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THE UNTAPPED POTENTIAL OF ZAKAT FOR REFUGEE EMPOWERMENT*

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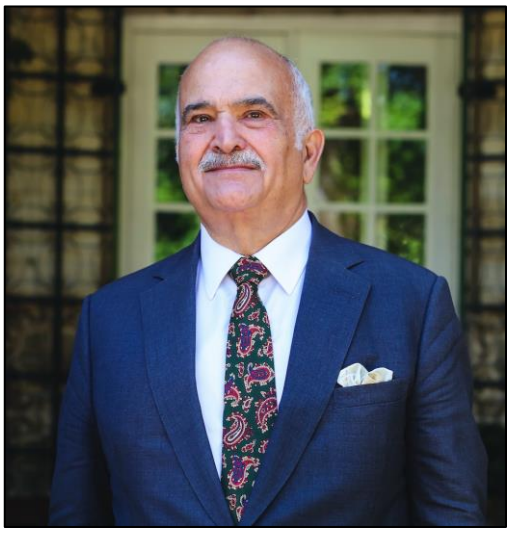

As the world faces unprecedented refugee crises, sustainable financial assistance has emerged as a vital aspect of Islamic philanthropy. Deeply rooted in principles of human dignity, empathy, and the responsibility to aid those in need, Islamic philanthropy encompasses various forms of charitable giving, including Zakat (almsgiving).

Zakat is a religious duty incumbent upon every Muslim, emphasising the redistribution of wealth to support the most vulnerable members of society. The general guideline for Zakat is to give 2.5% (or 1/40th) of one's eligible wealth each year. Among the eight categories of people eligible for receiving Zakat, the Quran (9:60) mentions "ibn sabeel" or wayfarer, referring to a traveller who does not have sufficient funds to sustain their journey. In this context, all persons who are displaced and away from home, including refugees, are considered wayfarers, and are entitled to receive Zakat if they are in need of assistance.

The beauty of Islamic philanthropy lies in its capacity to offer both short-term and long-term assistance. In times of crisis and emergencies, Islamic philanthropic organisations have demonstrated their agility in swiftly responding to provide food, shelter, healthcare, and essential supplies to refugees. Zakat can serve as a pathway for individuals to attain long-term self-reliance and economic empowerment through a range of programs that encompass education, training, and psychosocial support. For example, by allocating Zakat funds to income-generating projects, vocational training programs, and microfinance initiatives, individuals and communities can develop sustainable means of income and make valuable contributions to local economies. Zakat can also play a crucial role in supporting cash transfer programs, which provide individuals with the freedom to prioritise their needs, whether related to food, healthcare, education, or starting their own ventures.

In terms of sustainability, there are significant parallels between Islamic philanthropy and the United Nations' Global Compact on Refugees, which emphasises the importance of refugee self-reliance and dignity, along with actionable and sustainable measures for host communities. The recent Islamic Philanthropy Report, a collaborative effort between the United Nations High Commissioner for Refugees and the Abdul Aziz Al Ghurair Refugee Education Fund, notes that since its establishment in 2017, the UN's Refugee Zakat Fund has provided financial assistance to approximately six million forcibly

* *Source: https://wrmcouncil.org/news/opinion/the-untapped-potential-of-zakat-for-refugee-empowerment/*

displaced individuals [1]. The report has also shed light on the significant contribution of Islamic philanthropy in establishing schools and educational programs for refugee communities over the years. By fostering economic self-sufficiency, these programmes enable refugees to become contributors to the Zakat system as they grow older, thereby establishing a sustainable and virtuous cycle of development.

To ensure fair distribution of Zakat funds in accordance with Islamic principles, an effective and accurate measurement of need and poverty is necessary. The Multidimensional Poverty Index (MPI), adopted as the official measure by the United Nations Development Programme (UNDP), provides an ideal means to achieve this. The index goes beyond traditional income-based measures and incorporates multiple dimensions of poverty, including education, health, housing, and social inclusion. The MPI recognises that poverty is complex and cannot be solved with a one-size-fits-all solution. Instead, it emphasises the importance of contextualisation and localisation. It recognises that poverty manifests differently in various regions and communities, and therefore, solutions must be adapted to local realities. In essence, the MPI model allows for a more comprehensive understanding of poverty and enables targeted interventions that address the specific deprivations experienced by refugees and other vulnerable populations. By utilising the MPI, we can better identify the specific areas and populations that require assistance, ensuring that Zakat funds are directed towards those who are most in need.

Likewise, for Zakat to realise its full potential, more efficient management is critical. Currently, most Zakat institutions operate at the national level, with some countries hosting multiple public and private Zakat programmes. This lack of streamlining hinders the effectiveness of Zakat initiatives worldwide. Therefore, three steps are crucial:

1. The first step entails enhancing institutionalisation and collaboration among Zakat initiatives on a global scale to effectively tackle humanitarian challenges. Establishing a Global Humanitarian Zakat Fund would serve as a central platform for cooperation and coordination among Zakat institutions across the world. This body would function as a channel for mobilising resources and distributing aid to the most vulnerable, including refugees. It would also foster knowledge-sharing, promote best practices, and facilitate joint efforts among relevant institutions. Additionally, the global body would play a crucial role in ensuring accountability and transparency in the management of Zakat.
2. The second step is to adopt a strategic lens to charitable giving that aims for a transformative impact on poverty alleviation. This approach focuses on enabling and empowering individuals and communities to achieve self-sufficiency and resilience in the long term. Education, healthcare, and capacity-building take priority.
3. Lastly, achieving consensus on a universal measure of need and impact is essential. By developing a standardised framework to assess and evaluate poverty levels and the effectiveness of Zakat interventions, comparisons and prioritisation of beneficiaries can be made across different regions and organisations. This ensures that Zakat funds are directed towards those most in need and their positive impact is maximised. A Global Humanitarian Zakat Fund could play a pivotal role in facilitating this process.

Moving forward, it is imperative to develop a comprehensive approach to refugee empowerment that extends beyond emergency material assistance. Islamic philanthropy carries tremendous financial, religious, cultural, and social weight worldwide, and its utilisation in this regard is long overdue. Our utmost priority must lie in establishing a Global Humanitarian Zakat Fund, as the cornerstone for collaboration, strategic giving, and effective resource mobilisation to address pressing humanitarian issues worldwide. It is our collective responsibility to harness Zakat for the betterment of all individuals, irrespective of their faith, to transform refugee lives, promote justice and compassion, and build a more equitable world.

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[1] *UNHCR. (2023). Islamic Philanthropy Annual Report, p. 2.*

CAPACITY BUILDING OF ENTREPRENEURSHIP

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We are entering a century of fast-moving knowledge-driven information technologies, networks and artificial intelligence (AI) which have the potential change of every classroom practice. The impact of the use of computers and communication technology will not be limited to the learning process (teachers and students), but will change the whole institutional infrastructure and pattern of behavior within the educational system. We are passing through a transformation era in building human capital unparalleled in human history. Education faces the daunting challenge of preparing individuals for the information-age society. But we have to ask ourselves about the following:

- How to manage an avalanche of information?
- How to prepare the most efficient human capital for the brain-intensive marketplace?
- How to prepare flexible human resources to meet the uncertainty of a global economy?
- How to innovate to keep up with a high-speed, knowledge-driven, competitive economy at the workplace?

In addition, education has to respond to the following:

- to respond to social needs to "rights to education;"
- to "education for all;"
- to limited resources (physical and financial);
- to development of citizenship;
- and to maintaining ethical and cultural value system.

Languages and science and mathematics have to be taught at early childhood to build the microchips of the brain as "acquiring" and not "learning." The old concept of "we're over-loading the poor child" is no longer valid.

Injecting technology to make the educational model more efficient, equitable and cost-effective, for strengthening "mode of inquiry" and "problem-solving."

Curriculum reform is needed with full participation of policy planners, teachers, and civil society to determine what education at various stages should deliver. Modular education is a suitable formula to respond to challenges of the future, and accommodate individual differences. In addition, bridges should be built between modules to allow flexibility and mobility according to emerging trends, and market forces.

Multimedia software is becoming creative and it is possible for users to navigate in a broad spectrum of topics as well as in depth into these topics. The possibilities which computers offer as a tool to help students to learn, to construct knowledge and to comprehend, constitute a true revolution of the learning process and an opportunity to transform schools. Teachers become facilitators for the knowledge construction. Traditional teaching is based on transmission of knowledge, and students are the recipients of the information.

The result is a passive student who has little chance to survive in the knowledge-based society we are entering. This society requires creative, critical thinking to learn about learning, working in groups to advance potentials, to have a wide vision about economic, social, ecological problems encountered by today's society, and keep knowledge in specific domains.

Certainly, this requires an educational process to create the learning environment in which students can develop - one in which students can build and develop knowledge. This means that schooling of today has to be transformed. This transformation goes much deeper than simply installing a computer as a new educational tool.

So, computers must be inserted into the learning environment to allow "construction of knowledge," comprehension and development of capabilities that are necessary to function in the knowledge society. Learning becomes the product of a knowledge-constructing process through projects done by students using the computer network as a source of information for digital learning. Through the process of solving problems, students can learn how to get and select the right information to incorporate into the solution – to learn about how to learn – to be critical of results obtained, to develop strategies, and to understand that debugging is the engine that drives learning.

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In this way, students can acquire capabilities and values necessary for the knowledge society instead of them being transmitted by the teachers.

Digitalization has revolutionized our daily life, and given rise to new concepts and a new world of virtual realities of dealing with data representing business, financial markets, transaction, trade, industry, services, and other socio-cultural activities. It is moving now rapidly into interactive media of higher education, where the "virtual university" becomes a simple computer screen; and through that screen, students will have access to every type of education for life. Higher education could be provided at home with "virtual laboratories" and workshops; and the campus of the "university of tomorrow" may become the planet sphere itself.

Schools must have ethics at the core of their education for all. Globalization requires norms and ethical standards to be attained by all, for humanism and a united integrated world.

For Creativity: Security targeting Vs Risk taking

By nature, man seems torn between two concepts: security and adventure. Because of the first, he seeks shelter.

Because of the second he takes risks; all forms of risks – being wrong or being discovered. There is a price to be paid for each contrasting outcome. The price of being creative is admittedly higher. However, creativity does not mean leaving the field free for exercising every expression of human thinking. The ways of inventions and discovery also, follow the course of accepted disciplines, a scientific method, imitating chosen models or opposing contradictory models. Rejecting the rules of the game is out of the question. This creative, nonconformist, is apparent nowadays among young people who have revolted against paternalistic attitudes and self-preservation instinct in dominating societies. Youth are seeking new values for a new world free of the "culture of silence" and oppression. No long-term educational policy can do without an analysis of the profound reasons for the challenge young people are flinging down.

Education is increasingly called on to liberate all the creative potentialities of human mind. Young people for the first time in history are becoming the real entrepreneurs of the universe. Many are passing their business capitalization of $1 million before the age of thirty….

Education has the dual power and to stifle creativity. Recognition of its complex tasks in this domain is one of the most fruitful intellectual achievements of modern psychopedagogical research. These tasks may be described as preserving each individual's originality and creative ingenuity without giving up the need to place him in real life; transmitting culture without overwhelming him with ready-made models; encouraging him to make use of his gifts, aptitudes and personal forms of expression without cultivating his egotism; paying keen attention to each person's specific traits without overlooking the fact that creation is also a collective activity. "So, ideas without risks are useless, while risks without ideas are stupid."

To understand the nature of a new product, one has to discover the secret: who creates the product and how it originates? That could be in two ways:

1. Created by people who are not conscious of the product or service they create: by entrepreneurs; and
2. Created by intellectual entrepreneurs as a result of problem-solving to a challenge through systematic R&D, tests and experiments.

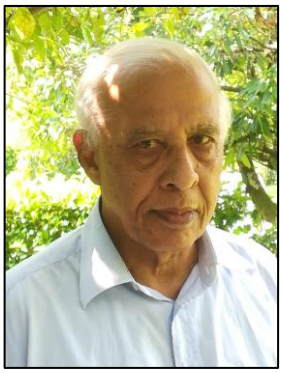
Entrepreneurs are characterized by: the ability to think, create and make decisions. They think independently and they reflect, dream, and make their dreams become a reality. They have the sense of inquiry and do not believe in inhibitions; limitations and they can do the impossible.

In short, they are creators of events. They read fast and have the technique to analyze and predict. They are self-reliant individuals who know how to have access to information and how to make use of it, and how to construct new knowledge. They are scientists in the sense that they can look at matters as others look at, but they can see what others cannot see.

Entrepreneurs must have a sense of humor. They laugh, relax, and take vacation to meditate. They are able to choose partners and create new jobs employing intellectuals who are knowledgeable, creative, and action-oriented. They can cause intellectual revolution and destroy all the myths and other limitations to human brain. They create their own company in order to function as independent thinkers away from bureaucracy and redtape. They watch and identify opportunities that no one else could find in the market place. They take risks and ignore boundaries and limitations. They release their potentials without limits. But they have information about markets, consumers, and forecasts.

AUGER ELECTRON SPECTROSCOPY

Muhammad Asghar FIAS*



Abstract. This text deals with the origin of the Auger electron emission process and its use to analyze the elemental composition of different surfaces in the domain of material sciences along with the experimental measuring technique, and the variation of the emission probability of this process as a function of atomic number compared to the x-ray emission probability.

1. Auger process and Auger electron

The electrons in an atom occupy precise energy levels determined through the quantum mechanical rules, Fig. 1a, b. The binding energy of these atomic levels decreases as one moves away from the core of the atomic nucleus. These electrons can transit from one level to another unoccupied level with a higher binding energy if the quantic selection rules permit the transition. Moreover, these electrons can move from levels higher binding energies to levels with lower binding energies through an external source of energy through a beam of electrons or of x-rays with energies of several eV to 50 keV.

Fig. 1a, shows as a *red line*, the incident electron beam striking and knocking out the core 1s -level an electron with a binding energy $E_{1s\ core\ state}$ and leaving behind a hole. This hole is filled by the transition of the 2s- level electron with a binding energy E_{2s} such that $E_{2s} < E_{1s\ core\ state}$ and leaving behind a hole in the 2s- level. Now, the energy difference ($E_{1s\ core\ state} - E_{2s}$) instead of emitting a photon, is used to knock out the electron from the 2p- level with a binding energy E_{2p}, leaving behind a hole in this level. The reaction process that results in two holes in two levels of the atom (here, 2s and 2p levels) plus the emission of an electron is called the *Auger process* discovered by Auger in 1925, and the emitted electron is called the *Auger electron* with kinetic energy:

$$\mathbf{E_{kin} = E_{1s\ core\ state} - E_{2s} - E_{2p}} \qquad \mathbf{(1).}$$

Fig. 1b, illustrates the same process using the x-ray notation: the incident electron knocks out the electron in the core K level leaving behind a hole which is filled by the transition of electron from the L_1 level leaving a hole in this level, and the available energy in this process is used to knock out the Auger electron from the L_2 level.

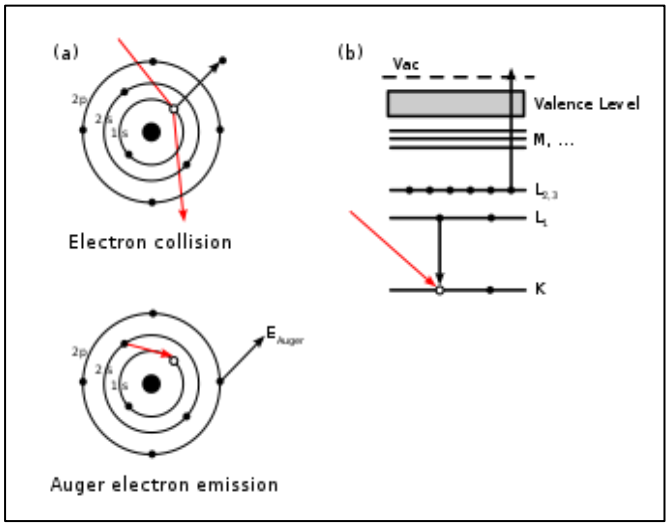


Figure 1a, b. *Two views of the Auger process. (a) illustrates sequentially the steps involved in the Auger deexcitation. An incident electron creates a hole in the core1s level. The electron transition from the 2s level fills the 1s hole and the available energy is used to emit the Auger electron from the 2p level. The final atomic, thus, has two holes, one in the 2s orbital and the other in the 2p orbital plus the freed Auger electron. (b) illustrates the same process using the X-ray notation, K L_1 $L_{2,3}$, (1).*

Fig. 2 represents the experimental set up used for Auger electron spectroscopy (AES) work, where the Auger electrons are guided by a cylindrical mirror to the electron multiplying detector.

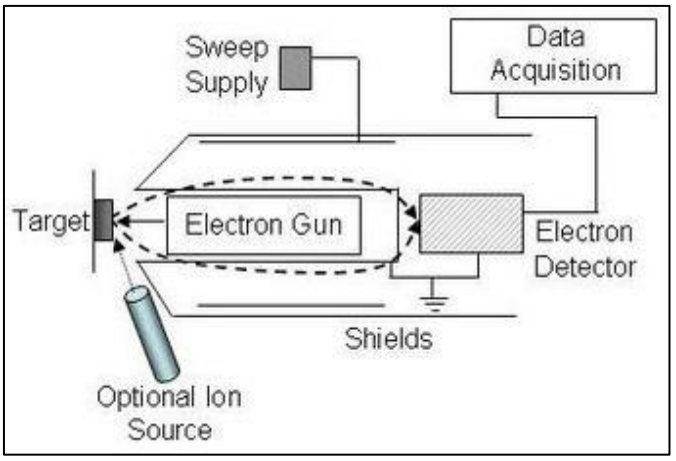


Figure 2*. AES experimental setup using a cylindrical mirror analyzer (CMA). An electron beam is focused onto a sample and the emitted electrons are deflected around the electron gun and pass through an aperture towards the back of the CMA. These electrons are then directed into an electron multiplier for analysis (electron detector). Varying voltage at the sweep supply allows derivative mode plotting of the Auger data. An optional ion gun can be integrated for depth profiling experiments (1).*

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Since the energies of the Auger electrons are small, in the field of material sciences, the Auger electron spectroscopy is used to analyze the elemental composition of different surfaces. Moreover, because of the low densities of the Auger peak maxima, the data are plotted as the first derivative of the electron density versus electron energy: dN(E) / dE, to enhance the detectability of the signal. Fig. 3, presents the dN(E) / dE versus electron energy data for 3 keV electron beam energy, on a Molybdenum sample showing the Molybdenum 187 eV Auger peak along with the contamination Auger peaks of 272 eV and 512 eV of Carbon and Oxygen respectively. In this data analysis, the known and tabulated Auger electron energies for different elements are used.

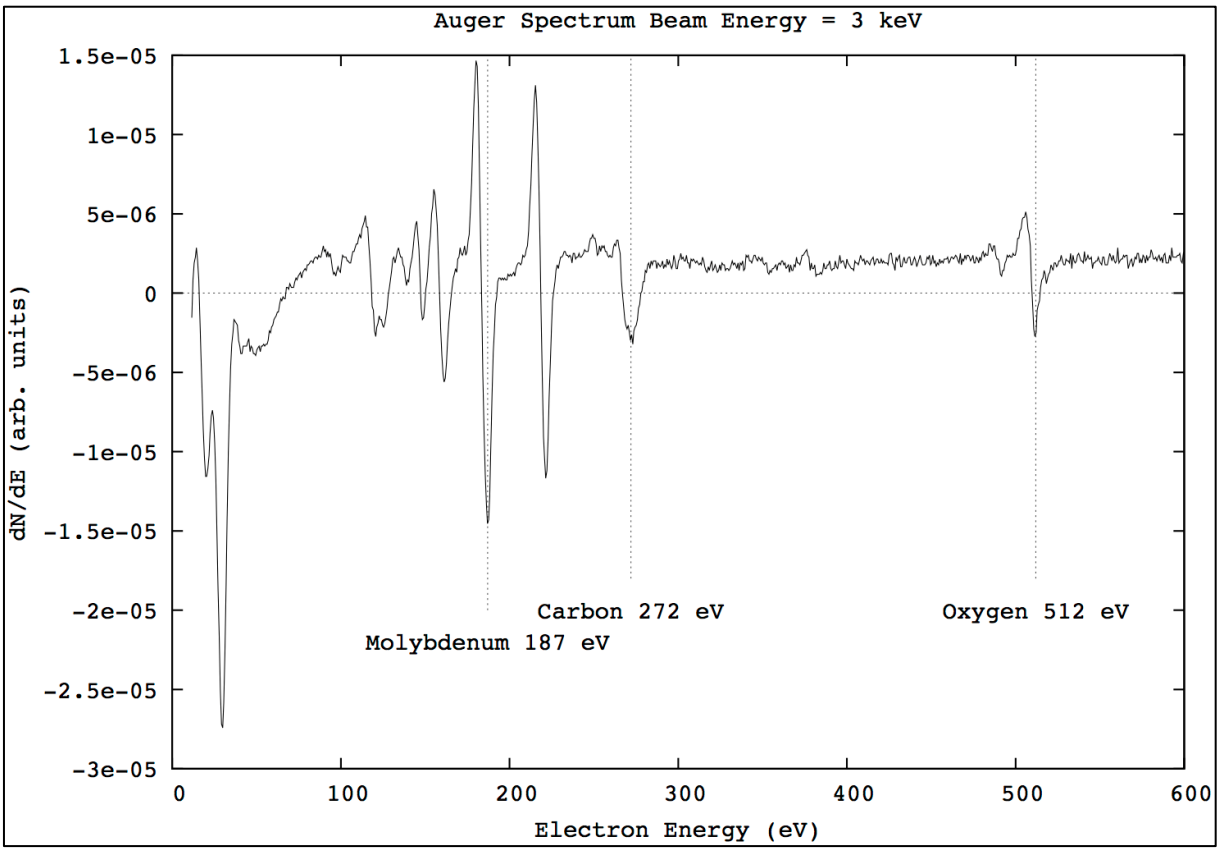

Figure 3. *Auger spectrum of a Mo sample contaminated by O and C. The primary beam energy was 3 keV and the characteristic peaks of Mo and Carbon and Oxygen are present in the data (1).*

Fig. 4, shows the variation of the Auger electron and x-ray emission yields as a function of the atomic number for the K shell vacancies. While the Auger electron yields dominate for lower atomic numbers, the x-ray yields dominate for higher atomic numbers. In fact, the comparison of the two curves suggests an anti-correlation between the x-ray yields and those of the Auger electrons.

Several models, both phenomenological and analytical, have been developed to describe the energetics of Auger transitions. One of the most tractable descriptions put forth by Jenkins and Chung, estimates the kinetic energy of Auger transition ABC as:

$$\mathbf{E_{ABC} = E_A(Z) - 0.5\,[E_B\,(Z) + E_B\,(Z+1)] - 0.5\,[E_C\,(Z) + E_C\,(Z+1)]} \qquad \mathbf{(2),}$$

where E_i (Z) are the binding energies of the ith level in the element of atomic number Z and E_i (Z+1) are the energies of the same level in the next element up in the periodic table. One notes that the structure of the relation **(2)** is quite close to that of relation **(1)**.

Since the total transition rate ω normalized to one, is the sum of the Auger electron transition and the photonic radiation x-ray process. The Auger yield ω_A is related to the fluorescence x-ray yield ω_χ through the relation:

$$\mathbf{\omega_A = 1 - \omega_x = 1 - W_X\,/\,W_X + W_A} \qquad \mathbf{(3),}$$

where W_X is the x-ray transition probability and W_A, the Auger transition probability. The anti-correlated dependence of W_X and W_A on the atomic number leads to plots of Fig.4.

Since the Auger process needs three electrons to operate, it is not applicable to Hydrogen and Helium atoms with one and two electrons respectively. Moreover, the fast decreasing Auger process

probability as a function of the atomic number Z can be measured only up to Z≤ 50 (2), and beyond this value, complex techniques can be used to identify heavier elements such as Uranium with Z=92 using the Auger effect (3).

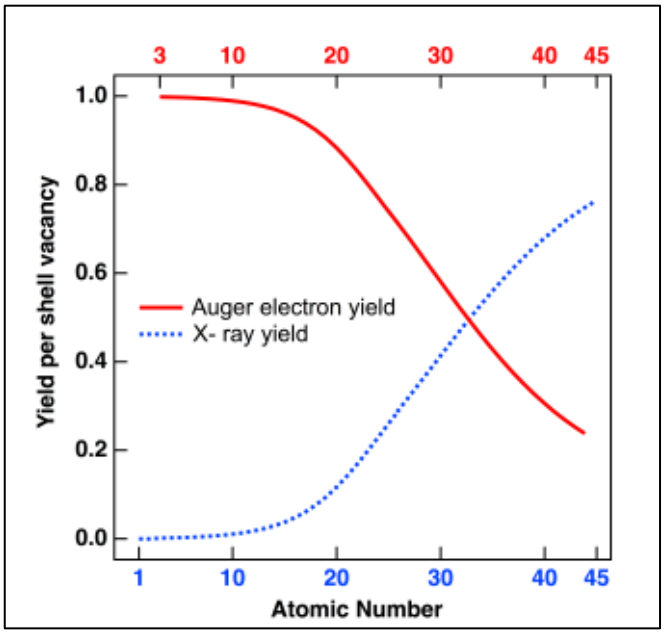

Figure 4*. X-ray fluorescence and Auger electron yields as a function of atomic number for K shell vacancies. Auger transitions (red curve) are more probable for lighter elements, while the X-ray yield (dotted blue curve) becomes dominant at higher atomic numbers. Similar plots can be obtained for L and M shell transitions (1).*

2. Conclusions

This write-up treats the Auger process of electron emission and its application in the analysis of elemental composition of surfaces in the field of material sciences along with the experimental technique used in this study, and the variation of the emission probability of this process as a function of atomic number compared to the x-ray emission probability.

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De Broglie Relation and the Signification of de Broglie Waves

Muhammad Asghar FIAS

Abstract: This write-up derives the De Broglie relation and points out its significance and its seminal contribution to the development of Quantum Mechanics.

1. De Broglie relation

The wavelength of the wave associated with any material particle is calculated in analogy to a photon which is assumed to have wave character whose energy E is calculated using the Planck relation:

$$E = h\nu = hc/\lambda, \quad (1)$$

where h is the Planck constant = 6.582×10^{-16} eV s, the ν, the frequency of the photon wave, λ, its wavelength, and c, the speed of light in vacuum.

From the principle of "duality of waves and corpuscles (particles)" the particle as wave is also represented as particle of mass m, whose energy E is determined via the Einstein's equation:

$$E = mc^2 \quad (2),$$

where c is the speed of light in the vacuum.

As the energies (1) and (2) are equal, this leads to:

$$mc^2 = hc/\lambda$$

$$\text{Or} \quad \lambda = h/mc \quad (3).$$

Here, the **mc** represents the momentum p of the photon.

De Broglie pointed out that the above relation (3) is general in nature and applicable to any material particle. The equivalent mass of the photon is replaced by the mass of the material particle and its velocity c is replaced by the velocity v of the material particle. Thus, for any material particle like electron, one can write:

$$\lambda = h/mv \text{ or } \lambda = h/p \quad (4),$$

where mv= p is the momentum of the matter particle.

The relation (4) is called the de Broglie equation and the λ is called the de Broglie wavelength. Thus, the significance of the de Broglie equation is that it relates the particle character with the wave character of matter. This significance of the de Broglie relation led to the development for particles of matter, the seminal Schrodinger equation that introduced the notion of wavefunction.

2. Applicability of the de Broglie concept

The value of wavelength for electrons of 9.1×10^{-31}kg mass and with v = 10^7 m s^{-1}, is λ = 7.27×10^{-11} m, which is significant for the de Broglie concept, because like the x-rays, it is measurable. However, for a mass of 10^{-2} kg and v = 10^2m s^{-1}, the value of = 6.6×10^{-34} m is not significant for the de Broglie concept, because it cannot be measured. Thus, the de Broglie concept is significant only for sub-microscopic objects such as atoms or molecules and subatomic particles such as electrons, protons and neutrons.

SCIENCE DIPLOMACY

Abdullah Al Musa
Secretary General
Higher Council for Science and Technology (HCST)

Humanity is passing through an age plagued with a plethora of problems that pose challenges to the drive towards sustainable development that compromise our efforts towards human wellbeing.

Anthropogenic-induced climate change, pandemics, famines, conflicts, artificial intelligence and externalities of human economic activities are threatening our global commons such as the high open seas, the biosphere and biodiversity to name only few.

Although these calamities have commonality and universality dimensions, they exert differential impacts on different parts of the globe in spite of the fact the man-induced ones are not uniformly initiated. Here science with its intrinsic independency, transparency and political neutrality can be an enabling agent to fairly tackle these problems through strengthening the world solidarity and soothing the political differences. It is the findings of science that incite the interest of different countries to sign the Paris Accord.

We definitely can capitalize on the collective substantial global knowledge to produce evidence-based solutions to tackle the global challenges. It is with the process of science diplomacy that we can involve multiple stakeholders including scientists from different backgrounds in multidisciplinary approach. The process is expected to promote scientific values such as academic freedom of inquiry, scientific integrity, transparency and bolster the long-needed notion of open science, knowledge sharing across geographical borders through collaborative research and mobility of researchers.

The interaction between scientists from different cultural backgrounds has also a spin-off outcome beyond academia and research that on the long run resonates in more understanding and tolerance that may have a constructive role in patching political rifts between countries.

Science policy was first found in the public policy discourse in developed countries with the United States pioneering the use of science and research to inform decision-making in foreign policy with aim to improve political relations where diplomacy failed.

The conceptual framework of science diplomacy was further elaborated by the Royal Society in partnership with American Association for the Advancement of Science to include 3 dimensions: science in diplomacy, science for diplomacy and diplomacy for science. The frame work envisages a process that combine political science, public policy and international relations with science. Thus, science policy has been used in developed countries as a tool by the states to advance directly or indirectly foreign policy goals while at the same time sustain the course and address the shared global challenges.

Developing countries soon follow **suit** but with different expectation and perspective. Recognizing the developed countries' advance research and innovation systems and acknowledging theirs is lagging behind. The developing countries looked upon science diplomacy as a tool to build capacity and access science and technology resources to accelerate development through networking, knowledge sharing and technology transfer. They aspire that other critical issues pertinent to development are ought to be fairly incorporated in the scope of science diplomacy. These are the brains drain, CO_2 emissions with its un-proportional impact on developing countries and the social cost created form exporting primary material.
To give an example, I came from a region that contributes only 5% of the total global CO_2 emission, but it is among the most severely hit by consequences of climate change. A situation that is further exacerbated by the intrinsic fragile and meager natural resources.

For Jordan, we embrace the science diplomacy concept by participating actively in dedicated programs and organizations with regional and international players making use of the opportunities made available by our partners. We also host a regional platform for collaboration through the synchrotron facility where science diplomacy is practiced at its best. In addition, Jordan is participating in multilateral mutual research funding agreements through PRIMA or in bilateral mutual research funding agreements with regional partners such as with CNR of Italy. Similar agreements with Turkey, Morocco and France are under processing.

ZERO-POINT ENERGY AND VACUUM FIELDS

Muhammad Asghar FIAS

Abstract: This contribution defines the term of zero-point energy through the quantal harmonic oscillator, shows that the quantal fluctuation of this zero-point energy as vacuum field, leads to the Casimir effect, and the Lamb shift in hydrogen is caused by the coupling of the electron electromagnetic field in the $2s_{1/2}$ level with the quantal fluctuating vacuum electromagnetic field.

1. Introduction

In Classical Physics, for a particle acted on by a conservative force, its total energy: $E = (½)\ mv^2 + V(x)$. For the classical ground state, the zero velocity minimizes its kinetic energy $½\ m\ v^2$ and puts the particle at the point, where it has the lowest potential energy V(x). Here, the particle's ground state is completely specified by its zero speed and its position at the minimum of the potential. The situation of the ground state is similar for a perfect crystal at absolute 0 °K = -273.15 °C with zero kinetic energy and zero entropy, and the atoms occupy the same macrostate. For both the cases, there is not any constraint of correlation between the particle's energy and its position.

However, the things are different in Quantum Mechanics, where the momentum p (speed) of a particle and its position x act as conjugate variables whose mutual variation is controlled by the uncertainty relation:

$$\Delta p\ .\ \Delta x \geq h\ bar\ /2 = h/4\pi, \qquad (1)$$

where Δp is the uncertainty in the momentum of particle, Δx, the uncertainty in its position, h is the Planck constant, and h bar = h /2 π. This relation states that unlike Classical Physics, the exact position and momentum of a particle cannot be known simultaneously. This implies that the ground state of a Quantum Mechanical system must be different with somewhat higher particle energy than that for Classical Physics.

2. Quantum Harmonic Oscillator

In the context of zero-point energy, Quantum Harmonic Oscillator is pertinent. Here, the energies of its quantized levels are given by the relation:

$$E_n = h\ bar\ \omega\ (n + 1/2), \qquad (2)$$

where n is the principal quantum number that varies as n = 1, 2, 3, 4, ……, h bar, the reduced Planck constant = h/2π, and ω, the angular velocity of the particle. The ground state energy is defined for n = 0 as:

$$E_0 = (1/2)\ h\ bar\ \omega = (h/4\pi)\ \omega, \qquad (3)$$

which is called the **zero-point energy** of the quantum harmonic oscillator. It is higher than the Classical Physics based ground state zero energy of the system. The zero-point energies contributed by different fields in Nature are expected to be present in the vacuum as vacuum energy. Moreover, these vacuum-based fields are expected to fluctuate quantum-mechanically according to the uncertainty relation based on energy and time conjugate variables:

$$\Delta E\ .\ \Delta t \geq hbar\ /2, \qquad (4)$$

where ΔE is the uncertainty in energy and Δt is the uncertainty in time.

3. Casimir effect

The Casimir effect is generally considered as evidence of zero-point energy as a quantal fluctuating vacuum field. The model calculation shows that the Casimir force per unit area F_C /A for idealized, perfectly conducting plates with vacuum between them is:

$$F_C\ /A = -\ hbar\ c\ \pi^2\ /\ 240\ a^4, \qquad (5)$$

where hbar is the reduced Planck constant = h / 2π; c, the velocity of light; and a, the separation between the two plates. The force is negative implying that it is attractive, which decreases as the separation between the plates decreases.

In experimental work, one considers the quantum-mechanically fluctuating vacuum electromagnetic field between a pair of grounded neutral metal plates. Here, the vacuum energy consists of contributions from the fluctuating electromagnetic field of all the wavelengths except those excluded by the spacing between the plates, Fig.1. As the plates are brought closer, more wavelengths should be excluded, and the vacuum energy should decrease. The experimental work confirmed the predicted existence of the Casimir effect and its variation as a function of the distance between the plates **(1)**, thus, confirming the physical reality of zero-point energy and quantum-mechanically fluctuating electromagnetic field.

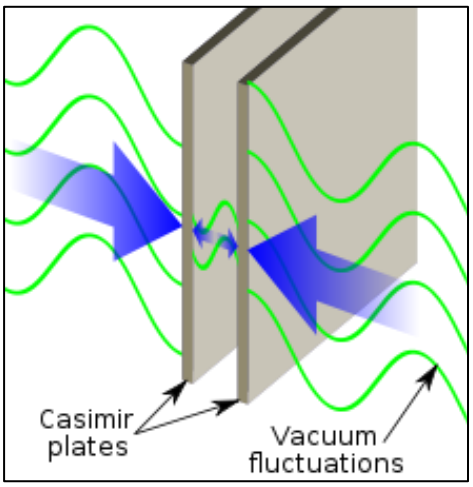

Fig. 1*. Casimir forces on parallel plates due to quantum-mechanical vacuum fluctuations* ***(4).***

4. Lamb-Retherford experiment and Lamb shift

Fig.2a, shows the fine structure of energy levels in hydrogen due to relativistic corrections through the Dirac equation to the Bohr model **(2)**. Moreover, Dirac's equation predicts that the energy levels $2s_{1/2}$ (n=2, j= ½) and $2p_{1/2}$ (n=2, j=1/2) with the same the principal quantum number n and the total angular momentum j, should be degenerate and have the same energy as indicated in Fig.2a. through the dark and the red-pointed lines.

In their experiment, Lamb and Retherford **(3)**, prepared a beam of hydrogen atoms in their $1s_{1/2}$ ground state. The beam passed through a region, where it was bombarded with a perpendicular beam of electrons that excited some of atoms to the excited $2s_{1/2}$ state of 0.1 sec half-life. After this, the beam was subjected to a microwave field of 1 to 10 GHz, to stimulate radiofrequency transition between $2s_{1/2}$ and $2p_{1/2}$ levels. After passing the microwave field zone, the atoms struck a tungsten foil (part of the electron detector) and the atoms still in the $2s_{1/2}$ state decayed to the ground state $2p_{1/2}$, and liberated the electrons from the foil due to the Auger process. By measuring the electron emission current from the foil with the microwave field turned on and with the microwave field turned off, Lamb and Retherford were able to determine the energy difference between $2s_{1/2}$ and $2p_{1/2}$ levels called the Lamb shift as:

$\Delta E = 4.372\times10^{-6}$ eV (Fig.2b); the microwave frequency = **1057.862 MHz**; and the wavelength **λ = 23.36 cm.**

The Lamb shift removes Dirac's degeneracy through the coupling of the $2s_{1/2}$ electron EM field with the quantal fluctuating vacuum EM field. The Lamb shift result initiated the epic development of the new theoretical field of *quantum electrodynamics* (QED) that removes the Dirac's $2s_{1/2}$ and $2p_{1/2}$ levels degeneracy and reproduces with high precision, the Lamb shift for hydrogen as**: 1057.864 MHz (5).**

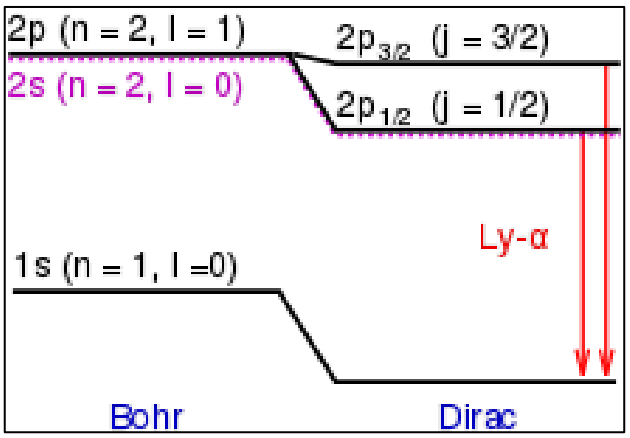

Fig. 2a*. Fine structure of energy levels in hydrogen due to Dirac's relativistic corrections to the Bohr model* ***(4).***

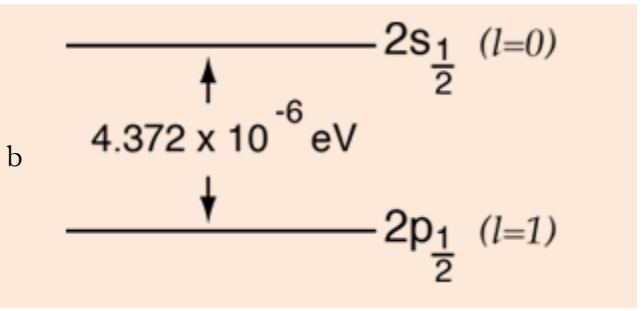

Fig. 2b*. The hydrogen $2s_{1/2}$ (l=0) level shifted upwards relative to the $2p_{1/2}$ (l=1) level called the Lamb shift caused by the coupling of the electron's EM field in $2s_{1/2}$ level with the quantum-mechanically fluctuating vacuum EM field* ***(4).***

5. Conclusions.

This text defines the term of zero-point energy through the quantal harmonic oscillator, shows that the quantal fluctuation of this zero-point energy as vacuum field leads to the Casimir effect and the Lamb shift in hydrogen is caused by the coupling of the electron electromagnetic field in the $2s_{1/2}$ level with the vacuum quantal fluctuating electromagnetic field.

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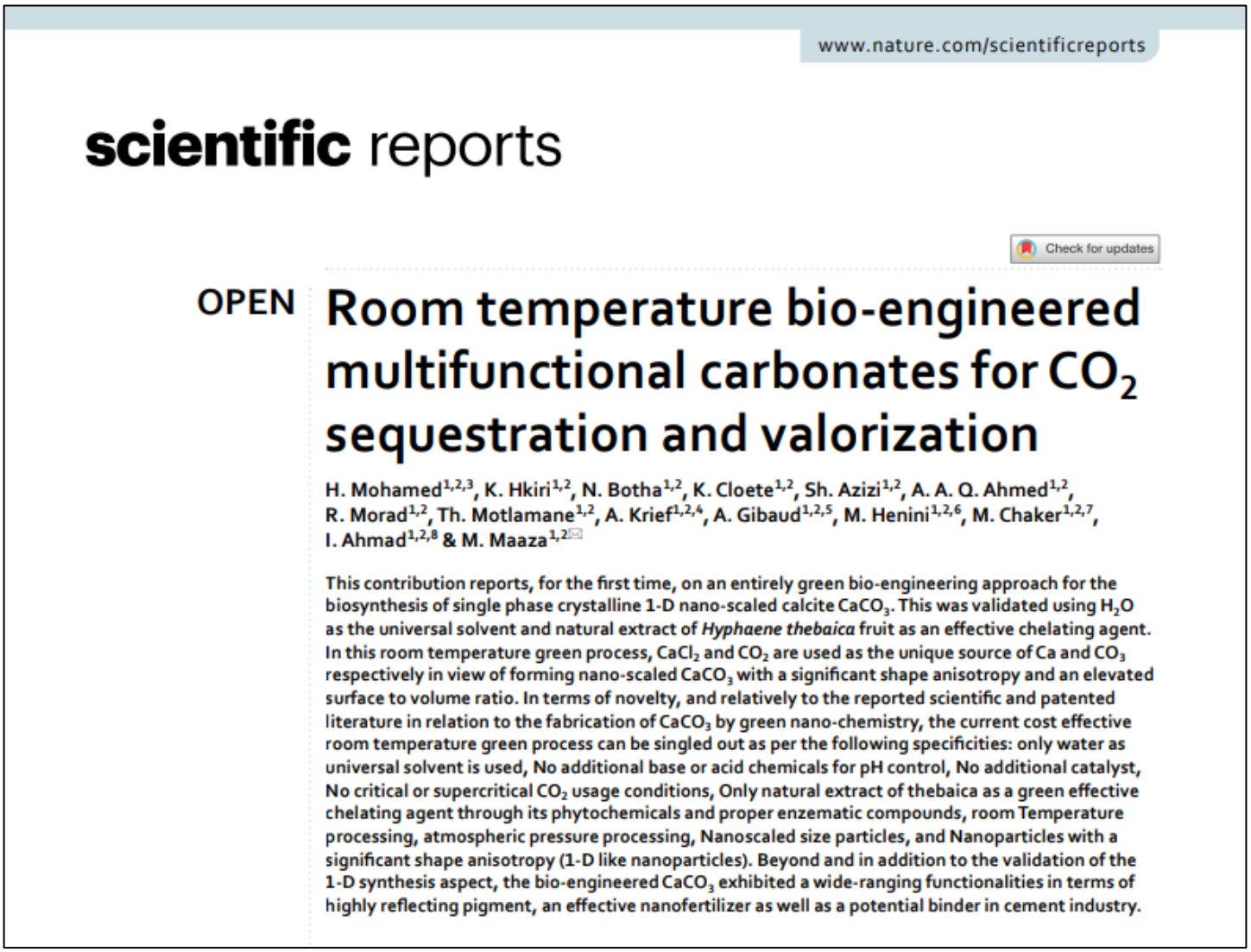
ROOM TEMPERATURE BIO-ENGINEERED MULTIFUNCTIONAL CARBONATES FOR CO_2 SEQUESTRATION AND VALORIZATION

H. Mohamed, K. Hkiri, N. Botha, K. Cloete, Sh. Azizi, A. A. Q. Ahmed, R. Morad, Th. Motlamane, A. Krief, A. Gibaud, M. Henini, M. Chaker, I. Ahmad & M. Maaza

Abstract

This contribution reports, for the first time, on an entirely green bio-engineering approach for the biosynthesis of single phase crystalline 1-D nano-scaled calcite $CaCO_3$. This was validated using H_2O as the universal solvent and natural extract of *Hyphaene thebaica* fruit as an effective chelating agent. In this room temperature green process, $CaCl_2$ and CO_2 are used as the unique source of Ca and CO_3 respectively in view of forming nano-scaled $CaCO_3$ with a significant shape anisotropy and an elevated surface to volume ratio. In terms of novelty, and relatively to the reported scientific and patented literature in relation to the fabrication of $CaCO_3$ by green nano-chemistry, the current cost effective room temperature green process can be singled out as per the following specificities: only water as universal solvent is used, No additional base or acid chemicals for pH control, No additional catalyst, No critical or supercritical CO_2 usage conditions, Only natural extract of thebaica as a green effective chelating agent through its phytochemicals and proper enzematic compounds, room Temperature processing, atmospheric pressure processing, Nanoscaled size particles, and Nanoparticles with a significant shape anisotropy (1-D like nanoparticles). Beyond and in addition to the validation of the 1-D synthesis aspect, the bio-engineered $CaCO_3$ exhibited a wide-ranging functionalities in terms of highly reflecting pigment, an effective nanofertilizer as well as a potential binder in cement industry.

Full article: https://www.nature.com/articles/s41598-023-42905-5



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Room temperature bio-engineered multifunctional carbonates for CO_2 sequestration and valorization

H. Mohamed[1,2,3], K. Hkiri[1,2], N. Botha[1,2], K. Cloete[1,2], Sh. Azizi[1,2], A. A. Q. Ahmed[1,2], R. Morad[1,2], Th. Motlamane[1,2], A. Krief[1,2,4], A. Gibaud[1,2,5], M. Henini[1,2,6], M. Chaker[1,2,7], I. Ahmad[1,2,8] & M. Maaza[1,2]✉

This contribution reports, for the first time, on an entirely green bio-engineering approach for the biosynthesis of single phase crystalline 1-D nano-scaled calcite $CaCO_3$. This was validated using H_2O as the universal solvent and natural extract of *Hyphaene thebaica* fruit as an effective chelating agent. In this room temperature green process, $CaCl_2$ and CO_2 are used as the unique source of Ca and CO_3 respectively in view of forming nano-scaled $CaCO_3$ with a significant shape anisotropy and an elevated surface to volume ratio. In terms of novelty, and relatively to the reported scientific and patented literature in relation to the fabrication of $CaCO_3$ by green nano-chemistry, the current cost effective room temperature green process can be singled out as per the following specificities: only water as universal solvent is used, No additional base or acid chemicals for pH control, No additional catalyst, No critical or supercritical CO_2 usage conditions, Only natural extract of thebaica as a green effective chelating agent through its phytochemicals and proper enzematic compounds, room Temperature processing, atmospheric pressure processing, Nanoscaled size particles, and Nanoparticles with a significant shape anisotropy (1-D like nanoparticles). Beyond and in addition to the validation of the 1-D synthesis aspect, the bio-engineered $CaCO_3$ exhibited a wide-ranging functionalities in terms of highly reflecting pigment, an effective nanofertilizer as well as a potential binder in cement industry.

Article source: https://www.nature.com/articles/s41598-023-42905-5

THE GROWTH OF DIGITAL LEARNING

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

Digital learning has been growing rapidly in recent years and is poised for more growth, as learners are increasingly accessing online courses. This trend has indeed gained momentum during the COVID-19 pandemic, which has not only stimulated a global acceptance of digital learning but also driven an increase in the quality and standards of online education, in a flexible and cost-effective manner thanks to advancements in educational technology.

Accessing quality digital learning has proven to be important for future-proofing careers, as it exposes students and working professionals to an array of skills and capabilities that will allow them to thrive in an increasingly complex and competitive workplace. As such, the digital learning marketplace has been evolving with the growing market needs, providing numerous options for reskilling and upskilling opportunities, and making educational attainments relevant. Moreover, research has shown that online learning can be even more effective than traditional learning, particularly in the context of corporate education: (1) it requires less time without affecting learning quality; (2) more material is covered in less time; and (3) it leads to increased productivity, revenue, and business performance.

Emerging technologies have been changing the face of online education by creating tremendous opportunities. For example, the use of machine-learning algorithms, a type of Artificial Intelligence, allows us to recognize patterns that personalize and tailor content for each learner in the platform and, therefore, adaptively enhance his/her learning experience, work smarter, and achieve personal objectives. Additionally, more-personalized learning experiences are achieved through virtual assistants or smart chatbots that support the learner in real time and facilitate navigation through the material. The result is a time-efficient, content-focused, and engaging learning experience. At the pace technology is evolving today, it will not be surprising to see more advanced algorithms that offer tailor-made learning strategies with the inclusion of virtual reality and augmented reality, making the learning experience more stimulating, interactive, and engaging.

On the whole, digital learning is no longer an educational trend, but rather a mainstream phenomenon that has become assimilated into the learning environment and thus an integral part of it. Digital learning is no longer a "nice to have" option in an institution's educational offerings. The COVID-19 pandemic has emphasized the need for higher education institutions to become more reactive and proactive toward the needs of the learners and break away from its deeply rooted traditions and embrace flexibility and change. Now that digital learning has become normalized, higher education institutions are diving into an era that sees an expansion of online offerings and encourages the exploration of new learning modalities that are compatible with the "new learners".

The Quality Issue

Quality is a major concern in online education. Before the COVID-19 pandemic, skepticism lingered around the quality of digital and remote education. One of the biggest challenges of digital education is the lack of face-to-face interactions between students and their instructors, which creates a sense of isolation and lack of social support. Creating a sense of community and belonging is an important aspect in any learning experience. This social dimension, i.e., the ability to share and engage with others, is the basis of our ability to learn. Learning is a dynamic process that requires interaction with others, whether collaboratively and/or competitively, to test knowledge, manipulate information, receive feedback, enhance initiative, and contribute to meaning. This is also important in building a sense of motivation and satisfaction. However, technical difficulties, such as poor internet connectivity or software, and the lack of technical equipment can also lower the quality of online education by disrupting the learning flow. These issues are not limited to the students but also concern the instructor, making teaching more tedious.

Despite these challenges, higher education institutions have been working to improve the quality of digital education. For example, they are

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[2] *Biologist, Professor and Chancellor of University of Petra, Jordan.*
[3] *Department of Biology, American University of Beirut, Lebanon.*

offering teachers professional development programs in online learning, investing in technology and infrastructure to improve online learning experiences, and providing support to students. Today, digital education is becoming increasingly popular, as more and more learners are opting for online courses or programs, and entirely online degrees have become more popular and prominent. Although digital education has become more normalized, students are still wary of enrolling in an online education program as they worry it might impact their chances of finding a job once they complete their education. This is one of the most common drawbacks of online degrees as they can be perceived as less valuable or respectable than traditional on-campus programs. Several surveys have shown that managers are still not entirely positive about online education and hiring employees with an entirely online education background. In fact, one of the main concerns of Arab students regarding digital learning is the lack of accreditation by Arab governments and the fact that online degrees are not widely recognized by employers. However, these students feel that they are not sufficiently prepared to enter the labor market with just a traditional education, and are increasingly seeking online courses, mostly short courses, to complement their learning journey and acquire additional skills and knowledge. As such, they would prefer to enroll in short courses as opposed to full programs or degrees.

The pandemic may have changed attitudes toward the perceived value of digital education and may have stimulated its broader acceptance. With technology also advancing, employers recognize the need to re-think this mindset. As the digital education market is growing and maturing, the public perception is also shifting. Actually, it is no longer uncommon for employees to work online, as the workplace is becoming more flexible and agile. And the idea that work is judged by the number of hours in a day is also shifting. The same goes for online education. As learners are starting to value online education, employers are also following suit. Although data on the perception of online education by Arab employers is still scarce, it seems they are becoming open to online education and mostly have no issue hiring students with online credentials, as long as it is from an accredited and reputable institution. The reputation of the online degree therefore hinges more on the reputation of the institution, its legitimacy and accreditation status. Another condition that contributes to the legitimacy and high quality of online learning is the recognition of online qualifications by governments and flexible credit-transfer policies.

But how do we judge the quality of online education? Who decides how it is defined? One cannot provide an answer that tallies with everyone across the board. For instance, online learning is more likely to be appealing to working professionals and parents, as it allows for more flexibility and accessibility than traditional on-campus education, whereas novice learners and young students are more likely to prefer in-person education. Therefore, this should be the basis for judging the mode of course delivery: comparing online versus in-person learning is a relative matter and subject to the learner's needs. "Moving toward online learning is part and parcel of better understanding who are our students, where are they, what are we offering and how well does it respond to their needs?", says Rick Staisloff, founder and senior partner of a higher education consulting firm focused on sustainable business models. An important question in judging the benefit of their learning journey is: how successful are they in entering the labor market?

But how is the quality of online education regulated? Although many argue that there aren't quality standards for online education, there are many studies that measure the quality and standards of teaching and learning in online education. Quality Matters (QM), an international steward of online education quality, has developed course-design standards that describe best practices and provides guidance for improving course quality, evaluating courses, and training faculty. According to QM, what contributes to the high quality of online education, in terms of student learning and satisfaction, is related to: (1) course overview and introduction; (2) learning objectives and competencies; (3) assessment tools and measurement; (4) instructional material; (5) course activities and learner interactions; (5) course technology; (6) learner support; (7) accessibility and usability. These are essential components of a high-quality online learning system. Monitoring and regulating is surely a complex problem that is not limited to online learning.

CLIMATE CHANGE*

Abdullah Al Musa
Secretary General
Higher Council for Science and Technology (HCST)

Further to the UFM Regional Platform in Research and Innovation meeting in June 2020, UFM gathered a team of experts representing both North and South shores of the Mediterranean.

For climate change, the experts identified 3 roadmaps namely:
1 .Water Scarcity.
2 .Sustainable Agriculture.
3. Biodiversity.

The Mediterranean Region is warming 20% faster than the world resulting on negative impact on water availability where precipitation is expected to be reduced by 10-15 % at 1°C Global warming and up to 30% at 2°C warming. The sea water surface has risen at 6cm/ 2 decades with elevated water temperature by 0.4°C/ decade coupled with increasing water acidity endangering the marine ecosystems. The coastal zones face risk of soil erosion and salty water may leak to nearby aquifers.

The already fragile ecosystems specially in the Southern and Eastern Mediterranean will be exposed to intensive pressure due to some intrinsic characteristics of their already overexploited natural resources, and their insufficient technical capacity and financial capability to effect large scale mitigation and adaptation programs .

The drivers of Climate change in the Region include agricultural intensification ,pollution, decreasing precipitation, declining biodiversity, population growth and Urbanization .

1. Water Scarcity
As early as 2050, the World Health Organization estimates that half of the world's population will be living in water stress areas .

In the Mediterranean Region climate change is expected to incite more than double extreme summer low flow events by 2050 with negative connotations with regard to water supply, water quality and ecosystems. Climate change is expected to exacerbate the Water related events (Floods and droughts); a situation that is mediated by warming and interruption of the water cycle. The declined rainfall will be sporadic, unpredictable and variable .

Addressing Water Scarcity is vital to help safeguard our livelihoods and maintain viable socioeconomic development. Management of water resources at different scales from Regional to national to homestead levels is needed. Locally a sound and fair management that take into consideration efficiency and productivity and provides fair and equitable access to water resource that integrate technical ,managerial, institutional, social and economic aspects among a range of actions and policies for allocating water among competing uses and users. At the regional level, the restriction of permanent flow from upstream riparian countries is exerting a harsh reality in the downstream countries which calls for urgent and needed regional cooperation and collaboration in research to make use of the collective and substantial regional knowledge to produce evidence-based solutions to tackle problems related to water resource management, water efficiency and water productivity.

Undertaking this collaborative approach can address the fragmented and often redundant efforts and can enhance understanding, technology transfer, knowledge sharing and capacity building.

2. Sustainable Agriculture
Agriculture both contributes to climate change and is affected by it. It seemed to be the most climate-vulnerable of all economic sectors. Agricultural practices and processes can result in significant amounts of methane and nitrous oxides, two important GHGs being released, contributing a significant share of GHG emissions up to 17% directly and an additional 7-14% through land use changes .

Irrigated agriculture is under pressure to sustain productivity as availability of fresh water for irrigation decreases and use of low-quality wastewater increases . Irrigation demands in the region are projected to increase by 22-74%. At the same time productivity of rain-fed farming system is low because of poor farming management practices, high seasonal rainfall variation, increasing frequency of droughts and heat waves specially during the growing season .

Sustainable agriculture could save large amount of water. In some hydroponic agriculture saving could be as high as 90% .

* *UfM – Regional Stakeholders Meeting Towards Co-creation of a UfM Knowledge and Communication Workshop and UfM Stakeholders Platform on Research and Innovation (R&I), Barcelona, 2nd October, 2023.*

Efficiency of sustainable agriculture is mediated by adopting appropriate farming systems that employ environmentally sound cultural practices, that range from appropriate cropping pattern, irrigation scheduling, drought tolerant varieties and applying timely adequate fertilizers and pesticides.

To combat the negative impact of climate change on the agricultural sector, research and innovation must be supported to introduce and investigate the appropriate resilient farming systems and to enhance technology transfer of sustainable agricultural systems. This is optimally executed by regional collaborative and cooperative research, technology transfer, and capacity building .

3. Biodiversity

Biodiversity is vital to maintain sustainability of natural resources, through conferring productivity, resilience, stability, adaptability and reducing risk and uncertainties to ecosystems. It plays a compensatory role whenever ecosystem experience disturbance. Its various functional groups and traits could play a complementary role in the ecosystem productivity process .

Biodiversity is negatively impacted by climate change through scarcity of water, heat waves and occurrence of droughts, flash floods and fire. The impact is exacerbated by the anthropogenic activities such as land use and urbanization.

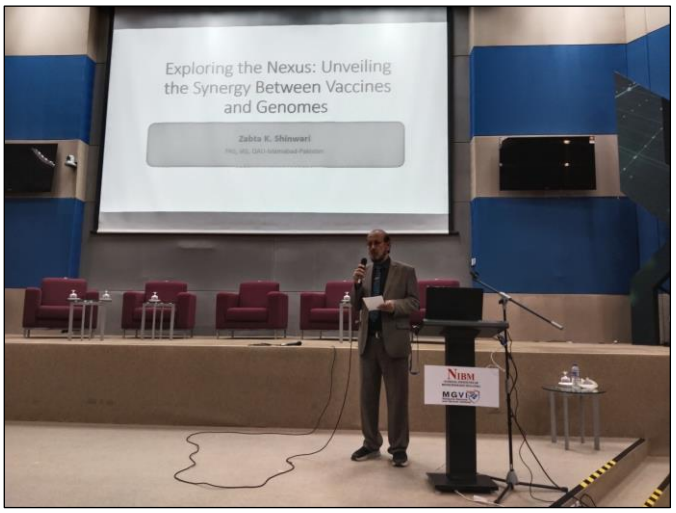
When land use is not controlled by proper guidelines, as the case may be in Southern and Eastern Mediterranean Countries (SEMCs), it may lead to fragmentation that jeopardizes the continuity of ecosystems and agricultural land becomes target for urbanization encroachment. Land use change may increase GHG emissions and decrease CO_2 sequestration by range lands and forest ecosystems through intentional man-induced fire, clearance of land for cultivation, cutting trees for firewood and rangeland overgrazing.

Image source: https://ufmsecretariat.org/science-diplomacy-conference-2023/

RECOMMENDATIONS FOR ENHANCING REGIONAL COLLABORATION IN SCIENCE DEVELOPMENT

Zabta Shinwari
Vice President, Islamic World Academy of Sciences

Introduction: During my recent presentation in Malaysia on **"Exploring the Nexus: Unveiling the Synergy Between Vaccines and Genomes"** in *Malaysia Genome and Vaccine Institute under the National Institutes of Biotechnology, Malaysia*, I had an interaction with senior management and academia and we discussed the role of neighboring countries in contributing to the development of science under the IAS, several key recommendations emerged from the discussions and insights gathered from experts and stakeholders. These recommendations aim to foster stronger collaborations, knowledge exchange, and resource-sharing among neighboring countries in the pursuit of scientific advancement.



Establish a Regional Science Network:

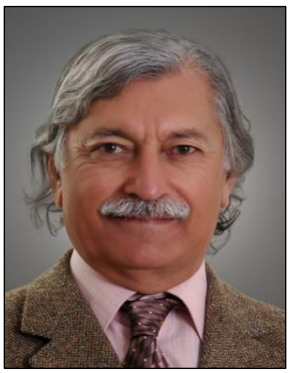
- Create a regional consortium or network of science institutions, universities, and academies from neighboring countries. This network can facilitate communication, collaboration, and resource-sharing in the field of science.
- Develop a centralized platform or portal to share research findings, scientific resources, and opportunities for collaboration among member institutions.
- **Donation of Obsolete Equipment:**
  - Encourage countries with more advanced scientific infrastructure to donate obsolete or surplus laboratory equipment to their neighboring countries. This will help resource-constrained institutions upgrade their facilities and conduct more advanced research.

- Facilitate the process of equipment donation through bilateral agreements and partnerships to ensure efficient transfer and proper maintenance.

- **Exchange of Faculty and Researchers:**
  - Promote the exchange of faculty, researchers, and students among neighboring countries. Establish joint research programs, sabbatical opportunities, and scholarships to facilitate cross-border mobility.
  - Develop streamlined visa and work permit processes to ease the movement of scientific personnel, making it more attractive for experts to engage in cross-border collaborations.
- **Joint Marketing of Traditional Knowledge-Based Products:**
  - Identify and document traditional knowledge-based products and practices unique to each country in the region. Collaborate on marketing and commercializing these products globally, while ensuring fair and equitable benefits for local communities.
  - Establish a regional brand or certification system to signify the authenticity and quality of traditional knowledge-based products, which can enhance their marketability.
- **Cross-Border Research Projects:**
  - Encourage joint research projects across borders to address regional challenges. Focus on areas such as environmental conservation, public health, and sustainable agriculture that require collective efforts.
  - Seek funding opportunities from regional and international organizations to support collaborative research initiatives.
- **Capacity Building and Training:**
  - Organize workshops, seminars, and training programs on cutting-edge scientific techniques and methodologies. These programs can be hosted on a rotational basis by member institutions to ensure skill development across the region.
  - Establish a mentorship program to connect experienced scientists with early-career researchers, promoting knowledge transfer and skill development.
- **Regional Scientific Conferences and Symposia:**
  - Host regular regional scientific conferences and symposia to provide a platform for scientists, researchers, and academicians to share their findings, foster collaborations, and exchange ideas.
  - Rotate the hosting of these events among member countries to promote inclusivity and regional integration.
- **Advocacy and Policy Coordination:**
  - Collaborate on advocating for science funding and policy development at the regional level. Lobby for policies that promote scientific research, innovation, and collaboration among neighboring countries.
  - Create a regional science policy coordination committee to ensure alignment and coherence in science-related policies and regulations.
- **Conclusion:**
  - These recommendations aim to strengthen regional collaboration in the field of science and harness the collective potential of neighboring countries. By working together on research, resource-sharing, and knowledge exchange, these nations can collectively advance their scientific capabilities and contribute to the broader global scientific community. It is essential to establish strong institutional frameworks and foster a culture of cooperation to realize the full potential of these recommendations.

PROF. QASIM JAN FIAS APPOINTED MEMBER OF THE PROVINCIAL INTERIM CABINET OF KHYBER PAKHTUNKHWA (KP)

Prof. Dr. M. Qasim Jan, Fellow Pakistan Academy of Sciences (PAS), Fellow, Islamic World Academy of Sciences (IAS), Fellow, The World Academy of Sciences (TWAS) has been Honoured with Prestigious Appointment as Member of the Provincial Interim Cabinet of Khyber Pakhtunkhwa (KP) on Saturday 18 August, 2023.



It is indeed a matter of immense pride and honour for the Pakistan Academy of Sciences (PAS) to announce that Prof. Dr. Muhammad Qasim Jan, Fellow, PAS and distinguished National Professor (Emeritus), University of Peshawar has sworn in on 18 August, 2023 as a member of the provincial interim cabinet of Khyber Pakhtunkhwa (KP) on Saturday. He is amongst one of the new 12-member caretaker cabinet, comprising nine ministers and two advisers and a special assistant. Governor Khyber Pakhtunkhwa, Ghulam Ali administered the oath in a ceremony held at the Governor House which was attended by the KP caretaker Chief Minister, Mohammad Azam Khan and other distinguished guests and officials from KP.

It is noteworthy to mention with pride that Prof. Dr. Qasim Jan has served as former President Pakistan Academy of Sciences (PAS). His prestigious appointment as Member of the Provincial Interim Cabinet of Khyber in fact speaks of the recognition of his executive management and meritorious achievements & services for the benefit of science and education in this country. Dr. Qasim Jan obtained his MS (Oregon, USA) and PhD (London, UK) degrees and is worldwide known for his extensive investigations of Creto-Tertiary island arc terrains in Kohistan Himalaya, Balochistan, and Neoproterozoic granitoids of Pakistan. He served as a distinguished Professor of Geology at the University of Peshawar for a long time before his appointment as Vice Chancellor of the same University. He is author/editor of hundreds of papers and books and has the prestige of being Fellow & Member of several academies and professional bodies, including the Pakistan Academy of Sciences (PAS), Islamic World Academy of Sciences (TWAS) and Mineralogical Society London. He has held several important positions nationally and internationally, including Vice Chancellor of three universities in Pakistan. His honors include gold medals from PAS, Distinguished Scientist of the Year Award (National Book Foundation & PAS), Life-time Achievement Award (Assoc. Petrol. Geologists of PK), ISESCO Science Prize, and Hon. DSc from King's College London and University of Leicester.

In recognition of his outstanding contributions in the field of Geological Sciences, the Government of Pakistan conferred upon him the prestigious Civil Awards of Hilal-i-Imtiaz (2010), Sitara-i-Imtiaz (1999), and Tamgha-i-Imtiaz (1993). The Pakistan Academy of Sciences wishes Prof. Dr. M. Qasim Jan many more awards and continued success in his endeavours to serve this country.

News source: https://www.paspk.org/news/prof-dr-m-qasim-jan-fellow-pas-has-been-honoured-with-prestigious-appointment-as-member-of-the-provincial-interim-cabinet-of-khyber-pakhtunkhwa-kp-on-saturday-18-august-2023/

PROF. DR. KAUSAR ABDULLAH MALIK TAKES OATH AS CARETAKER FEDERAL MINISTER FOR NATIONAL FOOD SECURITY AND RESEARCH

Prof. Dr. Kausar Abdullah Malik (H.I., S.I, T.I), Fellow, Pakistan Academy of Sciences (PAS) and Fellow, The World Academy of Sciences (TWAS), takes Oath as Caretaker Federal Minister for National Food Security and Research on Monday 11 September, 2023.

It is indeed a matter of great honour and immense pride for the Pakistan Academy of Sciences (PAS) to announce that Prof. Dr. Kausar Abdullah Malik, Fellow, PAS (elected 1995) has taken oath as Caretaker Federal Minister for National Food Security and Research on 11 September, 2023. The President of the Islamic Republic of Pakistan, Dr. Arif Alvi administered him the oath in a ceremony held at the

Aiwan-e-Sadr, Islamabad. His prestigious appointment as Federal Minister for National Food Security and Research in fact speaks of the recognition of his executive management and meritorious achievements & services for the benefit of Agriculture, Biotechnology, Genetic Engineering and Life Sciences in this country.

Prof. Dr. Kausar Abdullah Malik obtained his B.Sc. (Hon's) degree in 1964 and M.Sc. (Hon's) Degree in 1965 from Government College-Lahore, University of The Punjab, Pakistan and his PhD in 1970 from University of Aston, Birmingham, UK. Dr. Kausar Abdullah Malik is worldwide known for his extensive investigations and excellence in the domain of Biotechnology, Genetic Engineering and Life Sciences. At the platform of Pakistan Academy of Sciences, he has published several articles and policy documents in the domain of Life Sciences and Bioenergy. He is also serving as Distinguished National Professor, Department of Biological Sciences, F.C. College, Lahore.

Dr. Kausar Abdullah Malik has also been a Fellow of the World Academy of Sciences (TWAS) since 1997; Alexander Von Humboldt Fellow (1974-1975), Member Board of Trustees, International Foundation for Sciences, Stockholm, Sweden (1997 to date); Board of Trustees WWF-Pakistan (2004-2010); and several other distinctions. He is also Life Time Member of the Pakistan Nuclear Society.

Dr. Malik has held several important positions nationally and internationally, including Vice Chairman-Punjab Agriculture, Food and Drug Authority since 2016; Member, Food and Agriculture, Planning Commission, Government of Pakistan (2006-2008); Member, Biosciences and Administration, Pakistan Atomic Energy Commission (2001-2006; Honorary Secretary, National Commission on Biotechnology (2001-2008); Chairman Pakistan Agricultural Research Council (PARC), Islamabad (1998-2001); Director General, National Institute of Biotechnology and Genetic Engineering and Nuclear Institute for Agriculture and Biology (NIAB), Faisalabad (1997-1998); as well as Visiting Scientist at the Institute of Biophysics, University of Hanover, Germany (1986).

Dr. Malik's prominent honors include ISESCO Prize in Biology (1997); Gold Medals from Pakistan Academy of Sciences (1993); Certificate of Commendation for Scientific Research in Biology, Government of Pakistan (1998); and Distinguished National Professor, HEC (2006 - to date). In recognition of his outstanding contributions in the field of Agricultural Sciences, Biotechnology and Genetic Engineering, the Government of Pakistan conferred upon him the prestigious Civil Awards of Hilal-i-Imtiaz (2004), Sitara-i-Imtiaz (1998), and Tamgha-i-Imtiaz (1988).

The Pakistan Academy of Sciences wishes Dr. Kausar Abdullah Malik many more awards and continued success in his future endeavors to serve this country.

News source: https://www.paspk.org/news/prof-dr-kausar-abdullah-malik-h-i-s-i-t-i-fellow-pas-takes-oath-as-caretaker-federal-minister-for-national-food-security-and-research-on-monday-11-september-2023/

The new issue of the Medical Journal of the Islamic World Academy of Sciences (*Volume 30 Issue 1 – 2023*), has been published online. To access all issues of the Medical Journal, please visit:
https://medicaljournal-ias.org/

FIRST EDITION OF THE ACHEP CONFERENCE ON HIGH-ENERGY PHYSICS ON THE AFRICAN CONTINENT

The first edition of the African Conference on High-Energy Physics was held between 23 and 27 October 2023 in Morocco, organized by the Rabat-Salé-Kenitra regional university consortium. ACHEP is a series of biennial international conferences focused on high-energy physics, held at various institutes in Africa.
The Islamic World Academy of Sciences (IAS) was among the supporting partner organizations.

Organized under the High Patronage of His Majesty King Mohammed VI and with the approval of the International Union of Pure and Applied Physics (IUPAP), this conference promised to be a landmark moment in the field of science, bringing together internationally renowned researchers and young talents from Africa and the rest of the world.

This initiative highlighted recent advances in fields such as particle physics, nuclear physics, particle accelerators, and many others with a focus on topics such as Higgs boson research, dark matter, dark energy and other related fields.

A highlight was a panel discussion on the prospects for future scientific collaborations with the African continent, with the aim of increasing the continent's participation in high-energy physics research. Several heads of institutes were invited to participate in this round table, highlighting the importance of this event for the promotion of particle physics research in Africa.

The conference was an exceptional platform dedicated to scientific cooperation aimed at promoting research in the field of high energy in Africa. Organized with the full support of the Ministry of Higher Education, Scientific Research and Innovation, Mohammed V University in Rabat, Ibn Tofail University, as well as the National Center for Scientific and Technical Research and the Hassan II Academy of Sciences and Technology, the event was an ideal occasion to discuss the possibilities of future cooperation between African researchers and their counterparts in the rest of the world in these important global fields.

On this occasion, the President of Mohammed V University in Rabat, Farid El Bacha, stressed that this scientific meeting, the first of its kind in Africa, confirms the foreign policy of the Kingdom of Morocco, which is based on a continent in solidarity for social development and peace. Innovation requires freedom, dialogue, exchange and cooperation, he said, calling on young Moroccan researchers in the field to take advantage of these meetings.

In his speech, Mr. Al-Basha added that the university is working to create a new dynamic in cooperation with the Ministry of Higher Education, Scientific Research and Innovation, within the framework of the new generation of doctors, explaining that the common goal is to raise the level of the challenge to innovation.

The president of Ibn Tofail University, Mohamed Al Arabi Karkab, said that the Rabat-Salé-Kenitra region has the finest specialists in the field, whether at the regional or national level, adding that the university is always involved in the success of such major meetings.

For his part, Hamid Bouabid, Acting Director of the Directorate of Scientific Research and Innovation at the Ministry of Higher Education, Scientific Research and Innovation, explained that the field of physics is a priority in the National Charter to accelerate the transformation of the higher education, scientific research and innovation system 2030. He said that the ministry is in the process of establishing an institute on nuclear science and its applications, and for this purpose a budget has been allocated, he added that this first version would establish the parameters of cooperation at the level of the Rabat-Kenitra pole.

The program of this event included round tables and workshops, as well as presentations on High Energy Physics that enabled participants to engage in rich scientific discussions.

News source: https://aldar.ma/335636.html

YOUNG SCIENTISTS FESTIVAL (YSF) ORGANIZED BY: JAMILI SCIENCE AND TECHNOLOGY FOUNDATION

Organizational Chart

The Young Scientists Festival referred as **YSF** is a scientific event that conducted with the official endorsement of the Ministry of Science, Research and Technology (MSRT) and is organized by the Jamili Science and Technology Foundation, a non-governmental organization that is funded by industry and scientifically managed by the University of Tehran. The foundation also manages a UNESCO club in Iran which is called the "Basic Science and Technology UNESCO Club".

Vision of the YSF

The Young Scientists Festival has been annually held since 2017 which aims to support young scientists in transforming their ideas in basic science into viable businesses and products. The festival provides a platform for showcasing innovation, fostering entrepreneurship, and encouraging collaboration between academia and industry.

Mission of the YSF

The Young Scientists Festival organizes science popularization events to raise awareness about the impact of basic science on sustainable development and supports projects on applied basic science. This festival also aims to enhance the festival's impact by promoting internationalization and collaboration between Iranian and non-Iranian scientists.

Calendar of the festival

Registration Period: July – September
Evaluation and Selection Process: October-November
Closing ceremony: December

Supporting fields of the festival

Chemistry, Geology, Physics, Biology, Mathematics and Computer Science and Artificial intelligence

Modules of the applications

- Idea section of the festival: Individual researchers with complementary skills, consist of teams with 2 to 6 members. They can also present practical and innovative ideas stemming from various fields of basic sciences.
- Start-up Section: This section welcomes new start-up teams that have been active for less than 42 months and each team can consist of 3 to 6 members.

Selection Criteria and Evaluation Process

The evaluation criteria include feasibility for production and commercialization, environmental friendliness, safety, compatibility with SDG goals, and potential economic value.

Target groups of the festival

Academic and non-academic researchers from all disciplines. However, the principal investigator of the team must be between 18 to 44 years old. There is no age limitation for the team members of the festival applicants.

Types of support

- Financial: Product development grant.
- Educational: Training grant for the team members.

Teams with international members will receive 20% higher development grants.

Contact Information

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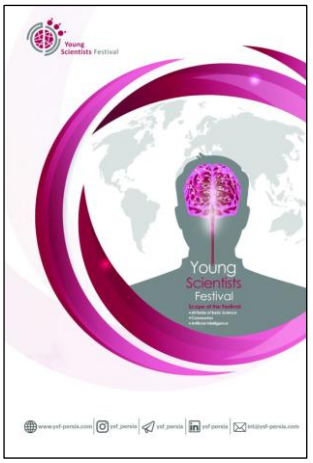
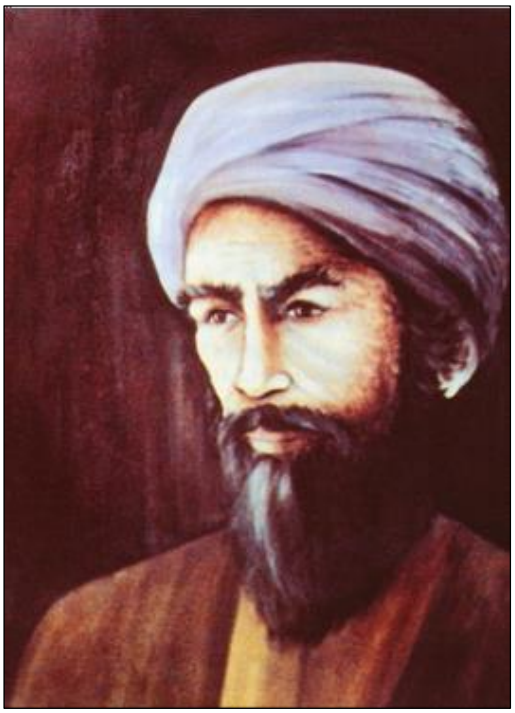


To view the YSF Brochure visit:
https://ysf-persia.com/en/wp-content/uploads/2022/05/ysfestival.pdf /
https://ysf-persia.com/en/wp-content/uploads/2022/08/YSF-PERSIA.pdf

IBN AL-BITAR* (DIED 1248 AD)

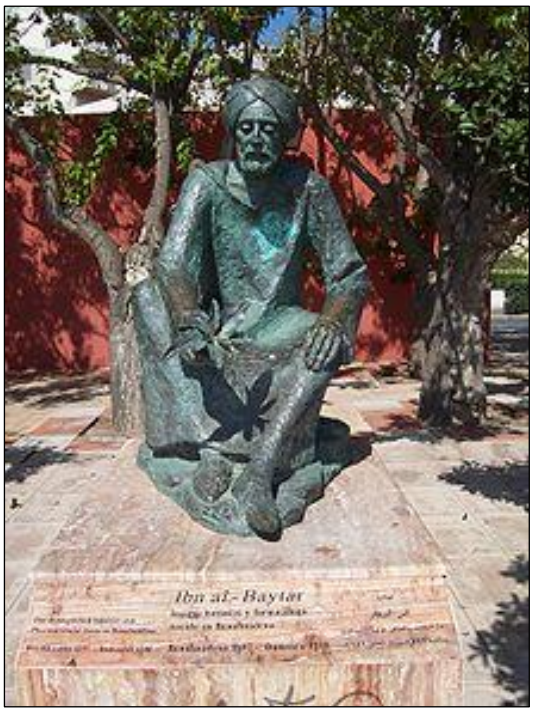


Abu Muhammad Abdullah Ibn Ahmad Ibn al-Bitar Dhiya al-Din al-Malaqi was one of the greatest scientists of Muslim Spain and was the greatest botanist and pharmacist of the Middle Ages. He was born in the Spanish city of Malaqa (Malaga) towards the end of the twelfth century. He learned botany from Abu al-Abbas al-Nabati, a learned botanist, with whom he started collecting plants in and around Spain. In 1219 he left Spain on a plant-collecting expedition and travelled along the northern coast of Africa as far as Asia Minor. The exact modes of his travel (whether by land or sea) are not known, but the major stations he visited include Bouaghia, Constantine, Tunis, Tripoli, Barqa and Adalia. After 1224, he entered the service of al-Kamil, the Egyptian Governor, and was appointed chief herbalist. In 1227, al-Kamil extended his domination to Damascus, and Ibn al-Bitar accompanied him there which provided him an opportunity to collect plants from stations located there. He died in Damascus in 1248.

Ibn Bitar's major contribution, *Kitab al-Jami fi al-Adwiya al-Mufrada,* is one of the greatest botanical compilations dealing with medicinal plants in Arabic. It enjoyed a high status among botanists up to the sixteenth century and is a systematic work that embodies earlier works, with due criticism, and adds a great part of original contribution. The encyclopaedia comprises some 1,400 different items, largely medicinal plants and vegetables, of which about 200 plants were *not known* earlier. The book refers to the work of some 150 authors mostly Arab, and it also quotes about 20 early Greek scientists. It was translated into Latin and published in 1758.

His second monumental treatise *Kitab al-Mughni fi al-Adwiya al-Mufrada* is an encyclopaedia of medicine. The drugs are listed in accordance with their therapeutical value. Thus, its 20 different chapters deal with the plants bearing significance to diseases of head, ear, eye, etc. On surgical issues, he frequently quoted the famous Muslim surgeon, Abul Qasim Zahrawi. Besides Arabic, Bitar, had given the Greek and Latin names of the plants, thus facilitating transfer of knowledge.

Ibn Bitar's contributions are characterised by observation, analysis and classification and have exerted a profound influence on Eastern as well as Western botany and medicine. Though the *Jami* was translated/published late in the western languages as mentioned above, yet many scientists had earlier studied various parts of the book and made several references to it.



Statue of Ibn al-Bayṭār in Benalmádena Costa, 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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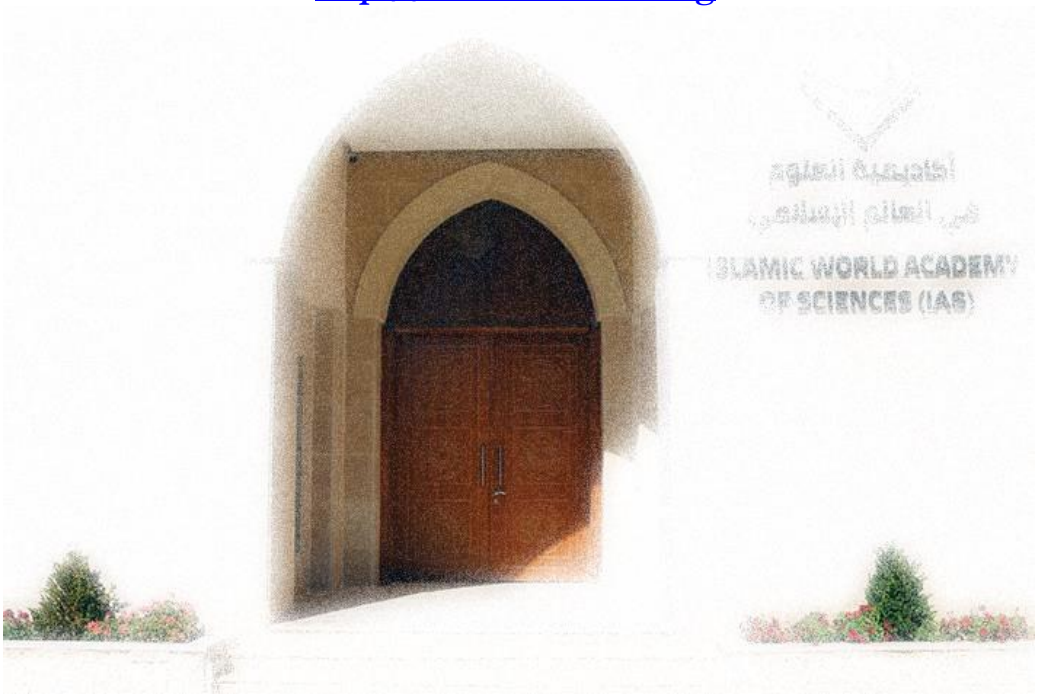

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