran per Shanghai's 2022 world ranking with 100 steps of progress compared to last year, while ranked 401-500 worldwide. The Shanghai ranking system is one of three prestigious international ranking systems, the results of which are published by Shanghai Xiaotang University. The evaluation of this ranking system is based on four criteria of quality of education, quality of faculty members, research and per capita performance, and six indicators demonstrating considerable TUMS growth. This year's success of TUMS has been positively influenced by the scientific achievement made by its prestigious faculties especially Prof MA who has been announced an awardee of the innovated Clarivate Highly-Cited Clarivate as the world's top researchers in the interdisciplinary section with 935 recognized works. Professor MA is an awardee of the 2005 IAS-COMSTECH in Pharmacology and Toxicology. He is now a permanent Fellow of the IAS. Noteworthy, CINVU is one of the networks affiliated with COMSTECH, hosted by Research, and Technology of the Ministry of Science and Technology of Iran. This network is an important and rich base for strengthening and developing public higher education in the virtual context of information technology. Its main goal is to achieve justice in knowledge and thought and to deepen and stabilize the learning tools and network of collaboration. It tries to empower educational, research, cultural, and skillful students, professors, universities, and elites of the Islamic world, involving 57 countries. TUMS has been promoted to the second-best university in Iran according to the Shanghai 2022 world ranking with 100 steps of progress compared to last year, while ranked 401-500 worldwide.

Source: https://www.linkedin.com/posts/activity-6978987087756726272-jVVz?utm_source=share&utm_medium=member_desktop

Prof. Yahya Tayalati, Honorary IAS Fellow, awarded the 2022 Morocco Scopus Award

Elsevier and National Centre for Scientific and Technical Research in the Kingdom of Morocco announced the inaugural Morocco Scopus Awards to honor Moroccan scientific research and reward the most prolific researchers in Morocco. This event aspires to celebrate and encourage Morocco's intellectual and scientific wealth.

Prof. Yahya Tayalati from Mohammed V University of Rabat, Morocco, received the award in the field of Physics and Astronomy for all the work developed within the framework of the collaboration and the large-scale projects of international dimension carried out. Prof. Tayalati is also a laureate of the prestigious 2021 Mustafa Prize in the field of Theoretical and Particle Physics and for his work on Observation of the Light by Light Scattering and the Search for Magnetic Monopoles

The National Centre for Scientific and Technical Research of the Kingdom of Morocco (CNRST), and Elsevier, a global leader in research publishing and information analytics, are partnering on the first-ever Morocco Scopus Awards 2022 celebration. The program and awards ceremony were held on Thursday, October 6, 2022, at the CNRST headquarters in Rabat.

Under a new agreement, Elsevier and CNRST provide Moroccan universities and researchers with robust access to ScienceDirect, Elsevier's full-text platform for scholarly communication, and Scopus, the largest abstract and citation database of peer-reviewed literature.

Source: https://www.elsevier.com/about/press-releases/research-and-journals/elsevier-and-national-centre-for-scientific-and-technical-research-in-the-kingdom-of-morocco-announce-the-inaugural-morocco-scopus-awards

UNIVERSE EXPANSION AND THE PROBLEMS WITH THE VALUE OF THE HUBBLE CONSTANT

M. Asghar FIAS[1]

Abstract: This article discusses the different methods to measure the Hubble constant H_0. The high precision results obtained from the so-called "local" methods and the value obtained from the analysis of the CMB data with the standard cosmological ΛDCM model, differ significantly approaching 4σ in significance. This suggests a strong need for the structural modification of the model.

Einstein's general theory of relativity (GTR) lays down the foundation of the expansion of the universe. To understand this, one needs to set up a metric that obeys the cosmological principle under which space is homogeneous and isotropic in terms of its contents. Friedmann was the first to set up it up (now, called the Friedmann-Lemaître-Robertson-Walker metric) as:

$$ds^2 = a(t)^2 ds^2_3 - c^2dt^2 \quad (1),$$

where ds^2_3 is the three-dimensional matrix and the a(t), the scaling factor.

The solution to the Einstein's equations with this metric leads to Friedmann equations:

$$H^2 = (da/dt/a)^2 = 2\pi G\varrho/3 - k c^2/ a^2 \quad (2)$$

$$dH/dt + H^2 = (da/dt^2)/a = -4\pi G/3 (\varrho + 3p/c^2) \quad (3)$$

Here, the parameter H = da/dt called the Hubble parameter, can change with time, if the mass density ϱ, cosmological constant or vacuum energy Λ and the spatial curvature k are time dependent. One defines the Hubble constant H_0 = da/dt, as the present-day value of H with the constant a =1. The dimensional analysis of the system suggests the other side of the equation with H_0 acting on the coordinates, should be the parameter of velocity v, and for an expanding universe, this has to be the *recession* velocity of a star, galaxy, cluster of galaxies. One can write down this fact via a linear relation as:

$$v = H_0 D \quad (4),$$

where D is the distance to the star, galaxy, cluster of galaxies, with the recession velocity v.

The relation (4) represents the **Hubble Law** that controls the expansion of the universe. However, from the historical perspective, it should be called the **Hubble-Lemaître law**, because Lamaître's work was the first initiator of this law.

One can determine the value of the Hubble constant H_0 for a luminous object emitting the EM-radiation from an atomic transition such as hydrogen, of known wavelength λ_e and shifted to a longer and measured λ_o due to Doppler effect, called the redshift z. The redshift z is related to the recession velocity v through the relation:

$$z = (\lambda_o/\lambda_e) - 1 = ((1+v/c)/(1-v/c))^{1/2} - 1. \quad (5)$$

For low values of v, this relation goes over to the non-relativistic relation:

$$z = v/c.$$

Although it is quite simple and straightforward to get the value of the recession velocity v, this is not the case for the distance of a luminous object from the Earth. One can see this problem in the evolution of the measured values of Hubble constant H_0 over time (Fig.1). Here one sees a value of 500 km/sec. M parsec, published by Hubble in 1929. He used the Cepheid-variables-stars -based calibration, which was not good enough and led to the incorrect values of distances and higher valuer of H_0. Lemaître (1927) got a value of around 615 km/ sec. M parsec, based on Hubble's data. However, as Fig.1 shows, over time, the quality of distance calibration has considerably improved: now the values of H_0 cluster between 50 and 100km/ sec. M parsec. This is particularly true for the Cepheid variables and the 1a supernovae – the so-called "standard candles" in the context of the "cosmic distance ladder". The Hubble Space

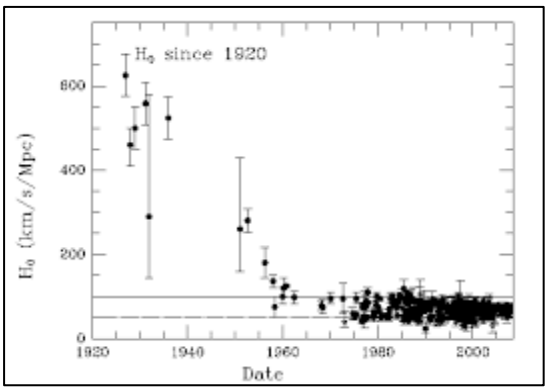


Fig.1, Evolution in the value of H_0 over time (Courtesy Google).

Telescope based Key project on the Extragalactic Distance Scale made a major contribution to this improvement.

1. Hubble constant H_0 from the standard candles-based data

[1] *12 rue des abeilles, 38240, Meylan, France*
masgharfr36@gmail.com

To get the value of the distance D from the Type 1a supernovae data, one uses Hipparcus's astronomical scale-based formula:

$M = m - 5 \log (D \text{ in parsecs}) + 5$ (6),

where m, the "apparent magnitude" is defined as to how bright the star appears from the Earth, and M, the "absolute magnitude" defined as to how a star appears at a standard distance of 10 parsecs or 32.6 light years. The number "5" in the formula corresponds to the zero effect.

The standard candles-based values of the recession velocity v and the distance D leads to the latest result:

$H_0 = 73.45 +- 1.62$ km/ sec. M parsecs

2. Hubble constant H_0 from gravitational lensing

Fig. 2, shows the result of gravitational lensing of a quasar by an *oblong-shaped* galaxy as seen by the observer on the Earth. The four distinct images around the fifth image in the center, are produced. As the light in each image traverses a path of different length, the fluctuations in the quasar's light show up in the lensed images at different times of the order of weeks. Although these time-differences do not directly yield D_d: the distance from the Earth to the lens, and the D_{ds}: the distance from the lens to the quasar, they do constrain them to one combination, which is good enough information to calculate H_0 from the quasar's known redshift.

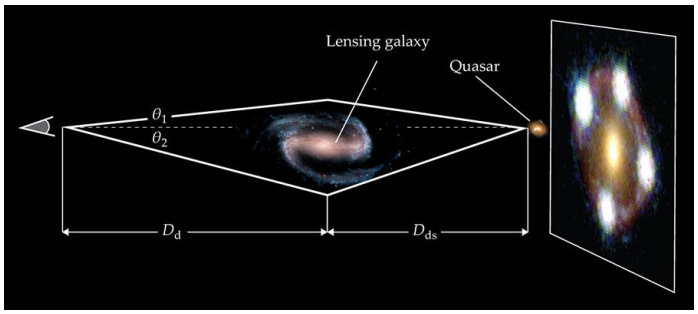


Fig.2. The gravitational lensing set up for the Hubble constant (Courtesy Google).

The latest work on the gravitationally lensed quasars led to an independent measure of:

$H_0 = 73 + 1.7 - 1.8$ km/ sec. M parsec

3. Hubble constant H_0 from gravitational waves from the merger of compact binary neutron stars

In astronomy the compact binary neutron star systems are fittingly called "standard sirens" since their properties make them analogues to the "standard candles" of the Type 1a supernovae and Cepheid variable stars. The characteristic time-evolution of the frequency-amplitude of the gravitational waves is called the "chirp. The analysis of the "chirp waveforms" in the context of the GTR allows one to get the distance D from the source represented by the merger of two neutron stars to the advanced LIGO and VIRGO detectors.

Since this merger also emits EM radiation whose redshift provides the system's recession velocity v. The combination of D and v leads to the Hubble constant H_0.

The latest work on the gravitational wave data on the two neutron-star-merger of GW170817 led to:

$H_0 = 68 +14 - 7$ km/ sec. M parsec.

However, this value H_0 cannot play a decisive role because it suffers from a large uncertainty. However, the authors of this work claim that one would need 50 binary mergers for a precise value of H_0.

4. Hubble constant H_0 from the analysis of CMB data

The CMB appeared 379,000 year after the Big Bang, when the temperature of the plasma decreased to 3000 K and led to formation of neutral atoms mostly hydrogen and their decoupling from the EM radiation. Since the universe has expanded to the present age of 13.8 billion years, and stretched the wavelength of the CMB and "cooled" it to 2.725°K.

The Planck satellite high sensitivity and high angular resolution data showed among other things, the CMB temperature fluctuations of about one part in 10^5 along with a spectrum of acoustic peaks. These data were analyzed with the flat universe-based cosmological model ΛCDM that is expected to describe the expansion of the universe all the way from the beginning to the present epoch. The latest analysis led to:

$H_0 = 67.66 + - 0.42$ km/sec. M parsec

5. Conclusions

One observes a significant difference approaching 4σ in significance between the precise values of H_0 obtained from the so-called independent "local" techniques and the equally precise value of H_0 obtained from the CMB data analyzed through the flat-universe-based cosmological model ΛCDM whose parameters take into account the different types of contents (ordinary matter, dark matter and dark energy) of the universe along with treating its expansion over time through the Hubble constant. Moreover, the CMB data analysis based on this model, shows that the universe contains 71.4% dark energy which is considered responsible for its expansion-acceleration. However, this expansion-acceleration and the very notion of dark energy is being strongly contested from different sides. These problems suggest that the cosmological model needs basic structural modifications.

E-LEARNING AND DISTANCE EDUCATION

Adnan Badran[2] FIAS[3], Elias Baydoun[4] FIAS[5], and Joelle Mesmar[6]

Today's buzzwords: "Distance education" and "E-learning". Although their meanings are often interchanged, there are differences between the two. By definition, the first denotes a method of learning that involves the physical separation of the educator from the learner, characterized by non-contiguous communication. And the second refers to a style of learning that includes the use of technology and digital resources for instruction and assessment. Both are focused around the digital technology element.

Although distance education and e-learning have been gaining momentum in the past few decades, it is the recent COVID-19 pandemic that has emphasized its importance and driven the education sector online. Ever since, the nature of distance education and e-learning has been changing and evolving more rapidly, as higher education institutions, staff, educators, and learners are embracing a new level of digital maturity. In parallel, the online learning ecosystem has also been growing considerably. Today, more and more organizations are taking up e-learning and distance education, in addition to embracing the blended learning approach, which is becoming increasingly popular. This is a crunch time for higher education institutions that must not be squandered.

In its previous conference and as part of the theme of focusing on Arab universities, the Arab Academy of Sciences has delved into the challenges and lessons learned from the COVID-19 pandemic and addressed how higher education should look like in the post COVID-19 era. Generally, this had meant a move from traditional means of education to purely digital at the start of the pandemic. This year, the Academy will reflect on how higher education institutions in the Arab world have been adjusting to this new normal and look onward into the future of higher education. The conference will aim to bring together key stakeholders including educators, experts, administrators, and students to share their experiences and ideas on distance education and e-learning. Participants will discuss challenges in shaping the future of education, drawing on the changing needs of students, educators, and staff in the wake of the COVID-19 pandemic. They will also be engaged to explore how to harness the full potential of distance education and e-learning in order to enhance and improve educational outcomes.

Particularly, Arab institutions need to rethink teaching and learning, redesign assessment, enhance student engagement, survey digital education tools and trends in tech-savvy education, address the digital disconnect and inclusive learning, and look into the future of research, among others. Largely, they need to adopt technology-enhanced learning as a central part of their strategic agenda, ensure the quality of education is guaranteed, and develop a vision for the future of higher education in the Arab world.

Blended learning is becoming the new trend of modern education, where the instructor becomes the facilitator rather than the disseminator. In this style of pedagogy, E-learning, distance education and face to face interactive learning, become blended toward building the minds of men and women to a horizon of enquiry, problem solving and creative critical thinking, and release the potential of learners.

While it is one thing to embrace e-learning and distance education as an essential part of the future of higher education; it is quite another to implement them. If these are to be successful, critical success factors need to be identified and policy makers in the higher education institutions need to be well informed for the education process to be implemented effectively. We propose that this conference provides a platform to: discuss the benefits and advantages of e-learning and distance education; address best practices and success factors; and consider the hurdles and challenges in their implementation by drawing on experiences from developing and developed countries, all the while taking into consideration the needs of students, emphasizing on quality assurance, and addressing norms and standards of accreditation.

[2] *Biologist, Professor and Chancellor of University of Petra, Amman Jordan. Chairman, Board of Trustees, University of Jordan.*
[3] *DG, IAS.*
[4] *Department of Biology, American University of Beirut, Lebanon.*
[5] *Treasurer, IAS.*
[6] *Department of Biology, American University of Beirut, Lebanon.*

REFLECTIONS ON THE MEETING OF HRH PRINCE EL-HASSAN BIN TALAL WITH SADHGURU

Abdullah Al-Musa
Secretary General, Higher Council for Science and Technology, Jordan

1. On May 4, 2022 a meeting was held between His Royal Highness Prince El-Hassan bin Talal along with representatives from various Sidi El-Hassan family of organizations and the prominent environmental activist Sadhguru, with the objective to highlight "Save the Soil" campaign. Discussions stressed the fact that the health of top soil is vital for survival of humanity. Its deterioration can affect directly or indirectly the wellbeing of human kind.

1.1. Importance of soil

1.1.1. Soil is the source of our food: we obtain more than 99% of our food calories from land-based products. The limited nutrients elements in the soil with the soil abundant microorganisms can insure sustainable supply of our food and other auxiliary functions that help maintain various aspects of soil productivity.

1.1.2. Top soil acts as habitat for vibrant biodiversity. Maintaining this biodiversity is vital to sustain ecosystems functions above ground where it has been found that reduction in soil biodiversity can contribute to eutrophication of surface water and global warming. In addition, decline in soil biodiversity causes decline in performance of a number of ecosystems regulating and maintenance services. If soil biodiversity is lost completely, the land-based food system would cease to function.

1.1.2.1. Soil Biodiversity is affected by:

1. Habitat fragmentation.
2. Invasive species.
3. Climate Change.
4. Urbanization.
5. Soil erosion.
6. Soil pollution.

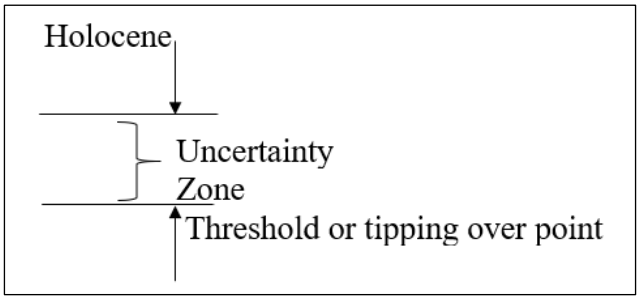
Most of these factors are human-induced:
Humanity since 1950 departed from the Holocene and entered the Anthropocene.

The world population in 1950 was around 2.5 billion and the global output of final goods and services, at 2011 prices, was a little more than 9.2 trillion international dollars. In 2019, the global population had grown to over 7.7 trillion and global income/capita had risen to $15000 from 3300 in 1950. This dramatic increase points to increased demand on the biosphere as manifested in excessive production and/or consumption of the goods and services provided by bounded resources, often with no real concern to the efficiency of production and consumption practices resulting in waste and pollution that adversely affect the biosphere including topsoil.

This creates a demand overshoot on the biosphere. The outcome of this is shown in the Earth's biogeochemical signatures through:

1) Global homogenization of flora and fauna (mainly through unsustainable agriculture).
2) Single species, *Homo sapiens*, controlled 25-40% of net primary production.
3) Human directed evolution of other species.
4) Changes in the Earth system processes which are called by Rockström *et al (2019)* as planetary boundaries. There are nine of them among which are Biodiversity, Climate Change, Land Use and Nitrogen and Phosphorus cycles seemed to be directly affecting by the top soil health and biodiversity.

These boundaries are critical for maintaining Earth System functioning. Planetary boundaries are not equivalent to a global threshold or tipping points. The boundaries are placed upstream of the tipping points at the safe end of the zone of uncertainty (figure 1). Once a process surpassed the boundaries, they increased the risk of large scale, potentially irreversible environmental changes. The 4 of the 9 processes mentioned earlier have taken the planet into regions regarded as outside safe operating conditions with the biodiversity and nitrogen and phosphorus cycles have exceeded their boundaries, but land use and climate change are also outside their safe operating space.



One feature of the change in these processes is the species extinction. The current extinction rates of species in various orders are estimated to have risen to 100-1000 times the average extinction rate over the past tens of millions of years. Around 1000 species are becoming extinct every year at a rate of l00 Extinction/million species/year.

1.1.2.2. Soil biodiversity loss.
Stable ecosystem will slow soil erosion but the removal of vegetation (overgrazing, deforestation logging) and unsustainable agriculture will accelerate erosion and may cause slides specially under severe environmental events.

As of today, around 80% of the globe's farm land has moderate to severe erosion caused by water and wind. 90% of wet lands have been lost over the past 300 years. The rate of soil erosion accompanying land-use change is judged to be the highest in the past 500 million years. This adversely affects Soil biodiversity with deleterious consequences on food system, water quality and beneficial microorganisms that may provide us with fermenting capacity, medicines and other chemicals.

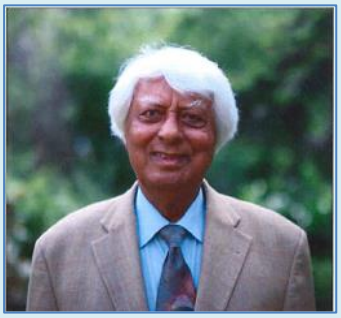
2. What could be done?

2.1. The following measures and practices could be implemented to help in Saving the Soil:

1- Embark and advocate projects that aim at biodiversity conservation, restoration and sustainable agriculture practices.
2- Advocate that the World and regional trade agreements should have provisions that enhance sustainable production practices (fair price that account for Externalities created by production processes using the accounting prices).
3- Reduce food waste and post-harvest loss.
4- Reduce pollutions and emissions.
5- Enact policies and adopt rule of law to safe guard environment including Soil environment.
6- Use taxes and payment for Ecosystem Services to help curb malpractice by providing operational scheme for protecting biodiversity and vegetation in rural areas (Al Hima, Pastoral land).
7- Empower citizenship by increasing people contact with nature and by education through introducing environmental education at all levels of education.
8- Enhance social Norm that favors integrity, trust, cooperation and respect for nature.

HRH Prince El Hassan bin Talal with Sadhguru.

PROF. SYED M. QAIM FIAS CO-ORGANIZED AN AUTUMN COLLEGE IN SEOUL, SOUTH KOREA



Professor Dr. h. c. mult. Syed M. Qaim of the Forschungszentrum Juelich (FZJ) and the University of Cologne, Germany, who is a Foreign Fellow of PAS, a Fellow of IAS and a Fellow of TWAS (from North), co-organized an International Autumn College on Radionuclides and Radiophamaceuticals from 17 October to 4 November 2022 in Seoul, South Korea. Sponsored by the International Atomic Energy Agency IAEA) in Vienna and the World Council on Isotopes (WCI) in Seoul, the event was financed mostly by the South Korean Government and it was held in the form of an e-Learning Course. A total of 19 radiochemists participated, mostly from countries where recently a Cyclotron and Positron Emission Tomography (PET) have been established.

As Chair of the Education and Training Committee of WCI, Prof. Qaim welcomed the participants, gave several technical lectures and worked as one of the two Tutors of the Course. The course was well received by the participants who are beginners in this fast expanding medical organ-imaging technique. A few groups in more advanced Islamic countries have already been engaged for several years in research and development work in this modern field.

On the other hand, the World Council on Isotopes (WCI), with its Headquarters in South Korea, the IAEA and the Korean Government have intensified advanced training programs in "Radionuclides and Radiopharmaceuticals" for scientists from the Third World countries. This is due to the ongoing installation of about 1000 medical cyclotrons in various parts of the world which are being used exclusively for molecular imaging and targeted radionuclide therapy. Two training courses are held every year via electronic learning.

Prof. Qaim holds the Chair of the Standing Committee on Education and Training of WCI and now the IAEA has appointed him a Tutor of those courses.

NOTE: HYDROGEN'S ROLE AS GREEN FUEL IN CLIMATIC EVOLUTION

M. Asghar

Abstract: This Note deals with the production of the main three types of hydrogen and the role of the green hydrogen as a source of energy in the context of climatic evolution.

Hydrogen is the most abundant element present in the universe with an atomic fraction of 7. 39 10^5 atoms ppm compared, for example, to 4.6 10^3 atoms ppm for Carbon and 1.04 10^4 atoms ppm for Oxygen. Like oxygen and nitrogen gases, Hydrogen gas as such is not present in the atmosphere. Different types of hydrogen are produced from its different compounds including those that contribute to the climatic CO_2 footprint **(1)**:

1. Grey hydrogen.

This type of hydrogen is produced through the process called steam methane reforming, where high-temperature steam (700 °C – 1000°C) is used to produce hydrogen from a methane source such as natural gas. In this method, the methane reacts with steam under 3 – 25 bar pressure in the presence of a catalyst to produce hydrogen, carbon monoxide (CO) and carbon dioxide (CO_2). The emitted greenhouse gas CO_2 joins the harmful CO_2 already present in the atmosphere rendering this process even more undesirable for climatic evolution. This method of producing grey hydrogen costs $2 to produce one kg of it.

2. Blue hydrogen.

The production of this type of hydrogen uses the same process as for the grey hydrogen, but the carbon produced is captured and stored deep underground often in salt mines or depleted oil and gas reservoirs. This method costs $2 - $6 to produce 1kg of blue hydrogen.

3. Green hydrogen.

The green hydrogen production avoids the use of CO_2 -producing fuels and is produced directly using the electrolysis process to split water into hydrogen and oxygen. This method costs $10 - $13 to produce 1 kg of green hydrogen.

The liquefaction temperature of hydrogen is – 253 °C, with a density of 70.87 g/liter. The hydrogen liquefaction costs 30 % of its chemical energy.

Hydrogen gas under pressure or in liquid form is stored in appropriately designed tanks and transported around by different means including pipelines and is used in different sectors of the industry.

Since most of the renewable solar energies are intermittent in nature and are available only for about 25 % of the time, there is a need to produce the green hydrogen using the excess of renewable electrical energy and store it as a source of energy for use during the "dead period", when these energies are not available.

Table 1, lists hydrogen energy density along with that of diesel and gasoline fossil fuels. As the Table shows, the hydrogen chemical energy density is about three times higher than that of these fossil fuels.

Table 1. Energy Densities

Hydrogen	120 Mega joules/kg	33.6 kWh/kg
Diesel	45.5 Mega joules/kg	12.7 kWh/kg
Gasoline	45.8 Mega joules/kg	12.8 kWh/kg

A fuel cell, Fig.1, is an efficient system to convert the hydrogen chemical energy into electrical energy. The fuel cell helps this task through the catalyst effect at its anode, to ionize the hydrogen molecules H_2 into protons (H^+) and electrons. While electrons produce the external electric current, the protons pass through the electrolyte to the cathode, where they interact chemically with the incoming flux of oxygen O_2 to end up as water H_2O.

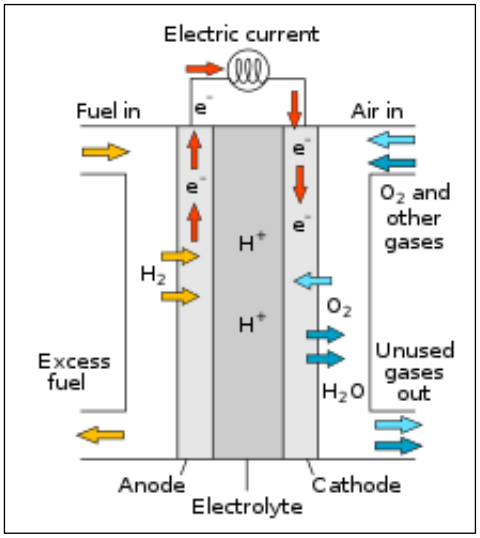


Fig.1. Scheme of a proton-conducting fuel cell (Courtesy Wikipedia).

The fuel cells can use the stored hydrogen gas or liquid. These cells are appropriately dimensioned in terms of power output for different transport systems such as cars, buses and trains shown in Figs.2, 3 and 4.

Fig.2. Cars: Hyundai Nexo is a hydrogen fuel cell-powered crossover SUV (Courtesy Wikipedia).

Fig.3. Solaris Urbino 12 bus near the factory in Bolechowo, Poland, (Courtesy Wikipedia).

Fig.4. Hydrail: Alstom Coradia iLint à l'InnoTrans 2016 in Germany (2018) (Courtesy Wikipedia).

Conclusions: This Note treats the production of the three main types of hydrogen and the role of the green hydrogen as a source of energy in the context of climatic evolution.

References

1. "What are the 3 main types of hydrogen?", (2021), Oliver Hague (Courtesy Wikipedia).

FELLOWS NO LONGER WITH US

THE LATE PROF. ABDUL LATIF IBRAHIM FIAS (MALAYSIA)

It is with a sense of sadness and sorrow that the President of the Islamic World Academy of Sciences (IAS) in Amman, Jordan, announces the passing away of the eminent scientist Prof. **Abdul Latif Ibrahim** FIAS (Malaysia).

Prof. Ibrahim was elected as a Fellow of the Islamic World Academy of Sciences in 1988. He was the former Dean and Professor of the Faculty of Veterinary Medicine and Animal Science, University Pertanian, Malaysia.

Prof. Abdul Latif Ibrahim, who was born in 1938, was a member of staff at the University Pertanian Malaysia since 1973.

Prof. Ibrahim was educated at Bangladesh Agricultural University, University of Hawaii and University of California from where he earned his PhD in Microbiology in 1976.

Of an extensive list of research work, Prof. Ibrahim had concentrated on the study of the Newcastle Disease, and other related phenomena of veterinary medicine.

Prof. Ibrahim also had an extensive teaching program, teaching Virology and Immunology to students reading Veterinary Medicine at the University Pertanian (Malaysia).

Prof. Ibrahim has more than one hundred and twenty publications dealing with many facets of Animal Science, and was the first recipient of the Svon Brohult award as well as being a co-recipient of the First International Science Award of Malaysia, for outstanding contribution in the field of science. Prof. Ibrahim was also a Fellow of the Academy of Sciences Malaysia (1996).

We pray to Allah (Subhanahu Wa Taala) to grant his soul eternal peace and give his family the courage and strength to bear this huge loss.

«Ina Lillah Wa Ina Ilaihi Raj'oon».

THE JUBILEE OF ACADEMICIAN AKHMET MAZGAROV FIAS

1 January 2023 marks the 80th anniversary of the Director of JSC VNIIUS, ex-President of the Academy of Sciences of the Republic of Tatarstan, Honored Chemist of the Republic of Tatarstan, Laureate of the State Prize of the Republic of Tatarstan and the Prize of the Government of the Russian Federation for Science and Technology, Academician of the Academy of Sciences of the Republic of Tatarstan and the Islamic World Academy of Sciences (IAS) Akhmet Mazgarovich Mazgarov.

In 1964 after graduating the Kazan of Chemical Technology Institute Akhmet Mazgarov worked at the Kuibyshev Synthesis Alcohol Plant, going from operator to deputy of the workshop chief. In 1968 he entered the graduate school of the Moscow of Chemical Technology Institute named after D.I. Mendeleev and graduated in 1970, successfully defending his doctoral dissertation.

In 1972 a young scientist Ahmet Mazgarov founded a laboratory for hydrocarbon desulfurization of the All-Union Research Institute of Hydrocarbon Feed in Kazan. In 1983 he defended his doctoral dissertation, and in 1985 he was elected director of this Institute. In 1990 Akhmet Mazgarov became a professor and honored chemist of the Republic of Tatarstan, and in 1991 was elected academician of the Academy of Sciences of the Republic of Tatarstan. In 1998 prof. Akhmet Mazgarov was awarded the title of Laureate of the State Prize of the Republic of Tatarstan in the field of science and technology. In 2002 he became a Fellow of the Islamic World Academy of Sciences (IAS), and in 2005 - Laureate of the Russian Government Prize for Science and Technology. From 2006 to 2014, Academician Akhmet Mazgarov - President of the Academy of Sciences of the Republic of Tatarstan and from 2008 to 2010 - Vice President of the Islamic World Academy of Sciences.

Akhmet Mazgarov is a world-renowned scientist in the field of chemistry of organic sulfur compounds, homogeneous catalysis, oil and gas processing, chemistry and technology of oil, gas and petroleum products purification processes from sulfur compounds. Under his leadership a scientific school on chemistry and technology of organic sulfur compounds was created and successfully operates in Kazan. Among the students of Akhmet Mazgarov are 12 candidates and 2 doctors of sciences. He is the author of more than 245 scientific papers and 140 patents, including 5 US patents and 1 FRG patent. According to the technologies developed by academician Akhmet Mazgarov more than 50 industrial plants for the treatment of hydrocarbons and wastewater in Russia and abroad (Iran, Bulgaria, Kazakhstan, Latvia, Lithuania) were built.

He is the author of the world's first process of crude oil demercaptanization (DMC-1 process), introduced into industry in 1995 by the American oil company Chevron at the Tengiz field in Kazakhstan. In 2006-2008 under his leadership, the reconstruction of two lines of the DMC-1 plant was carried out with the transition to DMC-2 technology, which ensured deep purification of oil from C1-C2 mercaptans with increased capacity and twice as compared to the design one.

Four licenses were sold to Iran for the technology of odorant production and purification of gas condensate, gasoline, propane-butane fraction and wastewater from sulfur compounds. These technologies are used to design and build 20 industrial plants. By 2022 a complex for the treatment of propane, butane, naphtha and sulfuric-alkaline effluents on Hark Island, odorant production in the Persian Gulf in Assaluye, a complex for the treatment of butanes and pentane fraction at the Bid-Boland refinery, a large-capacity plant for deep purification of "South Pars" gas condensate from mercaptans (DMC-3 process).

Under the leadership of Akhmet Mazgarov, the production of the phthalocyanine catalyst IVKAZ for desulfurization of hydrocarbon raw materials, the only Russian catalyst exported abroad (Iran, Bulgaria, Holland, Kazakhstan, Belarus, Lithuania) was developed and established with the participation of scientists from Moscow and Ivanovo in Kazan. Fundamental studies of the properties and composition of sour carbon oils were carried out, and as a result a new original DMC-1MA process was created for field purification of oil from hydrogen sulfide. The world's first pilot plant DMC-1MA was built at NGDU Nurlatneft, and in 2009 the unit was successfully started up.

From 2006 to 2014 Akhmet Mazgarov headed the Academy of Sciences of the Republic of Tatarstan. During this time, a large-scale reorganization of the scientific sphere of the Republic of Tatarstan was carried out, academic research institutes and centers were strengthened, support was provided to applied research institutes in the form of scientific and methodological guidance. Thus, the Academy of Sciences of the Republic of Tatarstan has become a real center for the development of the scientific and innovative sphere of Tatarstan.

For many years Akhmet Mazgarov was Deputy Chairman of the Scientific Council for Chemistry and

Technology of Organic Sulfur Compounds under the Ministry of Science and Technical Policy of the Russian Federation, a member of the Expert Council for Oil Refining under the Ministry of Energy of the Russian Federation, a member of the Scientific Council of the Russian Academy of Sciences for Petrochemistry, and a member of the editorial board of the journal "Neftekhimiya".

Akhmet Mazgarov conducts great work in the field of international relations, being an academician of the Islamic World Academy of Sciences (2002) and its vice president (2008). He participated in scientific reports at the World Petroleum Congress in Beijing (1997), the 18th and 20th International Organosulfur Symposium in Florence (1998) and Arizona (2002), gave a lecture course on the chemistry of organosulfur compounds in Iran, was on scientific trips to England, USA, Denmark, Morocco, Canada, Germany, Malaysia, Sweden, Finland, Iran Turkey and other countries. Academician Akhmet Mazgarov makes a significant contribution to the development of science and technology as a member of the editorial board of the journal "Chemistry and Technology of Fuel Oils," has the title of the best inventor of the petrochemical industry in Russia, was awarded the Order of the Badge of Honor (1986) and "For Services to the Republic of Tatarstan" (2013).

Akhmet Mazgarovich meets his anniversary in the prime of creative and vital forces, he is full of energy and determination to continue the research and create new, more advanced oil and gas processing processes.

ISC Global Knowledge Dialogue held in South Africa

The first of the series of Global Knowledge Dialogues was held in Cape Town, South Africa, on the margins of the World Science Forum.

The International Science Council (ISC) held its first in a series of Global Knowledge Dialogues in Cape Town, South Africa on the margins of the World Science Forum. More than 120 Member representatives from 40 countries attended the dialogue, which included partnerships with the Organization of Women Scientists for the Developing World (OWSD), and the Global Young Academy (GYA) and international representation from Australia, Malaysia, Japan, Turkey, Iran and the United Kingdom. INGSA chapter members and Future Earth representatives also attended the afternoon session.

Salim Abdool Karim, ISC Vice-President for Outreach and Engagement, opened proceedings, welcoming ISC Members and challenging the gathering to think about the myriad of unfolding crises that are converging on our planet.

In his address, Peter Gluckman, ISC President, took the opportunity to inform participants of existential threats facing humanity, including issues around social cohesion, mental health, conflicts and the failings of the multilateral system, the opportunities and concerns with new technologies, and a loss of trust in elites including academia and science.

The president outlined the Governing Board's vision for priority areas of the ISC, which included raising the profile of the ISC to be the effective global voice for and of science, addressing gaps in the scientific endeavour for sustainability through the ISC's Global Commission on Science Missions for Sustainability, creating the ISC charitable trust that will allow the Council to fundraise, and expanding the ISC's membership and building the capacity of Members. He also shared his views on the positive impact the Latin American and Caribbean Focal Point was having in its first six months of operation and was confident that the focal point for Asia and the Pacific, based in Australia, and a future focal point for Africa would have the same success.

Participants were then introduced to incoming CEO Salvatore Aricò, who thanked the ISC for the opportunity, saying he was looking forward to getting to know the Members and support the Secretariat in the next phase of the ISC.

A surprise element was added to the Global Knowledge Dialogue in the form of "Ignite Talks", designed to inspire and showcase Members' science by celebrating storytelling from a personal perspective. Ignite Talks focused on the leadership journeys in science from Dr Palesa Sekhejane, Human Sciences Research Council South Africa, Dr Olubukola Babalola, Vice President of The World Academy of Sciences (TWAS) and Vice President of the Organization of Women in Science for the Developing World (OWSD), climate science from Prof Josephine Ngaira, International Geographical Union, and a personal love story weaved into astronomy by Kevin Govender of the International Astronomy Union's Astronomy for Development Office in South Africa. The Ignite Talks energized the audience, bringing participants to their feet upon hearing the stories.

News source and for more information:
https://council.science/current/news/gkd-africa-grand-success/?utm_source=MembershipUpdate&utm_medium=Email&utm_campaign=20221208MU

AL FARGHANI* (C. 800)

Abul-Abbas Ahmad Ibn Muhammad Ibn Kathir al-Farghani, born in Farghana, Transoxiana, was one of the most distinguished astronomers in the service of al-Mamun and his successors. He wrote "Elements of Astronomy" (*Kitab fi al-Harakat al-Samawiya wa Jawami Ilm al-Nujum* i.e. the book on celestial motion and thorough science of the stars), which was translated into Latin in the twelfth century and exerted great influence upon European astronomy before Regiomontanus. He accepted Ptolemy's theory and value of the precession, but thought that it affected not only the stars but also the planets. He determined the diameter of the earth to be 6,500 miles, and found the diameters of the planets.

Al-Farghani's activities extended to engineering. According to Ibn Tughri Birdi, he supervised the construction of the Great Nilometer at al-Fustat (old Cairo). It was completed in 861, the year in which the Caliph al-Mutawakkil, who ordered the construction, died. But engineering was not al-Farghani's forte, as transpires from the following story narrated by In Abi Usaybi'a.

Al-Mutawakkil had entrusted the two sons of Musa Ibn Shakir, Muhammad and Ahmad, with supervising the digging of a canal named al-Ja'fari. They delegated the work to Al-Farghani, thus deliberately ignoring a better engineer, Sanad Ibn Ali, whom, out of professional jealousy, they had caused to be sent to Baghdad, away from al-Mutawakkil's court in Samarra. The canal was to run through the new city, al-Ja'fariyya, which al-Mutawakkil had built near Samarra on the Tigris and named after himself. Al-Farghani committed a grave error, making the beginning of the canal deeper than the rest, so that not enough water would run through the length of the canal except when the Tigris was high. News of this angered the Caliph, and the two brothers were saved from severe punishment only by the gracious willingness of Sanad Ibn Ali to vouch for the correctness of al-Farghani's calculations, thus risking his own welfare and possibly his life. As had been correctly predicted by astrologers, however, al-Mutawakkil was murdered shortly before the error became apparent. The explanation given for Al-Farghani's mistake is that being a theoretician rather than a practical engineer, he never successfully completed a construction.

The Fihrist of Ibn al-Nadim, written in 987, ascribes only two works to Al-Farghani: (1) "The Book of Chapters, a summary of the Almagest" (*Kitab al-Fusul, Ikhtiyar al-Majisti*) and (2) "Book on the Construction of Sun-dials" (*Kitab 'Amal al-Rukhamat*).

The Jawami or 'The elements' as we shall call it, was Al Farghani's best-known and most influential work. Abd al-Aziz al-Qabisi (d. 967) wrote a commentary on it , which is preserved in the Istanbul manuscript, Aya Sofya 4832, fols. 97v-114v .Two Latin translations followed in the twelfth century. Jacob Anatoli produced a Hebrew translation of the book that served as a basis for a third Latin version, appearing in 1590, whereas Jacob Golius published a new Latin text together with the Arabic original in 1669. The influence of 'The Elements' on medieval Europe is clearly vindicated by the presence of innumerable Latin manuscripts in European libraries.

References to it in medieval writers are many, and there is no doubt that it was greatly responsible for spreading knowledge of Ptolemaic astronomy, at least until this role was taken over by Sacrobosco's Sphere. Even then, The Elements' of al-Farghani continued to be used, and Sacrobosco's Sphere was evidently indebted to it. It was from 'The Elements' (in Gherard's translation) that Dante derived the astronomical knowledge displayed in the 'Vita Nova' and in the 'Convivio'.

The statue of al-Farghani in Cairo, Egypt (Source: Wikipedia).

* *Source: Personalities Noble, 2nd Edition, 2000, Edited by Hakim Mohammed Said, Published by IAS with permission of Hamdard Foundation Pakistan.*

IAS NEWSLETTER

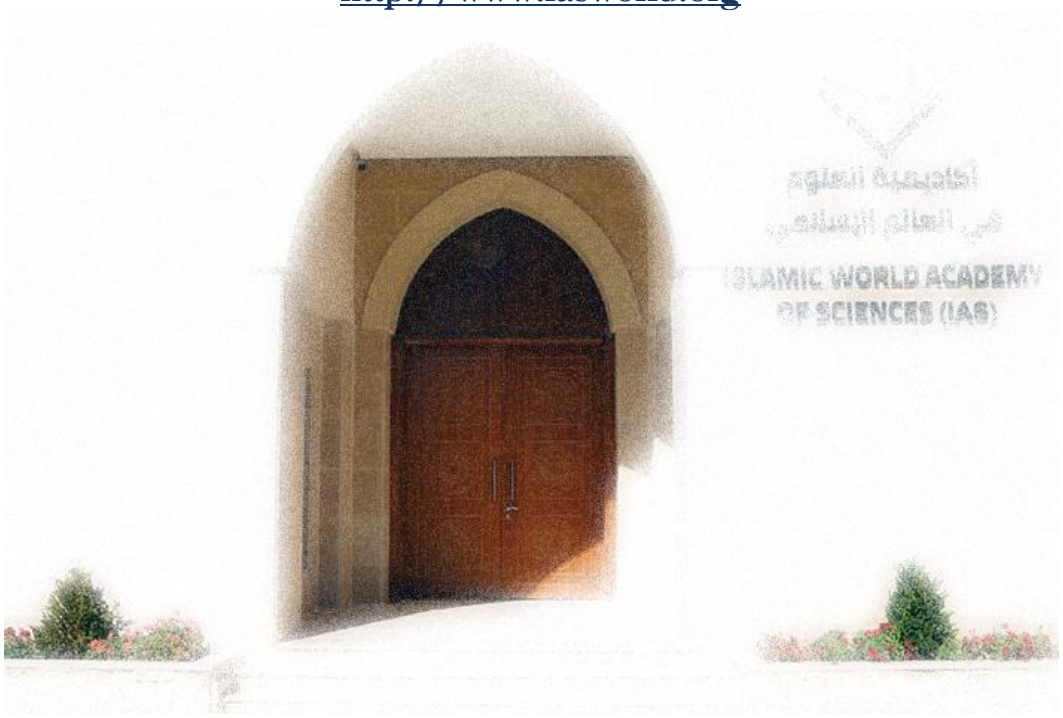
Published by the IAS Secretariat, Amman, Jordan

The IAS welcomes the submission of short articles for publication in the Newsletter (publication however is at the IAS discretion)

PO Box 830036 Zahran
Amman 11183 Jordan

Tel: +962-6-552 2104
Fax: +962-6-551 1803

E-mail: ias@go.com.jo
http://www.iasworld.org



IAS NL - Vol. 31 No. 50
Najwa Daghestani