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A VOYAGE OF MONOTHEISM: THE ROUTES OF PILGRIMS*

A call for union and reflection

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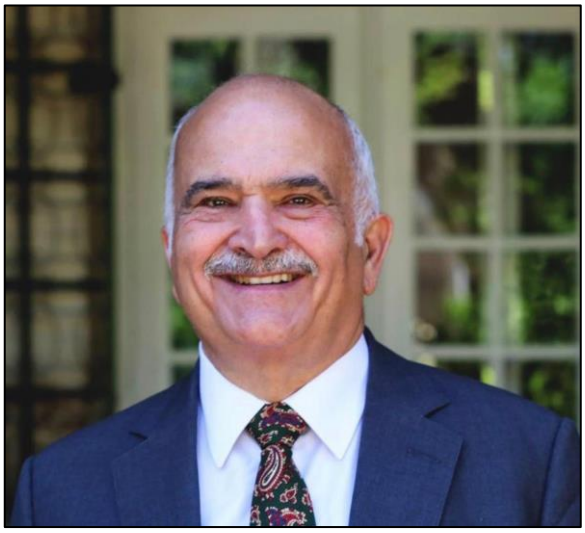
Founding Patron of the Islamic World Academy of Sciences (IAS)



The life journey of humanity takes different routes and paths. It is a voyage that evokes curiosity in subjective experience and our knowledge of the self, provoking unprecedented questions that allow us to experience a new realm of answers. Exploring the myriad layers of life empowers us to unfold the reality of our existence to understand that it is not bound to the span of our time on earth. We are a piece in a long chain of being that has evolved over the course of thousands of years and centuries -- since the first existence of humanity on Earth.

Embarking on new journeys can be one of the most rewarding experiences of our life. Voyaging is divinely designed to reveal our true colour and expose our subtle shortcomings. The Arabic term for travel, *safar*, reveals the spirituality of the concept, with the root's connotations of clarity and radiance, in opposition to disbelief and concealment. Thus, voyaging is the path to enlightenment, a departure or transcendence from the darkness of ignorance to the light of belief. For this reason, travelling has always been associated with learning and seeking knowledge since attaining knowledge requires journeying physically, spiritually, and intellectually.

History reveals how travelling connects civilizations, opens communication channels, and helps nations to find common ground. The famous Treaty of Quraish between the kings of the Levant and the kings of Yemen, to secure their trading caravan to Yemen in the winter and the Levant in the summer, is but one example. This treaty was a catalyst for building bridges between Quraish and the two kingdoms, whereby Quraish was blessed with security against hunger and fear. The Qur'an has pointed out this divine bounty as an invaluable blessing for which the tribe of Quraish should be grateful. Allah says: "So let them worship the Lord of this House, who has fed them to ward off hunger and has secured them to ward off fear." [Qur'an 106:3-4].

The Sufi thought in Islam offers an in-depth perspective on the nature of life's journeys and

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describes the theme and purpose of voyaging with profundity. It interprets its relevance to the realm of the divine to explain the connection between humanity's journey on Earth and their spiritual voyage from the lower world to the higher world. The writings of Muslim Sufi scholars unveil the enigma of voyage in the pursuit of humanity and spiritual fulfilment. Ibn ‘Arabi, the foremost Sufi theorist and one of the most inventive and prolific writers of the Islamic tradition, remarks in his book Al-Isfaar 'an Nata'ij al-Asfaar (Translation: Unveiling the Enigmatic Secrets of Voyaging) that those who are conscious of God divide voyages to three kinds: the voyage from God, the voyage to Him, and the voyage in Him.

The estrangement of hearts brings the members of one nation apart and strips humanity of the purpose of its existence on Earth. As we advance toward unity, distances fade even if we are physically far apart, which is the message that Hajj sends to the world. This sacred ritual echoes the voice of submission, peace, and unity in Islam, with the participation of millions of Muslims travelling from all parts of the world to the Sacred House in Makkah. Allah, Most High, says: “And proclaim to humankind the Hajj; they will come to you on foot and on every lean camel, coming from every distant pass - That they may witness benefits for themselves and mention the name of Allah on known days” [Qur'an 22:27-28].

One of the foremost objectives of Hajj is to cherish our commonalities and respect one another's differences as individuals and cultures through action. Moreover, Hajj allows us to appreciate the variations between different schools of thought in Islam. Such pluralism has generously contributed to the rise of Islamic civilization and reinforced the core elements of its foundation. The season of Hajj represents the ultimate platform for unity, where ideas coalesce and believers from all walks of life can experience first-hand how differences can draw them together and open up a wider space for discussion. The sacred cities serve not only as places for rituals and worship, but as hubs of spirituality where the elements of culture and economy connect the lower world with the higher world. The foundation of Islamic civilization is in fact built on the principle that constructing the earth is a form of worship. This is evident in the trade stations and markets in the Hajj route, alias the Silk Road, from Samarkand to Hijaz. Our ancestors managed to set up markets and trade to eradicate poverty, hunger, and need, whilst maintaining the sanctity of these spaces.

As Muslims, we seek an approach to faith that emphasizes the love for the Prophet's family, whom God has commanded us to love in the Qur'an: “Say, 'I do not ask of you any reward for it except the love of [my] relatives'” (Qur'an 42:23), and the love for the Companions of the Messenger (peace and blessings of Allah be upon him), whom God has praised, saying, “Muhammad is the Messenger of Allah and those with him” (Qur'an 48:29). This mindset implants in us the spirit of unity and love, regardless of sect.

Allah designed people to be different from one another to enrich the cumulative experience of humanity and offer each one of us a unique and positive perception of others. Such differences demand interaction to learn more about the other and the self. As emphasized in the Qur'an, it is a reciprocal process that is founded on the principle of diversity. Allah, Most High, says: “O mankind, indeed we have created you from male and female and made you peoples and tribes that you may know one another. Indeed, the noblest of you in the sight of Allah is the most righteous among you” (Qur'an 49: 13).

Amid the increasing calls for division among Muslims, under the guise of religiosity, those who are sensible and wise have the responsibility to speak up. This is critical to prevent the spread of misinformation -- the discourse of excommunication and defamation among Muslims. There is a direct correlation

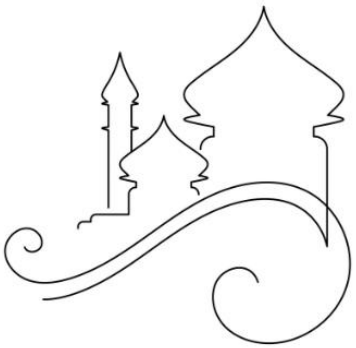
between the fall of morality and decline of knowledge, and the gap between people of the same religion and culture. The decline of knowledge promises the rise of ignorance, and the fall of morality necessitates disputes and conflicts. History is full of examples, but the most obvious is the long-standing conflict between Catholics and Protestants. A genuine openness to universal human thought cannot be deep and fruitful without openness to the diversity within our cultural and religious contexts.

The success of any civilizational project requires upholding human dignity, respecting cultural and religious uniqueness, and distancing ourselves from the logic of majority, dominance, and subjugation, inevitably leading to exclusion and the spread of oppression. Today, we need to emphasize the legitimacy of "the right to differ" instead of being swayed by the logic of power, where power subdues the truth, and thus, the weak becomes inherently wrong. Islam denounces the logic of power by affirming the fundamental contradiction between religious coercion and the nature of faith, which at its core, is based on the principle of freedom of will and choice. Allah, Most High, says: “And say, 'The truth is from your Lord, so whoever wills - let him believe; and whoever wills - let him disbelieve'” (Qur'an 18: 29). Religious nationalism, where religion-based exclusion is practised, is as damaging as political exclusion. The worst form of religion-based exclusion is when it is used as a tool to serve personal interests and goals unrelated to religion. It is high time to address the grassroots of our economic and political failures without rehashing contentious historical issues that will not solve our real problems in our current reality.

The principle of treating others as one wants to be treated is the Golden Rule which lays out one of the most important ethical foundations of diversity. With that said, the mockery and ridiculing of others' beliefs and schools of thought is an ethical dilemma that the Qur'an warns against. Allah, Most High, says: “O you who have believed, let not a people ridicule [another] people; perhaps they may be better than them.” Islam takes this issue seriously, as it even prohibits insulting those who hold different religious beliefs, even if they are polytheists. Allah, Most High, says: “And do not insult those they invoke other than Allah, lest they insult Allah in enmity without knowledge. Thus, we have made pleasing to every community their deeds. Then to their Lord is their return, and He will inform them about what they used to do" (Qur'an 6:108).

As noted, Muslims are commanded to present exemplary moral and ethical behaviour in their relations with followers of other religions. So, it is more befitting that they practice tolerance and adopt such ethics while dealing with other fellow Muslims and different sects. Despite the political drivers and circumstances, the cultural and spiritual roots of the Muslim nation remain the most profound, which reminds us of the importance of reviving the virtue of consultation (Arabic: Shura) -- it begins from within one's own country and extends to include the distant territories of Muslims.

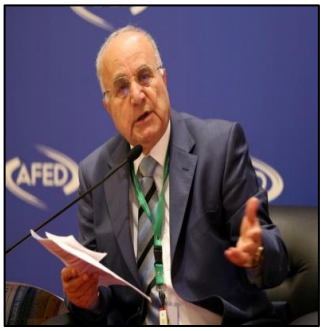
Finally, as we approach the celebration of Eid-ul-Adha, I would like to stress the need to reflect on the meanings of sacrifice and giving that Prophet Abraham (peace be upon him) exemplified in his pursuit of the love and satisfaction of Allah. This is a call for all Muslims to unite as believers under the umbrella of faith to qualify as true mercy for all people and be an upright nation that can be a witness over humanity.



REVIEW OF HIGHER EDUCATION, DIVERSIFICATION AND TEACHING SYSTEMS IN THE ARAB REGION

SPRINGER NATURE 2023

Adnan Badran[**] FIAS, FAAS



In chapter "An Overview of E-Learning and Distance Education in the Higher Education Landscape: The Good, the Bad, and the Ugly" (Mesmar et al.), the authors give an account of the evolution of education from the earliest civilizations to the present day. They present an overview of e-learning and distance learning, defining the terms used to describe the various forms now encountered, and emphasizing the diversification of the teaching systems required to meet the future needs of countries trying to bring quality education to large populations, and also the necessity of catering to the needs of individuals.

The concept of pedagogical ecology, the basis of which is Gibson's theory of affordances, is introduced in chapter "The Pedagogical Ecology of Learning Technologies: A Learning Design Framework for Meaningful Online Learning" (Dabbagh).

The evolution of technologies from pre-internet to Web 3.0 allows the reinvention of learning programs to suit the needs of both the learner and society. A new framework for online learning is presented which is designed to initiate reform of education in the Arab world from a system based on memorizing facts to an enabling system fit to deal with the complexities of the twenty-first century.

The future of universities in the twenty-first century, is reviewed in chapter "The Future of the University: Outlook for a 21st Century Economy" (Al-Chaer) with emphasis on their transformation from primarily institutions of a nation state, often with narrow goals, to transnational corporations that are financially sound with a focus on the academic excellence necessary for the knowledge economy of the future. There is recognition that the disruption caused by the COVID-19 pandemic has altered priorities and forced changes that might not have previously been considered with any urgency, and the situation of universities in the Lebanon is discussed as an example. The importance of academic freedom and free speech in future university systems is emphasized, as is the idea of teaching with the needs of the individual learner in mind. With respect to the latter, the author sets out proposals for five institutional models that focus mainly on the various requirements of different learning types, thus improving the university experience and final learning outcome of individual students.

The authors of chapter "Distance Education: Is it any Longer a Paradigm of Choice? The University of Jordan—A Case Study" (Obeidat et al.) make the assertion that online learning is now a necessity, not just a matter of choice, if education is going to properly serve the societies and increasing number of students of the twenty-first century. They give an account of how the University of Jordan set about implementing the changes needed to take full advantage of the opportunities presented by the 4th industrial revolution.

The development of online learning in higher education in Arab states, particularly Sohar University in Oman, is documented in chapter "Delivery of Online and Blended-Learning Higher Education Programs in the Arab World: A Case Study from Sohar University in Oman" (Al Fazari). The reluctance of some states to accept qualifications from online courses is noted, as is the need to overcome this prejudice by assuring the academic quality and integrity of such programs. It is recognized that while traditional education has its benefits the future lies with online learning, particularly with blended learning courses, which combine the best of both worlds.

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A flexible approach to e-learning is urged in chapter "A Flexible Blended Approach to Learning" (McKellar and Barton), in which the authors recount the experiences of the University of Hertfordshire, UK, during the pandemic. As a result of the development of an in-house virtual learning environment, StudyNet, over the previous decade, and the incorporation of an element of blended learning into most subjects, the university was able to adapt rapidly to teaching fully online during lockdown. Moreover, during the two years of restrictions, the university was able to improve on the existing system, with respect to staff training, assessment methods, and the needs of individual students. A flexible, blended learning system is seen as the basis for future learning at the university.

In chapter "E-Learning at the University of Petra during the COVID-19 Pandemic: Lessons and Recommendations", Abdel-Rahmen and El-Khalili recount their experience of implementing hybrid e-learning programs at the University of Petra, Jordan. They report the results of a study to determine the degree of student and teacher satisfaction with the courses provided, placing particular emphasis on the computer skills of the participants, access to the necessary hardware, teaching experience, student ages and study levels, and use the information to make recommendations to enable the transition from classical teaching to e-learning.

Mualla and Mualla (chapter "Interactive and Collaborative Distance Learning Approaches: A Decision-making Framework for Higher Education in Developing Countries") give an account of the impact of COVID-19 on higher education institutions in developed and developing countries, with particular reference to the experience in Syria where the Syrian Virtual University was especially successful because of its established digital teaching resources. Based on the experience of various universities worldwide, the authors set out a decision-making framework for the successful implementation of distance learning.

The digital divide between and within nations is brought into focus in chapter "Bridging the Digital Divide in Higher Education: North African Challenges and Initiatives" (Benjelloun). The specific problems encountered in North African nations, and the opportunities presented by e-learning and distance learning to reduce this gap, are presented in light of current rapid technological advancements and the ability of individuals to access this information.

The difficulties of converting traditional engineering courses, which involve practical skills, to effective online programs are considered in chapter "Hands-On E-Learning and Distance Education in Engineering: Wishful Thinking or a Practical Reality?" (Zabalawi et al.). The authors review the concept of engineering, past and present, and what is required for a successful online course in the future, with discussion of the challenges and attributes of e-learning. Based on their experiences at the Australian University in Kuwait, they put forward a detailed governance framework for online engineering education.

The importance of learning-management systems (LMSs) in the future of e-learning is discussed in chapter "Enhancing Collaborative and Self-Paced Learning in Traditional and Distance Education Settings" (Ebbini), based on the author's experience of their use in electrical and computer engineering. Emphasis is placed on the ability of LMS platforms to promote collaborative and self-paced learning, leading to student's becoming life-long learners. The case is made for a top-down approach to teaching, with appropriate levels of abstraction for complex subjects, as well as using demonstrations of real-life examples of systems to promote student interest and understanding. The inclusion of ethics in the teaching program is recommended to counteract the increased opportunity for plagiarism facilitated by e-learning.

The origins and development of online learning are reviewed in chapter "The Impact of Online Learning on Career Performance among Practitioner Engineers" (Baytiyeh) with special reference to the careers of practitioner engineers.

A survey of postgraduate engineers taking the online ProGreen Diploma in Lebanon and Egypt was undertaken to determine the skills that were considered most important for professional development, among which independent learning was rated the highest.

The particular problems of distance teaching of courses with a practical element are raised in chapter "The Implementation of Online Medical Education in the Arab World" (Dashash) with a review of medical education in the Arab world with respect to the technological capabilities of different countries. It was noted that modern online technology could, in fact, be effective in medical training, and in promoting life-long learning, which is necessary in order for healthcare professionals to keep up to date with the latest research. High-tech simulations of virtual patients and live streaming of surgical procedures were deemed to be useful supplements to hands-on training, provided that the underlying technologies and teaching skills were in place.

Transnational education, its benefits and downsides, as well as the challenges of implementation, is scrutinized in chapter "Transnational Education and E-Learning" (Arida). The various models are described, as is the need for proper quality assurance and regulation by internationally recognized bodies to ensure that both students and employers have confidence in the final qualifications.

In chapter "Cognitive Presence as a Catalyst for Creating a Community of Inquiry in Online Learning in a Lebanese Higher-Education Context" (Zgheib et al.), the authors emphasize an inquiry-based approach to online teaching and learning. They present the results of a study of higher education in Lebanon carried out to determine the extent to which learners engage in their courses, as measured by their cognitive presence, which is important for the creation of a community of inquiry, the ultimate goal being to promote a more student-centered approach to all types of online learning.

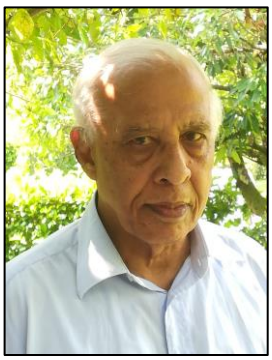
A major area of concern during the switch to distance and e-learning during the pandemic was the effect of student isolation on their mental health. This problem is assessed and addressed in chapter "Beyond Digital Learning Modalities and Tools: Centering Learners' Socioemotional Wellbeing in the Context of E-Learning in the Arab Region" (Al-Freih and Maha Bali) in which the authors interviewed university educators from Egypt and Saudi Arabia to elicit their ideas on how to place the learner's emotional and social well-being at the center of the e-learning experience. It was agreed that to do this, educators needed to adjust their courses to promote student engagement and interaction and thereby build a sense of community and belonging. The use of new assessment practices and utilization of online technologies, such as breakout rooms, quizzes, and polls, is recommended.

The take-home message of the 17 chapters of this book appears to be that online teaching, in some form, is the future of higher education in the Arab world, enabling the massification of education and promoting the flexible life-long learning needed for the modern technological age. However, it is not sufficient just to transfer classroom-based courses online, especially where there is a practical element involved. Programs must be redesigned to promote teacher–student and student– student interactions to maintain student interest and prevent problems associated with student isolation. Not surprisingly, there needs to be substantial and forward-thinking investment in all aspects of online learning.

Finally, we acknowledge with much gratitude financial assistance from the University of Petra, Jordan, that made this publication possible. We specifically thank Margaret Deignan of Springer Nature for her guidance, help, and continuing support in our series of books on higher education in the Arab world.

DARK MATTER IN THE UNIVERSE

Muhammad Asghar[*] *FIAS*



Abstract: This document deals with the presence of dark matter in the universe through the analysis of rotation velocities of spiral galaxies ,its distribution in the universe through the weak gravitational lensing, its density via the analysis of the cosmic microwave background (CMB) data, and the present unsuccessful international effort for its detection as conjectural exotic particles.

1. Need for dark matter

The baryonic matter in the universe interacts with the electro-magnetic radiation and is called the visible or luminous matter. The Solar System consists of the Sun and its 8 planets of which Mercury planet is nearest to the Sun, Neptune is farthest from it and the orbits of the other planets lie within the orbits of Mercury and Neptune planets. These planets rotate in their respective orbits around the Sun. According to Newton's law of gravity, the orbital rotational velocities of these planets decrease as a function of the distance from the Sun, because the mutual gravitational attraction decreases with the increase in distance, and the balancing centrifugal force = m v /^{2}r, also decreases leading to a decrease in the planets' rotational velocities as shown in Table 1 **(1).**

Table 1. Orbital Velocities of Solar Planets

Mercury	47 km/s
Venus	35.0 km/s
Earth	29.8 km/s
Mars	24.1 km/s
Jupiter	13.1 km/s
Saturn	9.7 km/s
Uranus	6.8 km/s
Neptune	5.4 km/s

In the case of Spiral galaxies of luminous matter, their arms also rotate around the galactic center mostly determined by a massive black hole. Like the Solar System, the velocity of rotating stars should decrease as a function of their distances from the galactic center as indicated by the dotted curve A in Fig.1. However, this behavior is not observed and the galaxy rotation red curve B in Fig.1 remain**s flat** as the distance from the center increases **(2).**

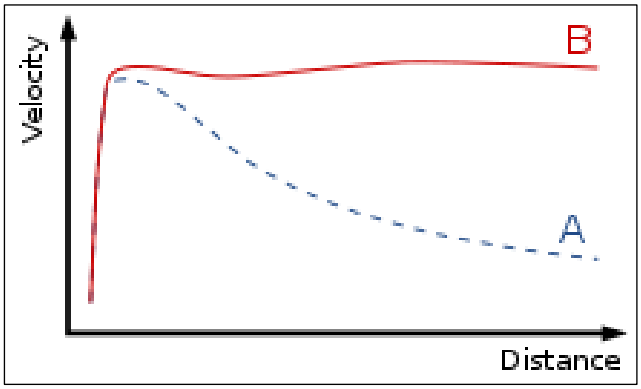


Fig. 1. *Rotation curve of a typical spiral galaxy: predicted* ***(A)*** *and observed (****B****). Dark matter can explain the 'flat' appearance of the velocity curve out to a large distance from the galactic center* ***(2).***

The suggested solution to this problem is the presence of **dark matter**, which is invisible, because it does not interact with the electro-magnetic field through absorption and reflection, but it creates its own gravitational field and interacts gravitationally with the luminous matter. The dark matter's density distribution as a function of the distance from the galactic center must be such that its gravitational field contribution helps to flatten the expected velocity curve A due to the luminous matter, to the observed red curve B in Fig. 1.

Historically the Swiss astronomer Fritz Zwicky first observed in 1933 that the velocities in galaxy centers were too high to account for the quantity of matter observed.

2. Strong and weak gravitational lensing

According to the general theory of relativity, massive objects such as clusters of galaxies lying between a distant light source such a quasar and the observing system, should act as focusing lens that bends the light from the source the more massive the lens, the more lensing is observed. This represents the **strong gravitational lensing** and is the case for the cluster of Abel 1689 observed by the Hubble space Telescope (Fig. 2). By determining the distortion geometry, one gets the total mass (the visible mass plus the invisible one) of the cluster, and from here, that of the dark matter distributed around the cluster can be determined, where the visible mass M of the cluster, can be determined from the luminosity relation:

(L/LSun) = (M/MSun)3.5,

where L is the luminosity of the cluster, the $L_{Sun,}$ the luminosity of the Sun, the M_{Sun}, the mass of the Sun and the M, the mass of the cluster.

At a distance **r** from the center of the galaxy (Fig. 1), the comparison of velocity V_B on the curve B and

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velocity V_A on the curve A, helps to get the amount of dark matter mass contributing gravitational field at the distance r to move the system from velocity V_A to velocity V_B.

Fig. 2. *Strong gravitational lensing as observed by the Hubble Space Telescope in the cluster Abell 1689, indicates the presence of dark matter* ***(3)***.

In the case of **weak gravitational lensing**, the astronomers can work out, where the dark matter is, because it distorts the light from distant stars. Here, greater the distortion, greater the concentration of dark mass. A massive international effort helped to determine the dark matter distribution map of the universe (Fig. 3), **(4)**.

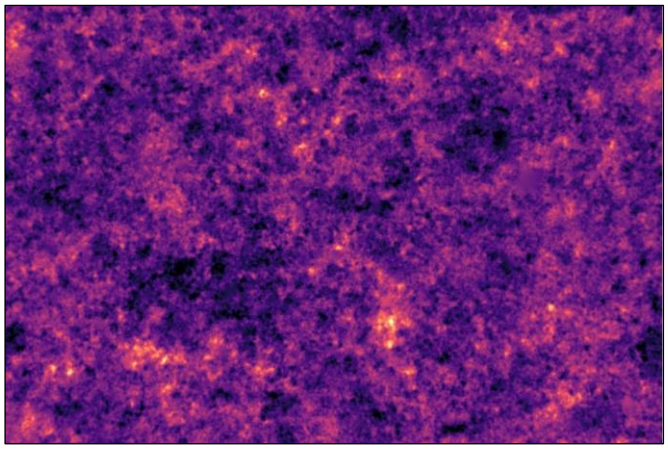

Fig. 3. *This is the most detailed map of the distribution of dark matter in the Universe through weak gravitational lensing. The bright areas represent its highest concentrations - which is where galaxies form* ***(4)***.
Image Source: N Jeffrey/Dark Energy Collaboration.

3. Dark matter density from the analysis of the 2.725° K cosmic microwave background (CMB) data.

The analysis of the CMB data from the different measuring systems such as the latest Planck Satellite-based high resolution and high sensitivity detector via the standard Λ-CDM model of cosmology for a flat universe leads to the density of its different energy-mass components:

Dark matter	22.8%
Ordinary baryonic matter	4.56%
Dark energy	72.6 %

4. Possible nature of dark matter and its detection

The general view is that dark matter consists of hypothetical exotic particles suggested by different theories and theoretical models such as axions, sterile neutrinos, weakly interacting particles (WIMPs) and quite a few others. A large variety of experimental set ups have been installed underground in different labs to ensure low background and are being carried out to detect the recoils caused by the collisions of the dark matter particles with the atoms of the detector's detection material such as xenon. The recoil may be in the form of scintillation ,phonons, or change in temperature. In the case of accelerator-based experiments one looks for the missing energy and mass in the reaction products. Despite a massive international effort in this domain, at present, there is no confirmed signal anywhere of this dark matter as conjectural exotic particles. Due to this situation, one has started to question its very existence and the possible inadequacy in the general theory of relativity.

5. Conclusions

This contribution treats the problem of presence of dark matter in the universe through the analysis of rotation velocities of spiral galaxies, its distribution in the universe via the weak gravitational lensing, its density via the analysis of the cosmic microwave background data, and the present unsuccessful international effort for its detection as conjectured exotic particles.

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WHY DO WE NEED DIGITAL LEARNING?

Joelle Mesmar[1], Adnan Badran[2], and Elias Baydoun[3]

1.1 Demographics and Increasing Demand

Knowledge about the age structure of a population and its distribution plays a critical role in shaping society and impacts various aspects of community life, the economy, the availability of resources, and the provision of educational and healthcare services. Over the past century, the age structure of populations has been changing considerably; for instance, the global median age has increased from 20 years in 1970 to about 30 years in 2022. According to the UN, people aged 18–23, which corresponds to college-age people, numbered around 715 million globally in 2016, and this number is expected to reach 800 million by 2040.

Per se, access to higher education has been growing at astounding rates in recent decades. According to UNESCO's Institute of Statistics for 2020, about 40% of the world population goes to some form of postsecondary education, an increase from a mere 20% only two decades ago. Moreover, based on an analysis of global higher education enrolments, it is anticipated that there will be a dramatic growth of 200% by 2040, equal to nearly 600 million students, from 216 million in 2016. Enrolments are expected to grow at an average of 4.2% yearly, corresponding to an estimated 380 million students in 2030 and 472 million by 2035. The growth of higher education participation is explained by a growing and changing economic need for skills.

This overall population growth, and particularly the growth of the youth cohort, has put major pressure on the higher education sector and is a key challenge to governments and higher education institutions, which require major reforms, policy planning, and governance imperatives. Countries need to understand this trend in order to implement sound strategies for the expansion of the higher education ecosystem. This has been enabled so far by the growth of private institutions in an eased regulatory environment, by more flexibility for public institutions, and recently by the growth of distance and online education as a result of new technologies and enhanced internet access. However, massification of higher education is not without its challenges. Universal access can be hindered by poverty, crises, and inflated tuition fees, among other factors. Higher education institutions in many Arab states are viewed as a "source of huge collective disappointment and revolt", as governments often use them as a "waiting room" for the young. In the Arab states, half of the entire population is under the age of 25. Moreover, this region has the largest share of youth (15–29 years old) in the world and yet has the lowest participation in the labor market in addition to very high unemployment rates. Today, higher education institutions in the Arab world are facing challenging moments as they need to expand to meet the demands of a huge college-age population while ensuring quality courses.

1.2 Cost of Education

While the demand for higher education is increasing to meet the needs of a growing young population, several countries are nevertheless witnessing a decline in higher education enrollments today. In certain regions, the reason for this reduction is demo-graphic and due to decreased fertility rates, but increased tuition fees and associated costs such as housing, food, and transport are also contributing factors. In financial terms, digital learning may have some advantages over on-campus education because institutions can save on expenses such as campus infrastructure and services, which contribute greatly to tuition costs. In general, digital education will have fewer everyday costs. While several higher education institutions charge less for online instruction, exceptions do exist, and costs can depend on the course of study and vary from one institution to another.

1.3 Environmental Benefits

Digital learning has many environmental benefits and can effectively support the education sector in combatting climate change. Studies have shown that digital learning can leave a much smaller carbon footprint due to a reduction in transport and therefore carbon dioxide emissions; it also allows energy consumption and energy usage to be reduced. Researchers showed that adopting a digital education paradigm has a carbon footprint that is 90% lower than in-campus instruction. This is attributed to: (1) limited campus operating expenses and maintenance; (2) a reduction in deforestation, with lower paper use and more digital media

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offerings; and (3) a reduction in pollution and emissions, due to decreased unnecessary transportation and lodging.

2. How Fast is Digital Learning Growing?

Digital learning has been growing rapidly in recent years in line with the development of the computer, the internet, and technology. The COVID-19 pandemic has accelerated this growth as more universities started adopting online programs and as e-learning opportunities were made available to the public. In fact, the pandemic has given digital learning a chance to re-emerge and prove its existence and benefits.

2.1 The Tools

The rationale for the use of distance or online learning in the early 1990s by certain universities was to reach out to a vaster audience and specifically to those who could not attend physically traditional classrooms due to geographical constraints, work commitments or schedule, and conflict, for example. As computers and the internet developed, digital learning mediums and approaches evolved from merely providing access to information to becoming important sources of learning and growth opportunities.

Essentially, digital learning wouldn't be possible without one key tool: the learning management system (LMS), a software-based platform that allows courses to be efficiently deployed and managed online. This type of system started in 1924 as a simple typewriter, or "typing machine", developed by Sydney Pressey, with two windows: one to administer questions and the other to enter answers. The concept of LMSs then started to gain interest in the early 1990s as universities were adopting them to upload course material, deliver content, monitor student attendance, track progress, carry out tests, post grades, and issue notices, from anywhere and at any time. Released in 1990, FirstClass is considered to be the first LMS and is a Macintosh-based interface that supports public forums and is mostly used as an e-mail system. Then in 2002, the Modular Object-Oriented Dynamic Learning Environment (Moodle) was released as the first open-source LMS and is now considered to be the most popular among open LMS systems. By 2020, Moodle was boasting over 200 million users from 242 countries engaged in 24 million courses worldwide. The establishment of cloud-based, open-source LMS systems, which require only an internet connection for access from anywhere and at any time, further expanded the LMS ecosystem. Today, there is a growing variety of such software playing a significant role in distance and online education. These systems have been increasingly adopted by various parties, including universities, training institutions and organizations, and companies, as a vital component of online learning.

In 2001, Massachusetts Institute of Technology (MIT) launched its OpenCourse-Ware platform, offering free access to resources and material from over 2,500 courses that represent MIT's complete curriculum. "It unleashed the global open-sharing movement, helping to pave the way for the worldwide phenomenon of open digital learning", said MIT's 17th president Leo Rafel Reif in 2021. With that, the age of open education and digital sharing was just getting started.

A decade later, massive online open courses (MOOCs) began to emerge. Udemy was founded in 2010, with the goal to make quality education accessible and to apply knowledge to improve lives through a variety of courses created by everyday experts in more than 50 languages and covering over 190 countries. During this time, other successful online learning platforms emerged that offered thousands of online courses from top universities and institutions around the world. One of the world's largest platforms, Coursera, offers courses in partnership with leading academic institutions and corporate companies to ensure that the learner meets industry standards for professional growth and career advancement. Another established giant is edX, which was founded by Harvard and MIT and Udacity. Today, there are numerous online learning platforms that serve millions of people around the world. These are often defined by different user verticals as well; for instance, Coursera and edX mainly focus on professional training, while Skillshare is mostly geared at creatives. In addition to offering a variety of courses, these platforms allow the learners to use the course credits toward a master's degree at one of the partner universities.

As demand for digital learning has been steadily growing, players in the higher education field are vying for a piece of the market. In order to grow and survive, traditional universities have been taking bold moves with the aim of competing with online education giants. Many have launched new online learning programs. For example, leading universities such as Harvard, Stanford, and Ecole Polytechnique offer online courses in various topics and platforms at the undergraduate, masters, and doctoral levels, as well as certificates. This is a trend that is likely to

keep growing, as more and more traditional universities are going online by upgrading their platforms, creating new tools, and increasing collaborations.

2.2 The Market Size

According to the Statista Global Consumer Survey, revenue from online education is expected to grow from USD 166.60 billion in 2023 to a projected market volume of USD 237.10 billion by 2027 at an annual growth rate of 9.22%. The largest segment of this market is attributed to higher education, which is expected to reach USD 103.80 billion in 2023. Most of this revenue will be generated by the USA, followed by China, the United Kingdom, India, and Canada. Another survey estimates that revenue from online education is expected to reach USD 198.9 billion in 2030 at an annual growth rate of 23.12% from a baseline of USD 30.60 billion in 2021. North America dominates the global higher education market, contributing more than 35% of the global revenue, and will continue to do so owing to an advanced infrastructure, investment in EdTech products, and a highly skilled labor force. The Asia–Pacific region is another dominant area for online education, with a market that is expected to grow at the fastest compound annual growth rate due to increased internet and smartphone penetration, as well as the implementation of government policies that support online learning. The Middle East's and Africa's share of the market is growing modestly and sporadically, Saudi Arabia having the largest share, followed by the UAE, owing to sustained investments by government authorities in the digital infrastructure and expansion of the corporate sector. Rising awareness of the benefits and advantages of digital learning, in combination with enhanced technology, is also expected to drive the growth of the online education market in this region.

2.3 The Consumer Segment

This rapid growth of the digital education market is due to a huge demand from people to learn online, which in turn is due to rapid changes in the world and the job market. Digital learning is an important tool with which to deal with the global skills gap. Today, careers are becoming more complex, as the job market is quickly evolving with technological change. Working professionals are realizing that learning is lifelong and that they need to sharpen skills or learn new skills, no matter their age or stage in a career. The key is to be aware of the emerging skills that ensure adaptivity at work and relevance.

Moreover, one shouldn't disregard the fact that the nature of the student in higher education has been changing. The profile of the typical student has been shifting from one that enrolls in higher education directly after high school and is financially dependent to one that has delayed their postsecondary studies and has work commitments and other work and life responsibilities. In the USA, for example, traditional students (aged between 17 and 24 years, attending four-year colleges) made up 15% of undergraduates in 2021, but the remaining 85% were a more diverse group of students, comprising commuter students, low-income students, adult learners that had delayed college enrollment, part-time and full-time workers, and working parents, among others, according to the Postsecondary National Policy Institute survey. Interestingly, this latter category of students, referred to as "non-traditional" or "post-traditional", who are 25 years and older, makes up 80% of students enrolled in online programs, which offer more flexibility and cost-effectiveness, as well as convenient and specialized course learning. This population of students existed before the pandemic and continues to grow at a faster rate today, as students need to balance the responsibilities and demands of their personal and professional lives.

The enrollments in online higher education have been outpacing those for traditional higher education. Running a traditional and campus-based higher education institution comes at a cost, including expenditures on building operations, housing, and dining, in addition to programs and overhead costs. When you add in shrinking government support for higher education, increased operational costs, escalating tuition fees, and growing student debts across the board, it is no surprise that enrollments in traditional higher education institutions have been dropping, as students question whether it is worth the investment.

Digital learning presents itself as a more affordable option. Coursera, for example, saw its number of new registrations increase by threefold in the years after the pandemic, with 20 million new registrations recorded in 2021, exceeding pre-pandemic figures, and bringing the total number of registrations to 92 million from 21 million in 2016. The highest rate of new learner registrations was observed in data from emerging countries, with Paraguay and Lebanon in the lead showing a growth of 98% and 97% per year, respectively.

ANALYSIS OF THE HUBBLE'S LAW

Muhammad Asghar FIAS

Abstract: This document analyzes the components of the Hubble Law relation.

1. Introduction.

According to the Einstein's General Theory of Relativity (GTR), the stars, moons, the galaxies, … in the expanding universe, are in motion and farther away they are from the Earth in terms of their distance d from the Earth, the higher is their recession speed u. This fact is expressed in terms of the Hubble's Law:

$$U = H\, d, \qquad (1)$$

where H is the Hubble Constant of proportionality between the recession velocity u and the distance d of a star, moon, galaxy…., from the Earth with the dimensions: X km / s / M p c, where H = H0 ≅ X is its present mean value, and Mpc = Mega par sec = 3.62 × 106 light years = 3.09 × 1019 km.

Different techniques are used to determine the distances d of stars, moons, galaxies, Fig.1. We take up here the issue of determining the velocity u of the radiation emitting sources for different situations.

2. Velocity u of a star from the relativistic Doppler Effect on its radiation.

a. Some basic definitions.

One defines the relevant quantities in the "radiation source referential" and the "radiation observer referential" respectively as:

Radiation frequency = f_0; radiation period = $T_0 = 1/f_0$; radiation wavelength = λ_0 and
Radiation frequency = f; the radiation period = T = 1/f and the radiation wavelength = λ

b. Situation when both the source with the speed u and the light radiation with the speed c move in the same forwards direction.

Distance covered by the source during a period T = u T

Distance covered by the radiation emitted from the moving source, during its period T = c T

This radiation-distance is compressed and shortened by the distance covered by the radiation emitting source in T, while moving the same direction to:

$$(c - u)\, T = \lambda \qquad (2)$$

This leads to $f = c/\lambda = c / ((c - u)\, T) = (c / c - u).\ (1 - u^2/c^2)^{1/2} / T_0 = f_0\, (c + u / c - u)^{1/2}$
through the relativistic time dilation $T = T0 / (1 - u^2/c^2)^{1/2}$.

Hence, the **relativistic Doppler Effect blueshift** is:

$$z_b = (f / f_0) - 1 = (c + u / c - u)^{1/2.} - 1 \qquad (3)$$

When u << c,
$z_b = (1 + ½\ u/c) / (1 - 1/2\ u/c) - 1 = (u/c) / (1 - 1/2\ u / c) = u / c$
for $(1 - 1/2\ u/c) \sim 1$

Hence, for u << c, the relativistic Doppler Effect blueshift reduces to:

$$z_b = u/c \text{ or } u = z_b\, c \qquad (4)$$

The measured value of z_b through the speed of light c, leads directly to the source velocity u.

c. Situation, when the source is moving backwards, and the radiation is still emitted in the forwards direction.

Here, the source velocity changes its sign from + u to -u results into a stretched wave length

$$\lambda = (c + u)\, T, \qquad (5)$$

which leads to the **relativistic Doppler Effect redshift:**

$$z_r = (f / f_0) - 1 = (c - u / c + u)^{1/2} - 1 \qquad (6)$$

When u << c,
$z_r = (1 - ½\ u/c) / (1 + 1/2\ u/c) - 1 = (-u/c) / (1 + ½\ u/c) = -u/c,$
for $(1 + 1/2\ u/c) \sim 1$.
Hence, for u << c, the relativistic Doppler Effect redshift goes over to:

$z_r = - u/c$ or $-u = z_r c$ **(7)**

where -u is the backward velocity of the source. Here, also, the measured value of z_r leads directly through the speed of light c, to the source velocity u.

3. Hubble Constant estimated values.

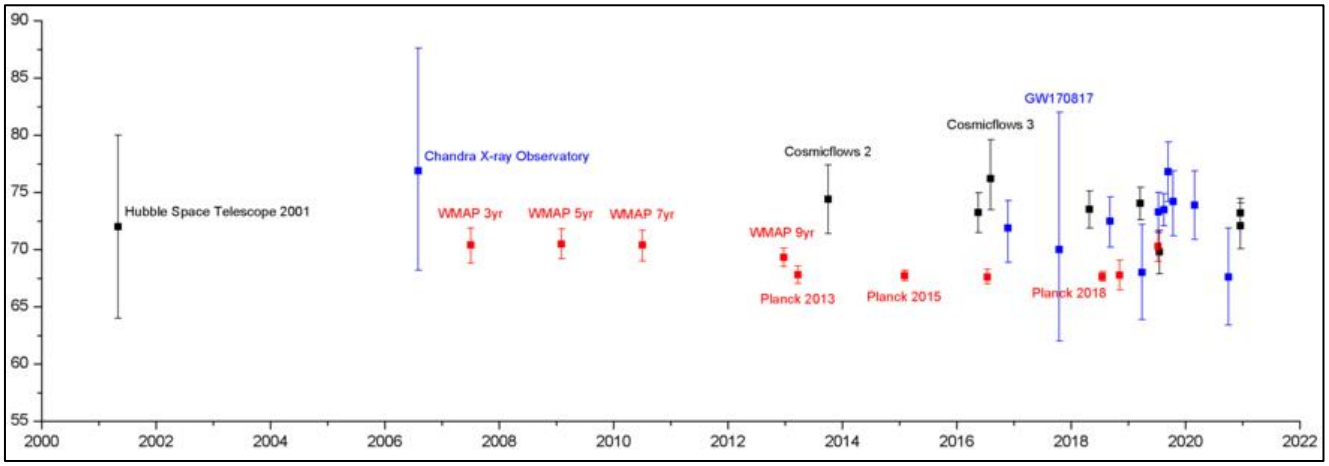

Fig.1. *Estimated values of the Hubble Constant, 2002 – 2020: black points represent the ladder-based distance measurements that cluster around* ***73*** *km/s/Mpc; the red points represent the early universe CMB/BAO analysis with the Lamda cold dark model (ΛCDM) (km)/s/Mpc which show good agreement on the figure around* ***67*** *km)/s/Mpc, while the blue are other techniques, whose uncertainties are not yet small enough to decide between the sets. (Courtesy Wikipedia).*

Here, the presence of two distinct groups of the Hubble Constant values of 73 km/s/Mpc, and 67 km/s/Mpc, suggests that there is a need to investigate the possible lacunas in the cosmological model, when used to analyze the cosmological data.

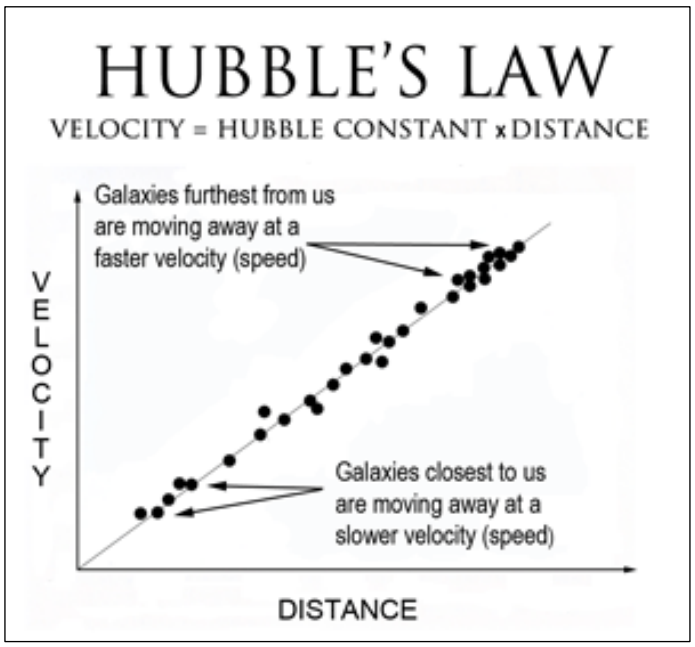

Fig. 2. *The linear relation between the recession velocities u of stars and galaxies and their distances d from the Earth. The linear fit to the recession velocity u and the distance d data passes through zero. The slope of the curve represents the Hubble Constant H.*
(Courtesy Wikipedia).

4. Hubble time as the age of the universe.

The quantity $(1/ / H_0)$ has the dimension of time and is called the Hubble Time. For the mean experimental value of $H_0 = 70$ (Fig.1), the Hubble Time = 13.97 billion years from the zero-time moment of the Big Bang. This result supposes that H_0 varies linearly with time and passes through zero as indicated in Fig. 2, and if there are some non-linearities in the system, their influence seems to be negligible. This value of Hubble Time as the age of the universe is not far from 13.799 ± 0.021 billion years found from the Planck-satellite based detector's high resolution and high intensity data on the Cosmic Microwave Background (CMB) analyzed using the Cosmological Lamda Cold Dark Model (ΛCDM) (1).

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NANOTECHNOLOGY FROM HUMAN TO MACHINE WITH SOME PRACTICAL EXAMPLES

Hala J. El-Khozondar FIAS*

The principles of nanotechnology are not brand-new to nature or to human history. According to what science and nature have taught us, biological systems are constructed from tiny cells and proteins that adhere to an innate blueprint governed by minuscule amounts of genetic information. The creation of the many color shades visible in the stained glass windows of medieval cathedrals and buildings by medieval stained glass artisans is a well-known and early example of a man-made nanoprocess. As a result, gold nanoparticles exhibit various colors according to their size. When gold is seen on a wider scale, or macroscale, it takes on the well-known yellowish hue [1]. The science and technology of fabricating or processing items with nanometric tolerances was referred to as "nanotechnology" by Professor Taniguchi of Tokyo Science University. The basic idea behind Professor Taniguchi's theoretical ideas was to employ electron, ion, and laser beam techniques to machine tolerances at the nanoscale [2].

Nanotechnology is a significant area of contemporary study that deals with the synthesis, strategy, and management of particle structures with sizes between 1 and 100 nm. In a lecture, renowned physicist Richard Feynman described the idea of nanotechnology. In his speech, Feynman urged the scientific community to focus on simple solutions to current issues. Why can't we fit the complete 24 volumes of the Encyclopedia Britannica onto the tip of a pin, said Feynman? [3].

Nanotechnology and nanoscience examine the utilization of incredibly small objects and may be used to all other scientific disciplines, including chemistry, biology, physics, and engineering. It could be able to produce a wide range of new products, including gadgets and materials for energy generation, electronics, biomaterials, and medical use.

Metamaterials are an excellent example of nanoparticles that humans created in the laboratory that have unique features not present in natural materials. They have both negative permittivity and negative permeability [4]. The electromagnetic wave propagations along these media are highly peculiar because of MTMs' double-negative characteristic. The propagation patterns of surface waves at the interface between double negative media and standard dielectric media are different from those at the interface between two such media. Examples include the exceptional directed dispersion properties of slab waveguides with double-negative media [5]. Numerical studies have been used to study the stress effect on the performance of an optical waveguide sensor that has a dielectric slab placed between the metamaterial cladding and substrate[6].

An example of nanomaterial applications, a humidity sensor which simply consists of a metal NPs impeded in a polymer host thin film that is coated on a glass substrate as in figure 1. The humidity/vapor in air detection is by the optimization of the shift in the reflection peak from a thin polymer film with different types of NPs impurities. In case of Au nanoparticle, the reflectance which is calculated using Fabry-Perot equation is given in figure 2. The peak changes position as refractive index of the sensing region changes[7]. The system is functioning as a humidity sensor for sure.

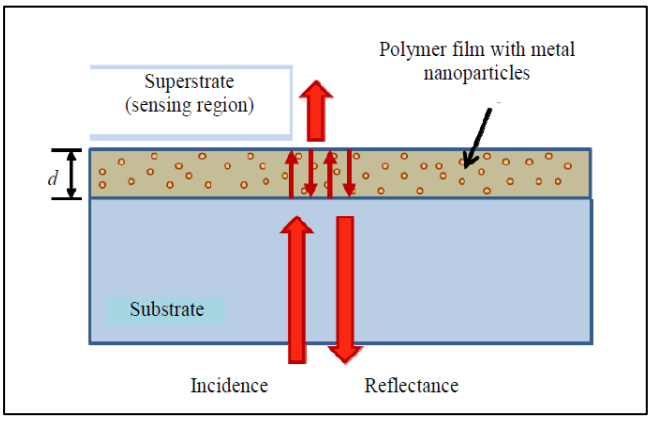

Figure 1: *humidity sensor: nanocomposite with thickness d is costed on a glass substrate.*

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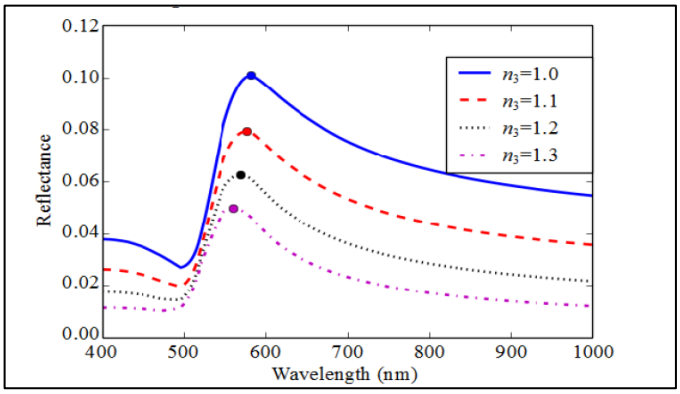

Figure 2: *Reflectance as function of wavelength at different value of refractive index of the air layer (superstrate), at fixed film thickness d=80nm and fixed filling factor of Au.*

A different example to be present here is a proposed photo voltaic (PV) cell structure using a graded-index Metamaterial (GIM) layer. The proposed PV consists of SiNx thin film deposited on glass and covered by GIM bounded by air is illustrated in Figure 3. The total transition of the system is calculated using transverse matrix method at different thickness of the second layer as shown in figure 4. Figure 4 shows that the peak of transmission is above 90% for wavelength between 600 nm to 700 nm which considered high compared to other studies [8].

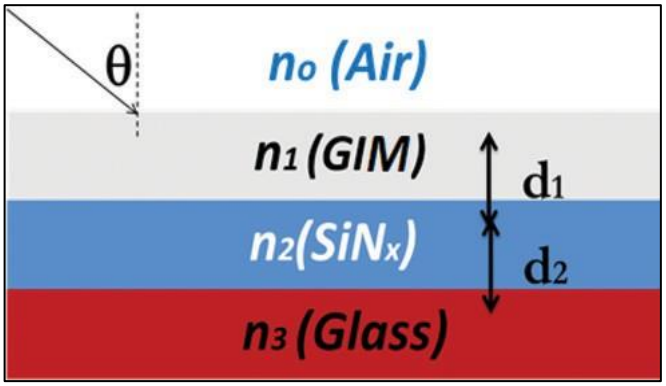

Figure 3: *The schematic of the proposed nanostructured solar cell.*

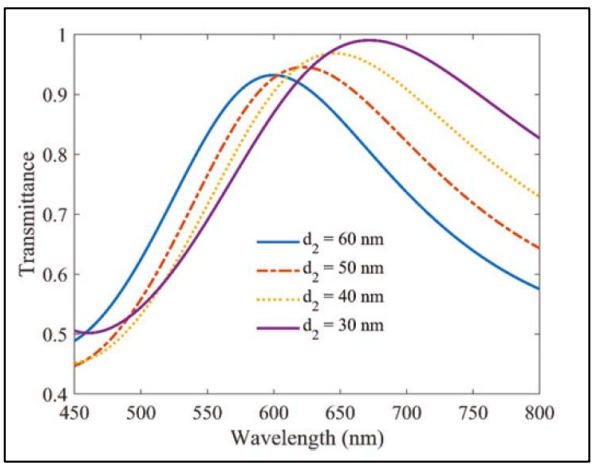

Figure 4: *The transmittance is calculated at normal incidence for n1 = −2 + ⊿(n) and n_2 = 2.2 at different values of d_2.*

As was already said, nanomaterials have the potential to be used in a number of crucial areas of our lives. The science of nanomaterials is still being researched to improve a number of different uses, including in quantum computing, human health, and renewable energy.

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RE-EMERGENCE OF EDUCATION IN ISLAMIC WORLD

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Education is fundamental for the development of any nation and higher education is a powerful tool for the eradication of poverty, boosting shared prosperity, and making the society strong enough to face challenges of times. This basic fact was very well known to Muslim Ummah during Middle Ages, a Golden Period in Islamic History. "Seek Knowledge" was the known Commandment of Islam for Muslims and they followed it for almost eight hundred years.

Muslims around the world during the last four centuries showed great interest in every aspect of life except education. Poetry, music, painting, ceramics, architecture, metalwork, etc became important activities throughout the Islamic world. But very little interest was shown in the fast-developing modern education coming from Europe. Probably the most harmful act was their refusal to allow the use of the Printing Press in the 15th Century, a turning period for Europe. Through the Printing Presses, the scientific revolution was made possible in all the spheres of scientific and industrial activity in Europe.

After a long spell of slumber, Muslims all over the world have started to understand that without modern knowledge and higher literacy, their exploitation by the West cannot be checked. This is what Sir Syed told the Muslim Ummah in the late 19th century. Fortunately, education is re-emerging in the Islamic World during the recent past, say the 21st century.

According to the survey by John Miller, 5 Muslim countries namely Azerbaijan, Tajikistan, Kazakhstan, Turkmenistan, and Uzbekistan find places amongst 25 countries with the highest literacy rates of 100%. World Bank and UNESCO data for 2018 show that 25 Muslim Majority countries have achieved average literacy above 90 percent. These include Saudi Arabia (95%), Indonesia (94%), Malaysia (94%), Iran (90%), Jordan (96%), U.A.E. (94%), and Turkey (95%). Nine countries, including Syria (86%), Tunisia (82 %), Iraq (79%), Egypt (75%) Algeria (73) are and Morocco (72%) were reported to be in the bracket of 70% to 89%. Unfortunately, fifteen countries including largely populated countries of Bangladesh, Pakistan, and Nigeria still lag in literacy (Less than 62%). However, compared to the literacy Data of 1980 (Av. 30%), 2018 data is highly satisfactory.
Global literacy rate (2017) is 82% (Men, 87%; Women 77%).

A redeeming feature is a fact that the Gender Difference (Men and Women) in literacy in many Islamic countries has also fallen sharply. At least 21 countries have the difference of only 0 to 7% only.

Tertiary Education (Higher education in all the disciplines of knowledge) in the Islamic world needs serious attention. Yes, indeed, scientific awakening is underway in the Muslim World. Research spending in many countries, like Saudi Arabia, Iran, Qatar, Turkey, etc has been raised substantially.

Tertiary Education in Western countries is generally above 40% whereas barring few countries likes Turkey, Saudi Arabia, and Indonesia, it is between 2 to 6%. Research spending in Muslim countries also needs serious attention. Only countries like Turkey, Saudi Arabia, Iran, and Qatar have substantially raised funds for this purpose. Qatar is reported to have proposed the raise of the Science budget from 0.8% to 2.8% of its GDP.

Many Muslim countries have already established centers of higher learning (Universities) with emphasis on the modern sciences. According to The Times Higher Education World University Rankings 2018, ninety-six universities from Muslim countries have been listed amongst the top 1102 Universities of the world. 22 belong to Turkey followed by Iran 18; Pakistan, 10; Malaysia and Egypt 9 each; Saudi Arabia, 5; U.A.E. and Indonesia 4 each; Jordan and Morocco 3 each; Tunisia 2 and Algeria, Bangladesh, Kuwait, Lebanon, Nigeria, Oman and Qatar 1 each.

Another redeeming feature in the rankings is the fact that in forty-one universities, female students are higher in numbers than male students. Eleven Universities have more than 65:35 female: male ratio with Imam Abdulrahman Bin Faisal University (22,257 students) of Saudi Arabia having the highest ratio of 81:19, followed by the United Arab Emirates Univ. (7,492 students) 79:21, Qatar Univ., (13,342 students) 73:27 and Kuwait Univ., (37,752 students) with the ratio of 72:28.

(Note: 2019 and 2020 reports have not been taken into account because of the uncertain situation around the world).
Source: https://en.beiruttimes.com/article/1229

LOOP QUANTUM GRAVITY

Muhammad Asghar FIAS

Abstract: The text deals with the basics of the loop quantum gravity theory set up to unify Quantum Mechanics and Einstein's classical general theory of relativity.

The loop quantum gravity (LQG) theory is one of the several attempts to unify Quantum Mechanics and the Einstein's classical general theory of relativity (GTR) as is the case for the EM, weak and strong forces of Nature (**1**). The Einstein's GTR theory is entirely based on a geometric formulation, where the warping (curving) of space due to the presence of mass, represents the gravity unlike the Newtonian gravity represented directly by the gravitational force itself like the other forces, and the GTR is not independent of the spacetime background as it uses it for its manifestation. However, like the theory of other forces, the LQG theory is non-perturbative and formally background independent, which signifies that the equations of LQG are not dependent on spacetime except for its invariant topology and they follow diffeomorphism invariance implying that the value at a point is independent of its position in space and independent of other points in space. To ensure this background independence, the equations of LQG give rise to their own space and time at distances which are 10 times of Planck length (2).

From the rules of Quantum Mechanics, one knows that the forces of Nature appear in discrete grains called bosons such as the photon bosons for the EM-interaction, the W^+, W^- and Z^0 bosons for the weak Interaction, the gluon bosons for the strong Interaction and graviton bosons for the eventual quantum theory of gravity.

For the LQG, its spacetime needs to be quantized into discrete space and time blocks of the smallest value determined by the Planck's space scale of $1.02\ 10^{-35}$ m, Planck 's area of 10^{-70} m^2, Planck's volume 10^{-105} m^3 and Planck's time scale of $5.39\ 10^{-44}$ s. The word loop in theory appears in the name because the theory is based on rewriting the Einstein's GTR in terms of lines instead of points as it is usually done. The ensemble of these loops is described as the "spin network" and their dynamics is expressed as "spin foam". Thus, in the LQG theory, the quantized space is not smooth but grainy, and the quantized time does not advance smoothly into the future, but in a little tick-tick-tick of a discrete clock. When one moves, it will not be a smooth motion, but it will consist of stuttering steps from one spacetime block to another. Moreover, in the LQG, the geometric area and the volume are represented by *operators* that have *discrete values*. Due to the presence of mass, the elementary volume deforms without changing its value.

Some results:

1.The LQG reproduces the Bekenstein-Hawking thermodynamics- based entropy S_{BH} formula by counting the number of states present in the event horizon:
$S_{BH} = c^3 k_B A / 4 G \hbar$,
where c is the velocity of light; k_B, the Boltzmann's constant; A, the area of the event horizon; G, the Newton's gravitational constant and $\hbar$, the reduced Planck constant = $h/2\pi$.

2. The LQG theory, by its grainy structure, eliminates the singularities in a black hole that appear in Einstein's classical GTR, at places, where the densities become infinitely high, and the gravity becomes infinitely strong.

3 The LQG claims that the speed of light (gamma-rays) should increase as the energy (frequency) of light goes up. However, the experimental work on gamma-ray bursts originating far away in the universe, shows that gamma-rays of different energies travel with the same speed.

The LQG theory represents strong gravity at small scales which should automatically go over to the Einstein's smooth and classical GTR of weak gravity at normal scales. Moreover, the LQG must be able to deal with the velocity and the gravity caused time dilation. At present it is not clear, if the LQG theory satisfies these necessary constraints. In fact, at present, there is no experimental backing for any of its claims, and thus, it remains just a tentative exercise.

Conclusion

This document deals with the basics of the loop quantum gravity of theory set up to unify Quantum Mechanics and Einstein's classical general theory of gravity. At present, without any experimental backing, it remains just a tentative adventure.

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SOME FEATURES OF WEFE NEXUS

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The Components of the nexus lie in the heart of the 17 Sustainable Development Goals (SDGs) adopted by the United Nations in 2015.

Applying the nexus approach will help to address 3 pillars of Sustainable Development namely the social, economic and environment dimensions, upholding these dimensions will translate into peaceful, prosperous and coherent Society that safeguard human dignity and equality.

1. The tool to address the interdependencies and connections across the components of the nexus should employ frameworks based on the underlying factors that lead to fragile WEFE System:

1.1. Climate change.

1.2. Nature or/and man-made Catastrophes that result in population displacement.

1.3. Advent of financial Crisis.

1.4. Occurrence of infectious animal/human epidemics.

2. Since WEFE resources are inexplicably interconnected, it is of paramount significance to align managerial processes and procedures governing the components and streamline them to emphasize the interdependencies among the components.

2.1. The collective managerial and governance approach is expected to enhance synergies and guard against uncertainties.

2.2. The nexus approach will lay a solid foundation for sustainable resource base, educated and efficient protocols of consumption of these resources.

2.3. The nexus principle calls for establishing functional networking among stakeholders including academics, experts, policy-makers and consumers.

2.4. locally, nexus approach is expected to align private incentives with public longing for healthy environment. The disparity between them is created by the gap between market prices of natural goods and services (water, environment) and their social value and scarcity. Water as natural resources in the nexus have under valued market price or even subsidized by government.

3. The nexus frameworks should not be a mere summation of existing frameworks that deal with individual elements of the nexus but a rather it should handle WEFE Sectors Concomitantly.

3.1. The frameworks should deal with scales ranged from local to regional to global at different levels of analysis.

3.2. Since Countries in the region shared similar and cross border challenges related to the components of the nexus with impact on the food system, though unequally, it is rather imperative to seek regional cooperation and integration using fair differential advantages of each country and facilitate knowledge sharing and technology transfer.

3.3. Such frameworks may consider water, labor and capital as inputs whereas food and energy as outputs and hence would employ hydrological modeling, Carbon foot print to quantify inputs and outputs.

3.4. The frameworks should generate scenarios of natural resource supply, transformation and use and their impact on water, energy and food resource in the contest of healthy environment.

3.5. The framework is expected to track trends, uses and availability of natural capital through employing sustainability indicators measuring family of foot prints that include environment, water, land, Carbon, energy and material footprints.

4. Synergies, linkages and trade-off among components of the nexus:

The interlinkages are recognized fewer than one of three dimensions: Social, economic, and environmental. Protecting water resources from pollution reduced the incidence of food-borne diseases, proper management of water resources and increasing water permeability in the soil profile, increasing water productivity, not only increase food production, but safeguard the biodiversity and ecosystem.

Energy directly affects extraction of water from deep aquifers and drives mechanization of food production, storage and transport, while water is used in thermal cooling systems and in hydro power production. The use of energy-efficient equipment will improve air quality and extend shelf-life of food by refrigeration. Using energy mix can reduce CO2 emission that would help in the efforts to curb global warming with positive consequences on the environment and food production.

Climate change is responsible for global warming and precipitate in sporadic reduced rainfall, shortened growing seasons and increased severity of environmental events. The impact of climate change extends beyond food production capacity to deteriorated livelihoods of especially rural communities.

NOTE: MACH'S PRINCIPLE AND ITS SCIENTIFIC VALUE

Muhammad Asghar FIAS

Abstract: This note deals with Mach's principle of inertia forces acting on a body, when in non-uniform motion.

Mach's Principle, in cosmology, is a hypothesis that the inertial forces experienced by a body in non-uniform motion are determined by the quantity and distribution of matter in the universe **(1,2)**. As the name indicates, an inertial force depends on the inertia of the body in movement, and Newton's second Law of motion is based on the inertial force F acting on a mass such that:

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

where the mass m of the body represents its inertia, the a, its acceleration which signifies a non-uniform motion.
Another example of inertial force is the rotation of a body with a mass m, hence, inertia, resulting in the appearance of the inertial centrifugal force F_{centr} such that:

$$F_{cetr} = mv^2/\,r \qquad (2),$$

where v is its velocity of rotation and r, the distance from the point representing the origin of rotation.

In the case of Newton's well-known rotating water-filled bucket experiment, he considered that the concave surface of water results from its rotation with respect to an absolute and still space. However, Mach's Principle of Relativity of Inertia contests the notion of absolute space claiming, as Leibniz did before him, that space as an entity does not exist and it is just a spatial relation between different objects. For him, all one has in the case of the bucket, is its rotation relative to the distribution of matter as stars in the universe.

Moreover, as according to Mach's Principle, the origin of inertia or mass of a particle is supposed to be a dynamical quantity **(3)** which is partly intrinsic and partly determined by the rest of the mass in the universe, it is worthwhile to try to evaluate its contribution to the intrinsic mass otherwise it will remain just a metaphysical concept according to Euler **(4),** even though it as a concept, was helpful to Einstein in the development of his GTR based on this Relativity Principle of Inertia, by suggesting a connection between geometry and matter. However, later he abandoned it, when it was realized that inertia is implicit in the geodesic equation of motion and there was no need for the existence of matter elsewhere in the universe.

As a conclusion, the Mach's Principle led to the elimination of the concept of absolute space with the claim that the inertial forces arise due to the acceleration relative to something in the universe, and this is the basis of Einstein's GTR. Concerning the contribution to the body's inertial mass of a body by the matter in the universe, it remains just a metaphysical concept, because there seems to be no way of verifying and reaching this contribution.

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WHAT IS METAVERSE?

Edited by Adnan Badran FIAS

In 1992, Neal Stephenson wrote Snow Crash, and coined the term metaverse to describe a virtual world where the characters escape from their harsh reality.

While there is no common understanding or definition of the metaverse, some experts consider it a 3D version of the internet – the concept of metaverse is centered on how users will experience the internet. It is envisioned as a shared and decentralized, persistent, synchronous, and living virtual world accessible to everyone that complements the actual world. It will have unprecedented compatibility of data, digital items, assets, and content.

In a nutshell, the metaverse is a network of interconnected online realms in which physical, augmented, and virtual realities interact. A location where you and millions of other users live your (digital) lives through an avatar and interact, learn, do business, and have fun. The metaverse will alter our perception of reality with numerous impacts on personal identity, law, and overall societal organization.

CALL TO EARTH

Adnan Badran FIAS*

When we talk about the emission of gases, we blame developing countries in Africa, Latin America and elsewhere.

But sometimes we forget that China's greenhouse gas emissions in 2019 exceeded those of other countries.

China is now responsible for more than 27% of total global emissions. The U.S. the world's second highest emitter, accounts for 11% of the global total.

India is responsible for 6.6% of global emissions, edging out the 27 nations in the EU, which accounts for 6.4% of global emissions.

I am delighted to see the leaders of the Amazon basin countries in South America have met to discuss saving the Amazon rain forests.

This is a forward step to save this huge tropical forest to maintain the Eco-Balance of our planet.

I am also delighted to see the G20 summit meeting in India is taking Climate Change seriously to mitigate its disasters.

Natural disasters are on the increase in our planet; hurricanes, cyclones, floods, droughts, wildfires and earthquakes. We need to establish a multilateral guiding system to encounter the challenges and mitigate the loss of lives and infrastructure. The summer of 2023 in Europe was recorded as the hottest summer ever.

Concerning our oceans and land to save against pollution is a multilateralism action that should be overseen by the UN system.

When we deal with the problems of climate change, environment and greenhouse gas emission, we should commit ourselves to multilateralism, because this is a global issue and cannot be solved unilaterally or by a group of nations acting together in harmony.

In our planet we are living under one roof, any environmental crack will affect all of us.
Therefore, multilateralism is the way to tackle global environmental problems that threaten our survival on this planet.

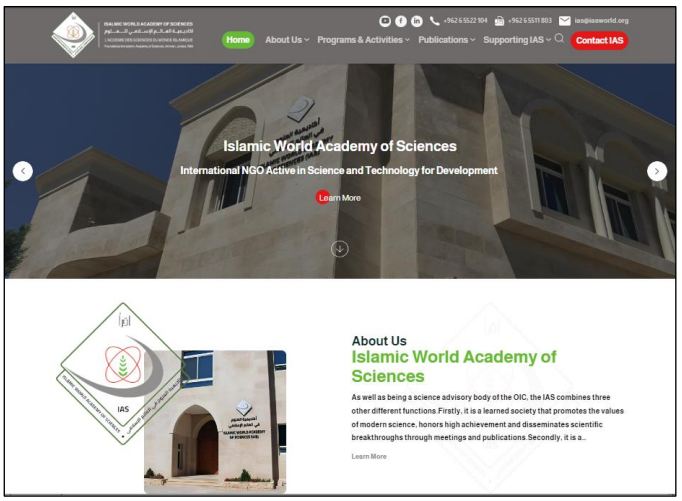
* *Biologist, Professor and Chancellor of University of Petra, Jordan.*

IAS NEWSLETTER IS REACHING UNIVERSITY LIBRARIES

A corner for the IAS Newsletter was established in the library of the University of Petra, Amman, Jordan, to be read by professors and students.

IAS NEW WEBSITE LAUNCHED

The IAS secretariat has updated its website with an easy to navigate interface for easy access for everyone to enjoy. The site contains IAS publications (including conference proceedings, books and Newsletter issues) The site also includes information about the Academy and its Fellows and a photo gallery among other imperative information. The website can be accessed through the link: http://www.iasworld.org



THE JOINT SCIENTIFIC MEETING OF FELLOWS OF THE ISLAMIC WORLD ACADEMY OF SCIENCES (IAS) AT THE INSTITUTE OF BIOCHEMISTRY AND BIOPHYSICS (IBB), UNIVERSITY OF TEHRAN, IRAN

Ali A. Moosavi-Movahedi FIAS

Left to right: (IAS Fellows) Prof. Ali Moosavi Movahedi, Prof. Mohammad Abdollahi and Prof. Shekoufah Nikfar

Based on the Islamic World Academy of Sciences (IAS) decision, Professor Ali A. Moosavi-Movahedi is designated the IAS Focal Point (Anchor) in Iran. Due to this duty on July 9, 2023, Fellows of the Academy of Sciences of the Islamic World, Dr. Shekoufah Nikfar, Professor of the Faculty of Pharmacy, Tehran University of Medical Sciences (TUMS), Dr. Mohammad Abdollahi, Professor of the Faculty of Pharmacy, TUMS and member of the IAS Council, and Dr. Ali A. Moosavi-Movahedi, Professor of Biophysics and head of Institute of Biochemistry and Biophysics (ibb.ut.ac.ir) organized a meeting for recognizing the ways for deep cooperation of the Persian and non-Persian members in the benefit of IAS.

During the meeting, the participants covered the following topics with the aim of advancing the goals of IAS:

1. Identifying new distinguished scientists for the IAS membership and presenting them for consideration to the Selecting Committee of Fellows at the IAS General Assembly.
2. Collaborating on a joint declaration that will outline important issues in the scientific field and publish it in the IAS newsletter.
3. To define a joint scientific/research plan that informs IAS members and Fellows about collaboration topics and introduces study opportunities for academic members and youth scholars from Islamic countries.
4. To engage in joint scientific cooperation regarding research on Halal food products and publish a short article to familiarize IAS members with relevant science.
5. In which fields of science do Iran and neighbor IAS member states lag behind?
6. Which scientific items and member states should progress faster?

During the meeting, the Fellows also discussed the following matters on the basis of the latest seminars in Pakistan (in-person) and Iran (virtual):

- Highlighting the underinvestment in research and development in Muslim-majority countries; it's worth noting that they typically allocate less than 0.5% of their GDP to this area, whereas advanced economies devote five times that amount. Additionally, Muslim countries are estimated to have less than ten scientists, engineers, and technicians per thousand residents, a far cry from the global average of 40 and the developed world's 140.
https://www.weforum.org/agenda/2016/02/how-can-muslim-countries-revive-interest-in-the-sciences/

- Prioritizing science and technology, space, and new developments in IT is crucial to keeping students engaged and up-to-date. Despite progress made by some oil-rich Muslim countries in areas like airport and railway management, they still rely heavily on Western or Chinese assistance to keep pace with the latest advancements. To achieve the strategic goals outlined in the 15-year vision of empowering Muslims in science and technology, coordination between Islamic countries and targeted communities is essential.

We, Fellows of Iran, emphasized progress in the following fields of science in the next 5 years:

1. Providing Halal food products for all Muslim countries.

2. Drug design and development.
3. Digital health and artificial intelligence.
4. Perfect immunization for all people.
5. Virtual education for all people.
6. Perfect transportation for all.
7. Taking decisive measures to curb air and environmental pollution.
8. To increase awareness about the impact of climate change and environmental pollution on human diseases from various aspects.
9. Extend popularization of science.

Indeed, underdeveloped and developing countries need to progress at a faster pace than others. To see which countries, lag behind science development, we can use indices available at http://data.uis.unesco.org and/or https://www.imf.org/en/Data

On these websites, you can rank Islamic regions based on many factors related to science and technology, the most important of which are, Gross domestic expenditure on research and development (GERD). GERD by field (agricultural and veterinary sciences, engineering and tech, humanities and art, natural sciences, medical and health sciences, and social sciences), GERD by activity (applied research, basic research, experimental development), the total number of researchers, and many more factors:
http://journal.iiwfs.com/article_130909.html?lang=en
https://www.embopress.org/doi/full/10.15252/embr.201643517

Education and Scientific Development in the OIC Member Countries 2016:
https://www.sesric.org/publications-detail.php?id=395

The Atlas of Islamic World Science and Innovation Final Report:
https://royalsociety.org/~/media/policy/projects/atlas-islamic-world/atlas-final-report.PDF

HIGH HONOUR FOR PROF. SYED M. QAIM FIAS IN CANADA

Professor Dr. Syed M. Qaim of Forschungszentrum Jülich (FZJ) and University of Cologne ,Germany, recently received the President's Award of the World Council on Isotopes (WCI) in recognition of his sustained pioneering work on nuclear data related to the development of accelerator-based radionuclides for medical applications. The award was presented to him during the 11th International Conference on Isotopes, organized by the Canadian colleagues under the umbrella of WCI, in July 2023 ,in Saskatoon, Saskatchewan, Canada .

The World Council on Isotopes is an international professional body of scientists, technologists and several small and big companies involved in the development, production and supply of isotopes for peaceful applications for the well-being of all. Strongly supported by the Korean Government and the International Atomic Energy Agency (IAEA) ,the WCI organizes biannually advanced courses on radioisotopes and radiopharmaceuticals for the benefit of young scientists from developing countries. Professor Qaim is a Tutor of those courses. Interest in the use of radioisotopes, especially in medicine, is also increasing in the Islamic countries.

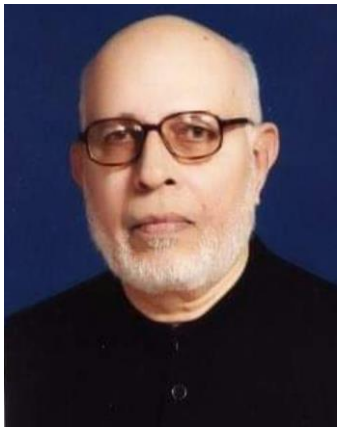
Professor Qaim is a Fellow of the Islamic World Academy of Sciences, A Foreign Fellow of the Pakistan Academy of Sciences and a Fellow of the Third World Academy of Sciences from the North. In recent years he has received various kinds of honours in about 10 countries of the world. The present award is implicitly an appreciation of his dedicated lifetime work in the field of nuclear chemistry.

Prof. Syed M. Qaim from Germany (left) receives the high award from the President of WCI, Prof. Jong Kyung KIM from South Korea, in Saskatoon, Saskatchewan, Canada. Photo source :WCI.

FELLOWS NO LONGER WITH US

OBITUARY:
PROF. MISBAH-UD-DIN SHAMI
(1930 – 2023)

By Zabta K. Shinwari



It is with heavy hearts and profound sorrow that we announce the passing of a distinguished scholar and a true luminary in the field of science, Prof .Misbah-ud-Din Shami, on August 15, 2023. His departure leaves an irreplaceable void in the world of academia and scientific research. Prof. Shami's life was a testament to his unwavering commitment to knowledge and his remarkable contributions to various fields of science.

Born on January 10, 1930, in Jullundur City, British India, Prof. Shami's journey through the world of education was marked by brilliance and dedication. He earned his BSc in 1950 and MSc in 1952 from the University of the Punjab, Lahore. He then pursued his higher studies at Washington State University, USA, where he achieved his PhD in 1964. His thirst for learning led him to the prestigious Imperial College of Science & Technology, London, where he was a recipient of the Royal Society's Postdoctoral Fellowship in 1969.

Throughout his illustrious career, Prof. Shami held numerous esteemed positions that showcased his exemplary leadership and commitment to academia. He was a Founding Fellow of the Islamic World Academy of Sciences. He served as an Advisor to the Chancellor at Hamdard University, Karachi, Pakistan, and played pivotal roles in the Pakistan Academy of Sciences, including serving as its President, Secretary General, and Treasurer. He also served as the Chairman of the Pakistan Science Foundation under the Ministry of Science & Technology , Government of Pakistan. Prof. Shami's influence extended to his alma mater, the University of the Punjab, where he held the positions of Pro-Vice Chancellor ,Dean of the Faculty of Science, Engineering and Pharmacy, and Director of the Institute of Chemical Engineering and Technology.

Prof. Shami's exceptional contributions were acknowledged and celebrated through prestigious awards and honors. He was bestowed with the Sitara-i-Imtiaz by the President of Pakistan for his exceptional services. Notably, he was the first Pakistani to receive the esteemed International UNESCO Kalinga Prize, a testament to his global impact on science and education. Furthermore, his outstanding work earned him the Niels Bohr Medal by UNESCO.

Prof. Shami's research areas spanned Inorganic Analytical Chemistry, Chemical Process Technology, and Chemical Crystallography. His groundbreaking insights and innovative contributions significantly enriched these fields, leaving an indelible mark on scientific progress.

Beyond his scholarly achievements, Prof. Shami was known for his humility, dedication, and unwavering commitment to fostering a culture of scientific curiosity and innovation. His legacy will continue to inspire generations of researchers , scientists, and educators to pursue knowledge with the same fervor and passion that he embodied.

As we mourn the loss of a true visionary, we remember Prof. Misbah-ud-Din Shami's remarkable life and extend our deepest condolences to his family, friends ,colleagues, and the entire scientific community. His memory will forever remain etched in the annals of science and academia, and his contributions will continue to shape the world for years to come.

إِنَّا لِلَّهِ وَإِنَّا إِلَيْهِ رَاجِعُونَ

INNA LILLAHI WA INNA ILAYHI RAJIUN

AL IDRISSI* (1099-1166 AD)

Abu Abdallah Muhammad Ibn Muhammad Ibn Abdallah Ibn Idris al-Qurtubi al-Hasani, was born in Ceuta, Spain, in 1099 AD. He was educated in Cordoba. Later he travelled far and wide in connection with his studies and then flourished at the Norman court in Palermo. The date of his death is a source of controversy, being either 1166 or 1180 AD.

Biographical notes on him are rarely found, and according to F. Pons Boigues, the underlying reason is the fact that the Arab biographers considered al-Idrisi to be a renegade, since he had been associated with the court of a Christian king (Roger II) and written in praise of him, in his work. The circumstances which led him to settle in Sicily at the court of Roger II are not on record.

His major contribution lies in medicinal plants as presented in his several books, especially *Kitab al-Jami-li-Sifat Ashtat al-Nabatat*. He studied and reviewed all the literature on the subject of medicinal plants and formed the opinion that very little original material had been added to this branch of knowledge since the early Greek work. He, therefore, collected plants and data not reported earlier and added this to the subject of botany, with special reference to medicinal plants. Thus, a large number of new drugs plants together with their evaluation became available to the medical practitioners. He gave the names of the drugs in six languages: Syriac, Greek, Persian, Hindi, Latin and Berber.

In addition to the above, he made original contributions to geography, especially as related to economics, physical factors and cultural aspects. He made a silver globe weighing around 400 kilograms for King Roger II. He described the world in *Al-Kitab al-Rujari* (Roger's Book), also entitled *Nuzhat al-Mushtaq fi Ikhtiraq al-Afaq* (The delight of him who desires to journey through the climates). This is practically a geographical encyclopedia of the time, containing information not only on Asia and Africa, but also Western countries.

Al-Idrisi, later on, also compiled another geographical encyclopedia, larger than the former entitled *Rawd-Unnas wa-Nuzhat al-Nafs* (Pleasure of men and delight of souls) also known as *Kitab al- Mamalik wa al-Masalik*.

Apart from botany and geography, Idrisi also wrote on fauna, zoology and therapeutic aspects. His work was soon translated into Latin and, especially, his books on geography remained popular both in the East and the West for several centuries.

Statue of al-Idrisi in Ceuta, Spain.
Photo source: Wikipedia

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

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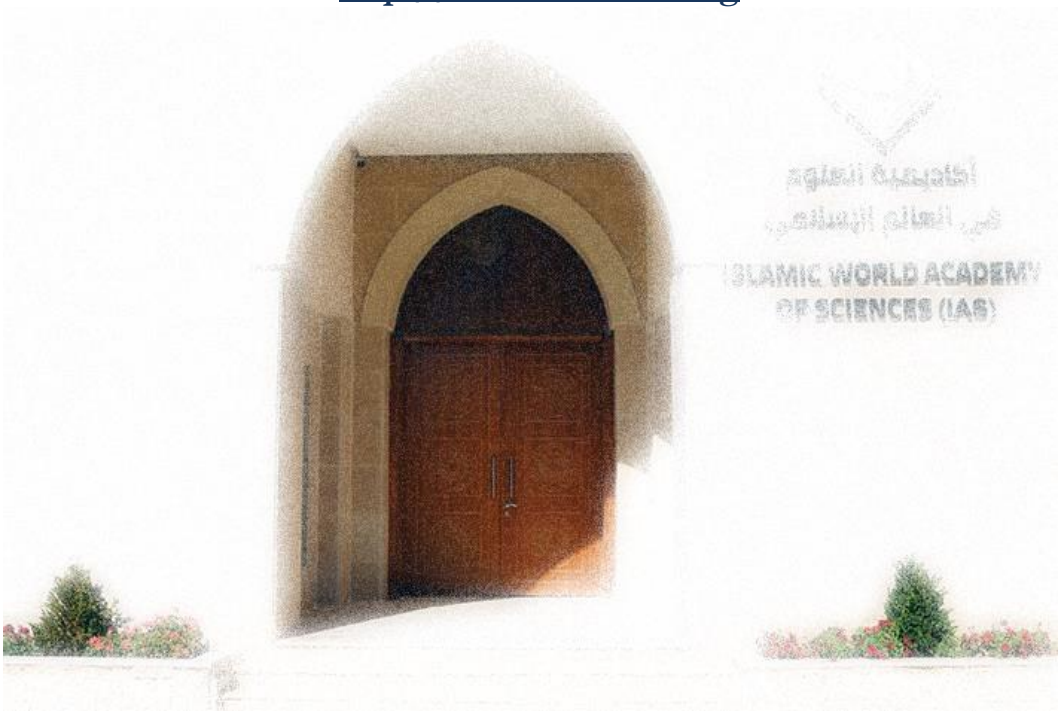

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