

What's New in this Issue of the Newsletter?

Somalia! Over 30 years later, the socio-political turmoil of the 1990s has left deep scars on the country's physics community. There is no longer a physics curriculum in any of the country's universities and no physics department in any of the faculties. Physics is only offered as a minor subject within the Faculty of Education in some universities. This is the summary of our first contact with local physicists, detailed in the columns of your newsletter.

Elsewhere, from the banks of the Congo River to the Ébrié Lagoon, young physics enthusiasts are keeping hope alive and proposing solutions to inspire vocations. Such is the case of the sickle-cell Ivorian patient who became a space physicist – the young astronomer whose vital energy results from a constant competition between his dreaded illness, his passion for physics, and the transfer of knowledge to younger people.

Staying with the youth theme, we'll introduce you to some of the young Africans who are achieving excellence around the world. We'll be highlighting the key role played by the African School of Physics (ASP), a biannual capacity-building initiative in high energy physics for students across the continent, which has served as a trigger and had a major impact on their career trajectories. We extend our warmest congratulations to the promoters of the ASP. In the same vein, we invite you to appreciate the feats of three tireless capacity builders and physics advocates based in the Congo Basin and in Morocco. We close the chapter on capacity building with a detailed report of the recent African School on Electronic Structure Methods and Applications (ASESMA), the first post-COVID edition of this biannual event held in Kigali last June.

We then take you to the Western Desert of Egypt, where Egyptian geophysicists working on a national project to build a new desert city are using geophysical tools to explore and make good use of groundwater, i.e., to optimize site management and resource distribution. Water is a scarce commodity in arid lands and African physicists are making their mark with pragmatic solutions. A physicist from Burkina Faso ventures into the Saharo-Sahelian strip, where he is facilitating the conquest of "blue gold" in several of the sub-region's counties and villages. This solar specialist and his team use photovoltaics to turn the sun's rays into drinking water.

In southern Africa, Botswana is being tested as a potential place for innovative solutions and products within Africa for broader expansion across the continent. To this end, we present a succinct report of the recent visit of the founding president of Advanced Fluidics, a US-based high-tech company.

AUTHOR

Stephane Kenmoe,
*Universität Duisburg-Essen, Essen,
Germany*

We conclude with an interview granted to us by the Editor-in-Chief of Nature Africa. In this interview, we discussed the publication's establishment and the motivation behind the project. It was the occasion to pay tribute to Mohammed Yahia, its leading architect who recently passed away.

Share and Contribute News to the Newsletter

We encourage you to forward this newsletter to colleagues you think may be interested in hearing about the latest developments in physics in Africa. Subscriptions to the newsletter are free and open to both Africans and non-Africans. To subscribe go to <https://go.aps.org/africanphysics>.

Do you have a meeting, conference, school, award, etc. you would like posted? Do you have any other news or articles you would like to share with your colleagues? Click [here](#) for more information on how to submit this information to the newsletter and share it with colleagues across the African continent.

Thoughts and Mileage

Professor Albert Kazadi has made significant contributions to the field of nanomaterials systems. As a Department Secretary and Chair at the University of Kinshasa, in the Democratic Republic of Congo (DRC), he was instrumental in training the next generation of students, researchers, and colleagues who have gone on to make significant contributions in academia and industry. In this article, he touches on the life and challenges of being a physicist in the DRC.



Figure 1: The author. (Photo Credit: Albert Kazadi)

"Physics is a fundamental science essential to the understanding of almost all branches of science and technology."

Being a Congolese physicist in the Democratic Republic of Congo (DRC) is not an easy task – it involves a lot of self-sacrifice and work to become one. Once achieved, there are a lot of challenges: research obstacles due to limited resources and teaching challenges due to financial constraints, to name a few. Despite all this, we are here to confront all these challenges, committed to never betraying the DRC. Physics calls us to defy all the challenges we face today to develop not only our country, but also the broader African continent and the global community. [1]

Physics is a fundamental science essential to the understanding of almost all branches of science and technology. It is interesting to note that the ideas and concepts of physics also encompass behavioral science. We cannot simply study physics by the book – we must attempt questions from workbooks and practice a lot of exercises. Only then will we be able to answer various types of questions, regardless of their complexity.

AUTHOR

Albert Kazadi,
*Department of Physics, University
of Kinshasa, Democratic Republic
of Congo*

CONTRIBUTING EDITOR

Raïssa Malu

"Being a physicist is exciting because physics is both beautiful and elegant. It leads us not only to mental development, but also physical."

A keen interest in studying physics plays a vital role in achieving success in this subject. Most people dislike the subject as it is far more complicated compared to other science subjects, causing many to forgo efforts to master it. Finally, it must be noted that the entire domain of physics is based on observations and experiments, without which a theory does not gain legitimacy in this field. [2]

Physics is a science, and as science, it operates according to the scientific method. This method relies solely on reason, logic, and experimental evidence to distinguish scientific accuracy from fallacy. Scientists do not merely rely on beliefs; they continually subject concepts to testing until satisfied. The assertion of a "prominent scientist" alone does not signify scientific validity. Unless a discovery is consistently established across diverse laboratories, by various individuals, and at varying time points, or the same theoretical result is derived by clear use of established rules, we do not accept it as a legitimate scientific discovery.

The genuine strength of sciences like physics lies in the fact that it continually challenges itself. Furthermore, it is widely held that the laws of physics remain uniform across locations. This explains why experiments conducted by scientists in different countries, irrespective of their religion or race, have always yielded the same results, contingent on their honest and accurate execution. It is also our belief that the laws of physics today are the same as they were in the past. The evidence, derived from the light that left distant stars billions of years ago, strongly indicates that the laws operating at that time were no different than those today. The spectra of different elements then and now are impossible to tell apart, even though physicists have examined this very carefully.

What is the future of physics in the DRC?

We believe that the future of this discipline in the DRC and across Africa will be radiant because physics is the quintessential science of nature, encompassing disciplines such as mathematics, biology, and chemistry.

References:

- [1] Dr. Rajesh Kumar et al., PGT-Physics, State Council of Educational Research & Training, New Delhi, 2012
- [2] Dr. Pervez Hoodbhoy, An Introduction to Physics, Virtual University Physics 101

Anyone who wishes to develop our world must emphasize physics, if not the foundational sciences, to the greatest extent possible.

Being a physicist is exciting because physics is both beautiful and elegant. It leads us not only to mental development, but also physical. The contacts I have had with scientists around the world, especially those of iThemba Laboratory for Accelerator Based Sciences - National Research Foundation in Cape Town, South Africa (iThemba LABS-NRF), revealed to me that this research center is the training matrix of many scientists both from Africa and other parts of the world.

What are your thoughts on potential future research topics in physics for Africa?

My current interests include:

- Physics of Nanostructured Magnetic Materials (Nanowires, Multilayered Thin Nanofilms, etc.) and Bio-nanomaterials (Metals Oxide Nanoparticles (MONPs) by biosynthesis of extracts of plants)
- Plasma and Space Physics

The DRC has an immense array of fauna and flora which is not yet exploited for scientific advancement as we believe it could be. This is why the physics community in our country is interested in nanomaterials obtained from plant extracts (such as roots, seeds, flowers, etc.) for applications in medicine, pharmacy, photovoltaic cells, and beyond. The Congolese soil and subsoil is rich in minerals that could be exploited for the production of batteries (lithium, cobalt, copper, etc.), guaranteeing a sustainable solution for renewable energy solutions. The DRC presents a viable solution to contemporary problems, allowing the potential to resorb certain diseases deemed incurable by European medicine and even traditional medicine. Additionally, we envision the realm of space and plasma physics as capable of addressing problems such as border control by GPS (GNSS), energy production (thermonuclear, photovoltaic), and more.

In a few words, this is what we think of physics in the Democratic Republic of Congo and elsewhere.



My Path to My Passion

I am Masevosi Esther Darole, a physics graduate from the University of Kinshasa in the Democratic Republic of Congo. My passion for technology, specifically energy, pushed me to study physics. The challenges of this field have not deterred me; instead, the support I've received has fueled my determination to advance in this vision. Grateful for the assistance I've obtained and continue to receive, I have also been motivated to extend my help to cadets through educational projects, particularly in science.



"During my academic career as a humanities student, I was confronted with the reality that the environment was very male-dominated. I was often the only female or one of just two. Navigating this landscape was not easy, as I had to constantly prove that I was capable."

Figure 1: The author. (Photo Credit: The author)

I am Masevosi Esther Darole, the eldest daughter of my family, born in Butembo in 1998, a city in the North Kivu province. I pursued a curriculum focused on scientific humanities with a specialization in math and physics at the Collège Kambali Pie X in Butembo. My aptitude for mathematics and scientific illustration guided my choice, and most importantly, I sought to challenge myself with an option that intimidated the majority of my peers.

Having an interest in emerging technology, I aspired to pursue a technology-focused education at the university level. However, one day while watching television, I learned about a project to extract methane gas from Lake Kivu. The report featured an interview with a physicist who formed part of the project. This was the first time I was exposed to the realm of non-teaching physics, prompting me to swiftly conduct online research on what a physicist does. Having understood this, I made the decision to study physics. With technology, I didn't just want to master the techniques; I also desired to comprehend the basic principles behind it.

AUTHOR

Masevosi Esther Darole,
Department of Physics, University
of Kinshasa (UNIKIN), and
Medical Imaging Department,
Institut Supérieur des Techniques
Médicales (ISTM), Democratic
Republic of Congo (DRC)

CONTRIBUTING EDITOR

Raïssa Malu

"Yet, I maintained the motivation to keep going in this field."

However, in order for me to study physics, my parents had to agree. Gaining permission was not easy, as my mother preferred for me to study medicine or, at the very least, chemistry. Most of all, my mother did not understand my desire to study physics, as she believed it would lead me to a career as a physics teacher in the humanities – a role that is not well-paid in my country. On the other hand, my father agreed, as he recognized my proficiency in physics, mathematics, and chemistry, and also wanted his daughter to become a distinguished university professor. Ultimately, with the agreement of my parents, I was sent to Kinshasa, the capital city, which houses the sole physics department in the country at the University of Kinshasa (UNIKIN).

During my academic career as a humanities student, I was confronted with the reality that the environment was very male-dominated. I was often the only female or one of just two. Navigating this landscape was not easy, as I had to constantly prove that I was capable. Moreover, with those who were more skeptical, I had to prove my competence to earn the same respect as my male peers.

Yet, I maintained the motivation to keep going in this field. Foremost, I must acknowledge my friend and elder, Bénédicte Kalumbete, who preceded me by a year in the field of physics. She welcomed me and accompanied me on this journey.

Secondly, my studies have been accompanied and supported by Ms. Raïssa Malu, Director of Investing In People (IIP) and an international education consultant, who offered me the IIP and Makutano Undergraduate Scholarship to assist me in paying for my studies. Ms. Malu is a woman who deeply inspires and motivates me so much that I also want to guide my younger children to study science, especially physics. With her mentorship, I had the opportunity to participate in several educational projects – in 2020 during the COVID-19 pandemic, I formed part of a team that produced online educational content with video capsules where we explained physics to 7th and 8th grade students in basic education. [1]

Subsequently, from December 2022 until now, I have formed part of a group of teachers trained by the French Embassy in the MOOC project aimed at improving the level of knowledge of Congolese finalist students through digital platforms. Moreover, from February 2023 until now, I have been actively involved in training animators for the Science and Technology Week.

Thirdly, my physics instructors, particularly the late Professor Dr. Vincent Lukanda, helped shape my desire to embrace the option "medical physics" in the fourth year (L1). Additionally, Dr. Max Seke, the head of our department, sparked my interest in the field of material physics. This influence led me to focus my thesis topic on the "characterization of a granular system by FRX, FTIR, and making a local standardized sand EN NF 196-1." The aim of my research was to enhance our country's natural resources in order to develop a local standardized sand resource.

There are also significant figures in the field of physics who inspired me, such as the physicist Marie Curie, renowned for her work on radioactivity. This subject fascinates me so much that I aspire to further my studies in nuclear energy, hoping to not only harness this energy but also diverse energy modalities. My biggest dream is to power an entire city with emerging energy technology in order to facilitate life for citizens. To achieve this goal, I completed a three-month internship, from November 2022 to February 2023, at the Centre Régional d'Études Nucléaires de Kinshasa (Cren-k) within the physics department, where I received training in NDT (Non-Destructive Testing) and Radioisotope applications.

I also mention my two favorite books that have accompanied me since my first year: "La Physique pour les nuls" by Dominique Meier and "Physique" by Eugene Hecht. There are also several other interesting books on nuclear physics and quantum mechanics that I cannot list here. Not to be overlooked is my favorite television show since my humanities studies, "Ce n'est pas sorcier." These books and the program have served as an inspiration to me. In 2018, during the open house at the faculty of sciences at UNIKIN, I presented the prototype of a microscope in order to explain the importance of optics and Newtonian mechanics, showcasing how physics is applied in daily life.

"I finished my second cycle of physics with distinction..."

I finished my second cycle of physics with distinction, which allowed me to be retained as a teaching assistant in the physics department within the Faculty of Science and Technology at UNIKIN and also in the medical imaging department at the Institut Supérieur des Techniques Médicales (ISTM).

At this point in my journey, I am seeking a scholarship for graduate school in order to fulfill my dreams of serving my community in the field of energy. Additionally, I aim to become a university professor, becoming a source of pride for myself and my parents.



References:

[1] <https://youtu.be/UpgOf6DATDU> and <https://youtu.be/96xZfAktUcl>



Bernard M'Passi Mabiala: The Image of Capacity Building and Regional Integration in Central Africa

A profile on the physicist who impulses electronic structure methods and applications in Congo and in Central Africa.



M'Passi Mabiala
in his office at the
general
directorate of
higher education

(Photo Credit: M'Passi Mabiala)

Professor Bernard M'Passi Mabiala is a servant of science. He has sacrificed his career in order to give a face to Congolese physics. The physics school in Brazzaville, the capital of Congo, bears his signature. Several generations of African physicists have continuously benefited from the impetus he has given to computational condensed matter physics in Congo and the Central African sub-region.

From experimental physics to computational physics and renewable energies

At the end of September 1976, just after his scientific baccalaureate (entrance exam to university), Bernard M'Passi Mabiala took off for university studies in East Germany, precisely in Halle. Aware of the shortcomings in experimental training at secondary school level due to the lack of a suitable environment, poor equipment, and even the lack of appropriate practical laboratories in high schools and colleges, he opted for a master's degree ("Diplom" in Germany at the time) in experimental physics, despite his excellent theoretical predispositions.

**AUTHOR & CONTRIBUTING
EDITOR**

Stephane Kenmoe

"A visionary and builder at heart, he had clearly understood that one needs to complete the research cycle in order to establish a line of Congolese physicists capable of carrying out research and producing useful knowledge for science-based societal transformation."

Subsequently, he trained in experimental physics, and then more specifically in solid state physics with a specialization in surfaces and interfaces, at the Martin Luther University in Halle-Wittenberg, Germany. In his dissertation, he studied the ion sputtering of Cu-Ni alloys using Auger spectroscopy. Upon completing his training, he returned to Congo to assume a teaching assistant position at the Marien Ngouabi University in Brazzaville, a common practice at the time.

In fact, due to a lack of managers and the development needs of their countries, young African graduates, particularly those from Eastern European countries at the time of the two blocs, were obliged to return to their home countries following training in order to pass on the knowledge they had acquired to their communities.

Despite returning home, he had not lost sight of his intention to pursue a PhD thesis in the near future. A visionary and builder at heart, he had clearly understood that one needs to complete the research cycle in order to establish a line of Congolese physicists capable of carrying out research and producing useful knowledge for science-based societal transformation. It was a distant dream, but not impossible. A heavy calling, but a necessary one for a country like Congo, which is in full development. During his tenure as an assistant in the physics department in Brazzaville, a French university aid worker, impressed by his predispositions, skills, and passion for the scientific development of his country, recommended him for a PhD program in France.

This is how Bernard M'Passi Mabilia journeyed to Strasbourg, France, to continue his PhD studies through a sandwich program financed by the French Cooperation. Having already possessed an experimental background, he aspired to delve into the intricacies of matter and comprehend the first principles that govern physical phenomena. Consequently, he also studied theory during his doctoral program, focusing specifically on Density Functional Theory (DFT), which he used to examine the relaxation and magnetism of transition metal surfaces and interfaces. In 1996, he successfully obtained his PhD and returned to Congo.

In 1998, the Nobel Prize was awarded to Walter Kohn "for his development of the density-functional theory," aligning remarkably with Dr. M'Passi Mabilia's academic pursuits. (The Prize was also awarded that year to John A. Pople for "for his development of computational methods in quantum chemistry.") Upon his return to Congo, he became an Associate of the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, where he collaborated remotely with other DFT experts such as Dr. Salvador Meza Aguilar from Mexico, Dr. Alberto Debernardi from Italy, Dr. Claude Demangeat from France, and Professor Richard Martin from the USA. This collaborative effort effectively opened Congo to a network of international specialists in the field.

As a participant of the African Clean Energy Research Alliance (ACERA) network —which comprises the University of Leeds in the United Kingdom, the Dar es Salam Institute of Technology in Tanzania, Makerere University in Uganda, and Marien Ngouabi University in Congo with financial support from the Royal Society — his original theoretical research activities have evolved under his leadership. He has expanded his activities to include experimental physics, with a particular emphasis on renewable energies. Furthermore, he has initiated and coordinated master's and PhD training programs in the fields of materials science and energy. Within the Institut de la Recherche en Sciences Naturelles et Exactes (IRSEN), he helped establish research units in nanoscience and nanotechnologies, as well as in materials and energies.

Beyond Congo, sub-regional integration and the founding of CEPAMQ

Professor M'Passi Mabilia has undoubtedly made major contributions to the sub-regional integration of physicists in Central Africa. Noteworthy among these efforts was the hosting of two significant events in Brazzaville: an installment of the Regional African School for Electronic Structure Methods and Applications (RASESMA) and the second edition of Central African School for Electronic Structure Methods and Applications (CASESMA) in April 2023.



Another notable example of Professor M'Passi Mabiála's contributions include the co-founding of a center of excellence in physics in Central Africa. During his tenure at ICTP, where he was the first regular associate and then senior Congolese, he met Professor Moise Kwato from Cameroon. Together, they established the Centre for Atomic Molecular Physics and Quantum Optics (CEPAMQ) in Douala, Cameroon. CEPAMQ has effectively trained many young physicists from Congo, Cameroon, Chad, Central African Republic, Gabon, and beyond.

The Group of Numerical Simulations in Magnetism and Catalysis in Brazzaville

In the same vein, Professor M'Passi Mabiála established the Group of Numerical Simulations in Magnetism and Catalysis, in which the first local Congolese completed their PhD theses, thereby giving impetus to doctoral training in computational condensed matter physics in collaboration with CEPAMQ and ICTP through the sandwich program (STEP-Program). The laboratory's research interests include catalysis, magnetism, and 2D materials. The techniques applied include static DFT calculations, theoretical spectroscopy, and molecular dynamics in order to take account of temperature and approximate operando conditions and experimental observations.

The Brazzaville School of Physics has already achieved a compelling scientific output, which opens doors to computing resources, as is the case with supercomputers in South Africa and Italy. Professor M'Passi Mabiála remains optimistic about the possibility of hosting a supercomputer in Brazzaville.

"In the [foreseeable future], and within a well-thought-out framework, it's possible. Also, we need to count on collaboration, because even developed countries don't have all the equipment," he says.

Outlook

Today, Professor M'Passi Mabiála holds the position of General Director of Higher Education within the Ministry of Higher Education, Scientific Research, and Technological Innovation of Congo. Nevertheless, he continues to spare no effort. His aspiration is to establish a Congolese physics society in the near future. He believes that this endeavor will contribute enormously to bolstering research, federating efforts to organize science-focused events, and strengthening this pursuit.

He reflects upon a discussion that transpired several years ago among speakers at the 2006 APS March Meeting, specifically the Forum of International Physics (FIP) session on international physics, during which attendees discussed why it worked elsewhere and not in certain countries. All agreed that it was attributed to a problem of vision. Driven by this vision, Brazil began the trajectory to repatriate its scientists, channeling financial resources into research, and becoming a leader in several fields.

We hope that such a transformation will also occur in Congo. However, every society is bound by its own realities and pace, but Congo possesses a great visionary in Professor M'Passi Mabiála. We can look forward to a bright future, not only for Congo but for the entirety of Africa.



M'Passi Mabiála at the end of his teaching of a condensed matter physics course at the University of Science and Technology of Masuku in Franceville, Gabon.

(Photo Credit: M'Passi Mabiála)



The Path of a Young African Woman Toward Light Sources

How the African School of Physics and mentorship opportunities have been decisive in navigating my career in the field of physics.



(Photo Credit: Sanae Samsam)

Sanae Samsam at
the Physics
department of the
University of Milan

AUTHOR

Sanae Samsam,
*Istituto Nazionale di Fisica
Nucleare (INFN), Milano, Italy*

CONTRIBUTING EDITOR

Mounia Laassiri

Attending the African School of Physics (ASP) [1] in 2016 was a life-changing experience for me. The opportunity to meet scientists from around the world, all with different backgrounds and experiences, was both inspiring and eye-opening. However, it was the guidance and encouragement of Dr. Luca Serafini and Dr. Kétévi Assamagan that left the deepest impression on me. Their encouragement has given me the confidence to pursue my PhD in physics, and for that, I will be forever grateful. In this article, I share my experience and the impact it has had on my career and personal growth.

Dream Come True Through the ASP Mentorship Program

During my three-week stint at the ASP in Kigali, Rwanda, I was exposed to an array of courses that were both intense and inspiring. This incredible experience was further enriched by the company of new friends from various parts of Africa. The highlight of my time at the school was undoubtedly the ASP mentorship program, which proved to be transformative for my research career. Under the guidance of my mentor Luca Serafini, I completed my first training abroad at the Italian National Institute for Nuclear Physics in Milan (INFN-Milan) after being awarded my first two scholarships. The first originated from the International Center for Theoretical Physics (ICTP) through the Training and Research in Italian Laboratories (TRIL) program [2] while the second was granted from the Italian Ministry of Foreign Affairs and International Cooperation (MAECI). Subsequently, I was able to hone my skills and receive vital assistance in my quest to secure admission for a PhD at La Sapienza University of Rome, in collaboration with INFN-Milan.

"During my three-week stint at the ASP in Kigali, Rwanda, I was exposed to an array of courses that were both intense and inspiring. This incredible experience was further enriched by the company of new friends from various parts of Africa."

Conquering Challenges and Finding Rewards: My PhD Journey in Accelerator Physics During a Global Pandemic

Although my PhD journey presented its challenges, it was ultimately rewarding. My studies commenced in November 2019, coinciding with the onset of the COVID-19 pandemic, which persisted for two years. During this time, I was unable to be with my family and had to continue working on my PhD in accelerator physics within the confines of a single room. This field is complex and requires a great deal of theoretical and experimental expertise. Despite the closure of all laboratories, I made the decision to focus solely on the theoretical side of my research. I was fortunate to have the guidance and support of my supervisor Luca Serafini and my advisor Professor Vittoria Petrillo. In collaboration with my research group, we developed theoretical and numerical models designed to study the effects of high-order modes on beam dynamics inside linear accelerators, particularly those using superconducting cavities with energy recovery for different applications, including Free Electron Lasers (FELs).

After three years of dedicated effort, I finally obtained my PhD degree in accelerator physics and can call myself a Doctor of Philosophy. Three years ago, I could not fathom that I would have the opportunity to achieve my goals during a period in which everything seemed to be impossible. Nonetheless, with the help of my supervisors, family, and friends, I have achieved my second dream and now am a Postdoc at INFN-Milan. My present research is centered within the fields of accelerators and light sources (LS), specifically the optimization and simulations of X-ray Compton radiation spectra in both linear and nonlinear regime, combined with measurements of the STAR2 high energy line. This is a very relevant subject for the success of the STAR Project, currently under development by INFN at the University of Calabria in Cosenza, Italy [3].

Inspiring the Next Generation: Advancing Physics Research in Africa

My goal is to follow in the footsteps of Luca Serafini and Kétévi Assamagan and inspire young scientists to pursue scientific research, with a particular focus on contributing to the development of the physics research field within Morocco and Africa.

References:

[1] <https://www.africanschoolofphysics.org/>

[2] <https://www.ictp.it/opportunity/training-and-research-italian-laboratories-tril>

[3] Star Project at university of Calabria, <https://www.mi.infn.it/en/activities-research/122-attivita-di-ricerca/progetti-speciali/518-star-project.html>

Having experienced the challenges of being a researcher in Morocco myself, I am passionate about improving research infrastructure and opportunities in my home country. Unfortunately, access to accelerators in Africa is limited, with only a few small-scale facilities currently in operation across the whole continent. This is particularly true in Morocco, where no accelerator currently exists.

Despite the important role that LS plays in scientific research, Africa is the only continent without a synchrotron LS, while more than 70 facilities exist around the world. The African Light Source (AfLS) project was proposed over 20 years ago with the goal of building a synchrotron LS in Africa. Such a facility would produce intense beams of light that could be used for a wide range of research applications, including materials science, chemistry, biology, and medicine, and would be a valuable resource for scientists across the continent.

Empowering African Science: The AfLS Project and the Drive for Collaborative Research

The AfLS project is currently led by two distinct organizations that hold a shared vision of building a synchrotron light source in Africa and advancing scientific research and capacity-building across the continent. Through the initiative to organize schools and conferences within Africa, there is now the possibility to speed up the progress toward the first AfLS through a collaboration between researchers from INFN in Italy and the University of Johannesburg under the direction of Luca Serafini and Simon Connell. Both scientists are currently working hard to secure funding for the initiative, which will be based on Inverse Compton Scattering (ICS) as a first phase toward large-scale machinery. This project will be discussed during the 3rd African Conference of Fundamental and Applied Physics (ACP2023) on September 23 in George, South Africa. The outcomes of this conference, in which I form part of their international organizers, will be published as well in the African Physics Newsletter.

As a young African scientist passionate about LS and accelerator physics, I believe that the AfLS project represents an important opportunity to foster scientific cooperation and bridge a gap between different continents. I am eager to contribute to this effort by helping to facilitate collaborations that could benefit both my country and the wider African scientific community.



Geophysical Surveys Cover North Africa's Sahara for Water Sustainability



Figure 1: Left, measurement of the Magnetotelluric east of Qattara depression (Moghra area). Right, photo of Maha Abdelazeem (PI) and M. Gobashy of the measuring team. (Photo Credit: The authors)

Through the national project titled, "Implementation of the Geosciences to Construct the New Desert Urban, Site Management, and Distribute Resources; Pilot area: Moghra Oasis, Qattara Depression," the magnetic field of the earth was measured on an area of 3,600 km² in the Egyptian desert, near the Qattara depression situated in the northeastern part of the great Sahara in North Africa. To achieve this, a very accurate magnetometer was employed to detect the minute variations in the Earth's field, measured in nanoteslas (nT). The primary aim of this initiative was to use the magnetic properties of rocks to develop a model of the aquifer within this very arid environment.

Moreover, the project also involved the measurement of magnetic susceptibilities to provide mathematical constraints for the proposed model based on the magnetic field measurements. Furthermore, measurements of electromagnetic and electrical resistivities of rocks were conducted. These measurements were used to examine the geoelectric properties and establish the geoelectric layers of the aquifer.

The steering team for this work was formed by a total of 20 scientists hailing from the Cairo and Tanta Universities, and the National Research Institute of Astronomy and Geophysics (NRIAG) in Helwan, Cairo. The project entailed two years of fieldwork and an additional year of office work. We extend our gratitude for the financial support received from the STDF, the Science, Technology and Innovation Funding Authority within the Egyptian Ministry of Scientific Research. The results were awe-inspiring and demonstrated how geophysics played a crucial role in exploring the groundwater aquifer, site management, and distributing resources.

AUTHORS

Mohamed Gobashy,
Department of Geophysics, Cairo
University, Giza, Egypt

Maha Abdelazeem,
National Research Institute of
Astronomy and Geophysics,
Helwan, Cairo, Egypt

CONTRIBUTING EDITOR

Mohamed Abdel-Harith

The achieved objectives of the project included:

1. Comprehend the general and detailed geology of eastern Qattara;
2. Locate natural resources (i.e, sand and dolomite) in the northern part of the research area;
3. Perform a detailed assessment of the possible aquifers, including their extent, water quality, and potential productivity using magnetic and electric measurements;
4. Determine the most suitable sites for water wells and the development of a production plan to maximize aquifer utilization. Additionally, evaluate the touristic attraction elements and provide suggestions for the future development of the region; and
5. Mitigation of natural hazards, including environmental pollution and earthquakes.



Figure 2: Measurement of the earth's magnetic field using the GEM magnetometer. (Photo Credit: The authors)



Interview with Akin Jimoh, Chief Editor of Nature Africa

Our editorial team spoke to Nature Africa about its establishment and the motivation behind the project. It was the occasion to pay a tribute to its leading architect, Mohammed Yahia, who recently passed away.

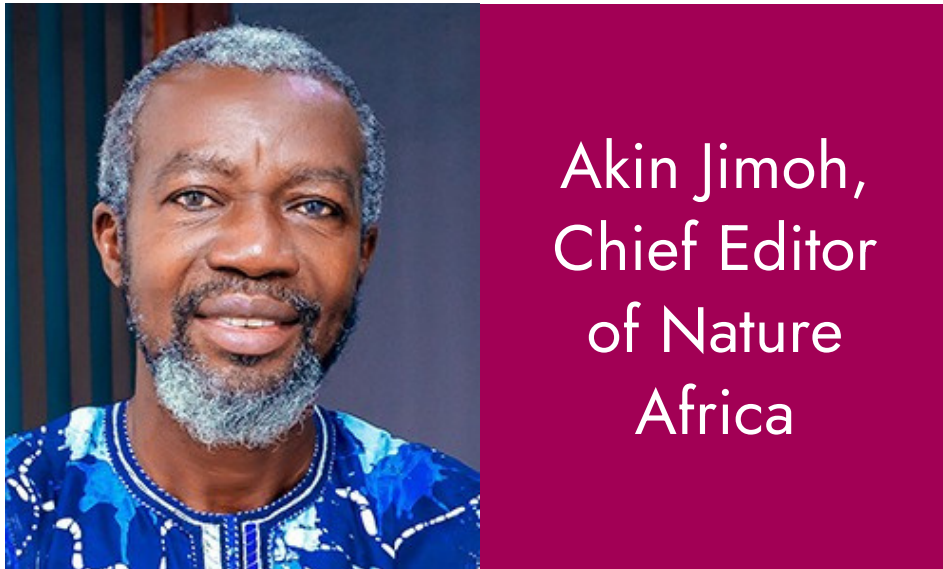


Figure 1 Photo Credit: Nature Africa

When was Nature Africa first established, and what was the original thinking and motivation behind the project? You may say, who proposed the idea?

Nature Africa was first published in 2021, with the first edition on March 17, 2021. It is a standalone digital magazine that reports on scientific research and issues of science policy across the African continent. Recognizing that a lot of excellent research from Africa does not receive the coverage it deserves, Nature Africa sheds light on some of the excellent research from the continent and delivers them to a wider audience. The stories are relevant to researchers and a wider audience of people interested in science. Nature Africa is not a peer-reviewed journal and will not consider primary research articles for publication.

AUTHOR

Tammy Van Tonder,
Faculty of Science, University of
the Witwatersrand, Johannesburg,
South Africa

The magazine is published by Nature Portfolio, part of Springer Nature, and is available at [nature.com/natafrica](https://www.nature.com/natafrica). It is produced with financial support from a consortium of partners. Nature Portfolio holds the sole responsibility for all editorial content. Published in English and French, it also promotes strategic focus on public understanding of science with the goal of achieving scientific literacy across the continent.

The magazine Nature Africa came to fruition through the exceptional passion of Mohammed Yahia, of blessed memory, a former Executive Editor of Nature Portfolio in the Middle East and one of the key promoters of the platform. Mohammed was a past president of the World Federation of Science Journalists (WFSJ) and vice president of the Arab Science Journalists Association. He was the launching editor of Nature Middle East, an online portal that focuses on science and science-related news from the Arab world. He worked with the editorial teams of several publications in the Middle East and Europe, including Nature Italy, Nature Arabic Edition, and For Science, the Arabic version of Scientific American.

What types of articles are you looking for? Is this only for African-based authors, or are submissions open to scientists from around the world?

Articles in Nature Africa range from research highlights, science news, and feature stories written by science journalists such that readers can keep up with the latest African research. The publication also offers opinion pieces and commentaries, providing a platform for the scientific community to provide their perspectives on scientific matters. All stories published are freely accessible, and the website gives voice to African researchers based within Africa as well as those working in the diaspora.

Is the subject material meant to be primarily of relevance to Africa?

Africa has an array of researchers that are contributing to scientific development not only in the continent, but also at the global level. Subject matters we focus on are predominantly on key research and scientific developments across the continent, which are expected

to be of relevance to the target audience.

What would you like to see achieved with this new journal?

The advent of COVID-19 brought a new level of misinformation about science. We aim to counter that misinformation while celebrating the significant scientific advances and valuable research carried out by scientists in Africa.

What have been some of the highlights of the journal thus far?

It is difficult to single out a topic or an article as a highlight because each one is a step towards increased understanding of science in Africa. We have been increasing our audience base and developing a new generation of writers, thereby deepening public understanding of science across the continent. The series of Collections we publish (see below) represents an array of topics that gives depth to issues of public importance.

Do you intend to cover some particular themed topics in the journal?

Yes. We publish special issues once in a while depending on the relevance to the continent and new research developments in science. A couple of these special editions have been published in Collections as shown below:

Collection 20 February 2023

<https://www.nature.com/collections/cgceddghib>
Genomic Research

A revitalized pursuit in genomic study could unlock a wealth of untapped genomic information from populations that have been overlooked and pave a path towards equity in healthcare. Africa's rich genetic diversity presents a unique chance to innovate cutting-edge diagnostics, medications, and vaccines that can tackle the growing health concerns and support global disease prevention initiatives.



Collection 15 September 2022

<https://www.nature.com/collections/gcbcegbdbg>

Infectious Diseases

Even though COVID-19 brought the world's attention to infectious diseases, Africa had already been grappling with them for a long time. The continent accounts for the majority of deaths from infectious diseases, and many of these are preventable. Can researchers help reduce the burden of these diseases?

Collection 29 July 2022

<https://www.nature.com/collections/egfgcjfjb>

Plant Pathology

Food security is a challenge for the whole world, but it is often felt most acutely in sub-Saharan Africa due to various challenges. But new research is offering smallholder farmers a chance to boost their crop yield in ways previously impossible.

Briefly, what are some of the technical guidelines that you require for publication in the journal?

Nature Africa is not a peer-reviewed journal and will not consider primary research articles for publication. We do welcome other submissions from the community, including:

Opinion pieces/commentaries: Scientists are welcome to submit ideas for articles that express their thoughts on research-related issues and topics.

Nature Africa targets the science community, as well as a more general, non-specialized audience with an interest in science. Articles should use non-technical language that can be understood by people who are not specialized in the researcher's field. Please summarize your idea in an email to the editor, describing what your article will be about, why you think it's an important topic for Nature Africa's readers, and when you think you can submit it. Include your idea for an article rather than a fully written piece. Your article cannot have been published elsewhere. Nature Africa does not pay for commentaries by researchers. Anyone interested can [contact the Nature Africa editorial team](#).

News and features: Nature Africa is always keen to support science journalism across the continent. Freelance journalists interested in collaborating with the portal can send news and feature story ideas by [submitting a one-paragraph pitch to the editorial team](#). Two samples of a writer's recent work should be included.

There is more information here on [how to write for us](#) and how to make sure individual pitches get noticed. For more information about the work that we do and the kind of stories we are interested in, watch [this workshop recording](#). If we are interested in your article ideas, an editor will be in touch.



Entrepreneurship in Botswana: A Market Test Place for African Innovations

The article focuses on the understanding the entrepreneurship market in Botswana and ways in which to explore collaborations and programs to promote innovation and entrepreneurship.



Figures 1 and 2: Photographs courtesy of BITRI. (Photo Credit: The author)

Dr. Surya Raghu, founder president of Advanced Fluidics – a high-tech company located in the US – and a Visiting Professor in the Faculty of Science at Wits University in South Africa, recently visited research and educational institutions in Botswana. During the visits, he engaged in meetings and discussions related to innovation, research commercialization, and understanding the entrepreneurial ecosystem in Botswana. His objective was to explore collaborations and programs for capacity building in innovation and entrepreneurship within Botswana.

Botswana boasts a favorable ecosystem, achieving the highest ranking by the Global Entrepreneurship Monitor (GEM 2015) in post-school entrepreneurial education, entrepreneurial finance, and physical infrastructure. The WIPO Global Innovation Index (GII 2022) similarly ranks Botswana above the Sub-Saharan average across all seven pillars of metrics.

The Botswana Institute for Technology Research and Innovation (BITRI) is an advanced research institution, tasked with the mandate of conducting “needs-based research” in areas critical to Botswana. Visiting under the invitation of the Institute’s Director of Research and Partnerships, Dr. Raghu presented on innovation and research commercialization and took a tour of their excellent lab facilities. He engaged in discussions with Dr. Samuel Chigome, past-president of the African Materials Research Society, and Dr. Maitshwarelo Matsheka, head of the nanomaterials department, in order to explore further collaborations for joint activities in research and innovation programs.

AUTHOR

Surya Raghu,
Advanced Fluidics LLC

Examples of commercialization achievements stemming from BITRI include the production of face masks using electrospinning and ongoing development of test kits for bovine diseases.

Dr. Raghu's next visit was to the Botswana Digital & Innovation Hub (BDIH), where he met with their director, Mr. Diane Mongudi, and engaged in discussions with the innovation manager, Mr. Obakeng Segwagwe, regarding possible partnerships with other institutions in Botswana to conduct an innovation and entrepreneurship workshop at their headquarters. Situated within a 57-hectare, 60-million dollar facility, the BDIH houses both a Science and Technology Park and an incubator, providing an ideal ecosystem for startups to thrive. Mr. Segwagwe expressed keen interest in hosting an innovation-driven entrepreneurship workshop at the BDIH.



Figure 3: Photograph courtesy of BDIH. (Photo Credit: The author)

The final visit was at the University of Botswana in Gaborone, where Dr. Raghu met with the deans, deputy deans, and program directors within the Faculty of Engineering, Science, and Medicine to discuss their activities in research, innovation, and entrepreneurship. He also met with the Deputy Vice-Chancellor of Research and Enterprise, Professor Doreen Ramogola-Masire, who extended her support for a workshop on innovation and entrepreneurship.

Innovation, research commercialization, and entrepreneurial skills are poised to connect solutions with market needs. The interconnection of all research and educational institutions and the local innovation ecosystem in Botswana, along with increased emphasis and training in innovation and entrepreneurship, will promote local entrepreneurial activity. The limited size of Botswana's markets is no disadvantage – with its receptive environment for innovation, favorable policies, and developing institutions nurturing collaborative innovation – Botswana has the potential to serve as excellent testing grounds for innovative solutions and products within Africa for broader expansion across the continent.



Reaching Out to African Geniuses

Genius in Africa (GiA) is a non-profit organization committed to inspiring vocations in basic sciences across Africa.



Figures 1 and 2: Left, students of the T.L Oyesina Model Secondary School, Ibadan, Nigeria completing a physics examination during Jesutofunmi voluntary teaching service at the school; Right, GiA Working Principle Challenge 2.0 flier. (Photo Credit: The author)

AUTHOR

Jesutofunmi A. Fajemisin,
University of South Florida,
Tampa, Florida, USA

CONTRIBUTING EDITOR

Mounia Laassiri

In order to develop home grown solutions and achieve the United Nations' Sustainable Development Goals, Africa needs a critical mass of science champions. Therefore, cultivating interest in basic science is of prime importance for science-driven development. Genius in Africa (GiA), a non-profit organization, is committed to identifying and nurturing talents among African children, regardless of their location or circumstances.

Recognizing the disparities in education and opportunities across the continent, GiA aims to maximize the potential of these children by providing them opportunities to express their uniqueness and prepare the next generation of problem solvers. We strongly believe that there is a genius in every child and the quality of information they are exposed to at an early age has a significant influence on who they will become in the future. To achieve this vision, GiA employs a multifaceted approach encompassing outreach, educational support, GiA's Working Principle Challenge, peer support, and more. Presented below are the key achievements from our endeavors over the past 18 months.

"GiA strives to unlock the potential of young Africans, equip them with essential skills, and empower them to become leaders and innovators in various fields, contributing to a brighter future for the continent. "

In over a year since our inception, we have organized two editions of the Working Principle Challenge. This challenge aims to spark curiosity for knowledge among African teenagers. We use so many electronic devices in our day-to-day activities, focusing on learning how to use them, rather than how they work. By inspiring African teenagers to explore their knowledge, the challenge allows them to express it creatively through poster presentations. Through this, they explore scientific concepts within their immediate environment. To date, a total of 23 African teenagers from three African countries (Nigeria, Cameroon, and Kenya) have been awarded 20 USD for their participation in the Working Principle Challenge.

On August 5, 2022, we hosted our first Literature Review Training, featuring our keynote speaker, Dr. Nelson Dzade. During the event, African young scientists were taught the effective approach for conducting literature reviews in their respective fields. The training can be found on the Genius in Africa YouTube channel [1].

Furthermore, our peer support services are available to students facing distress. Our goal is to create a safe place of openness for African teenagers in difficult situations. We are in the process of partnering with professional organizations in Africa to facilitate referrals in serious situations. Additionally, GiA's educational support is directed towards rural primary and secondary schools. Through this initiative, we provide students with writing materials in Africa's rural areas. Our first project will be executed in September 2023 at the Apewosika School in Ghana.

Through these strategies, GiA strives to unlock the potential of young Africans, equip them with essential skills, and empower them to become leaders and innovators in various fields, contributing to a brighter future for the continent.

We extend our heartfelt gratitude to our dedicated volunteers whose tireless efforts were instrumental in achieving these objectives. Our sincere appreciation goes to the African School of Fundamental and Applied Physics for their invaluable support in this vision. Furthermore, we commend Palesa Ramohlouane, our peer support facilitator, for her unwavering commitment to training our volunteers in delivering effective emotional support.

We would also like to acknowledge the contributions of Dr. Kétévi Assamagan, Dr. Omololu Akin-Ojo, Dr. Nelson Dzade, Mr. Peter Iyiola, and many others whose support played a significant role in shaping this vision.

Our Contact information:

Instagram: @geniusinAfrica

Facebook: Genius in Africa

Website: www.geniusinAfrica.org

References

[1] <https://youtu.be/xxioEo14dQk>



Space Scientist in Ivory Coast

The sickle-cell patient who became a space physicist.



Commission G



URSI GASS 2020 Young Scientist Award

Diaby, Aziz

Université Félix Houphouët Boigny, Côte d'Ivoire

Estimating the daytime vertical ExB drift velocities in the F-region of the equatorial ionosphere using the IEEY and AMBER magnetic data in West Africa

Figure 1: The URSI Young Scientist Award obtained by Aziz Diaby.
(Photo Credit: https://www.ursi.org/young_scientists.php)

Aziz grew up in Dabou, Côte d'Ivoire, a small town not far from Abidjan. From an early age, he was curious about what was going on in the sky. He attended the Bessio De Lambert Modern Secondary School and the Tiapani Dominique High School, where he obtained his scientific baccalaureate, an examination for university entrance. His academic journey led him to Senegal to study physics and chemistry. Following two years of general studies in these subjects, he went on to specialize in physics, graduating with a master's degree in the subject.

With his degree in hand, he returned to his homeland. Aziz enrolled in a master's degree program in external geophysics with a specialization in geomagnetism and aeronomy at the Université Félix Houphouët-Boigny in Abidjan. It was in the second year of his master's degree program that his adventure in research really began. In 2015, he had the opportunity to participate in a workshop centered on the effects of the ionosphere on Satellite-Based Augmentation System (SBAS) and Ground-Based Augmentation System (GBAS) applications at the International Centre for Theoretical Physics (ICTP) in Trieste, Italy. After defending his master's degree, Aziz began his studies in a doctorate program in atmospheric physics. His specialization remained in geomagnetism and aeronomy. The title of his thesis was, "Estimation of diurnal EB vertical drift velocities in the F region of the equatorial ionosphere using magnetic data from the IEEY (International Equatorial Electrojet Year) and the AMBER (African Meridian B-Field Education and Research) network in West Africa."

The vertical drift velocity of the plasma controls the distribution of ions and electrons within the E and F regions (the ionosphere is divided into 3 regions: D, E, and F) of the equatorial ionosphere. Notably, the electron density irregularities within the F region, the equatorial electrojet intensity (EEJ), and the equatorial ionization anomaly (EIA) are strongly influenced by the vertical drift of the plasma at low latitudes. Knowledge of the vertical drift speed of plasma at low latitudes is therefore of vital importance in understanding the phenomena and processes observed in the equatorial ionosphere.

AUTHOR

Kassamba Abdel Aziz Diaby,
Université Félix Houphouët-Boigny,
Abidjan, Ivory Coast

CONTRIBUTING EDITOR

Stephane Kenmoe

However, the difficulty of obtaining effective measurements of this important parameter in all sectors of longitude means that we have to resort to alternative methods.

The method employed by Aziz in his work was based on the strong correlation between the magnetic variation associated with the EEJ and the vertical drift velocity of the plasma within the F region of the equatorial ionosphere, as demonstrated in the work of Anderson et al. (2004) [1]. This methodology was chosen on the greater availability of magnetic measurements in all longitude sectors. This work was published in the journal *Advances in Space Research* [2] and was awarded the International Radio Scientific Union (URSI) Young Scientist Award in 2020 [3]. The Young Scientist Awards are presented at the General Assemblies of URSI and at the URSI Atlantic Radio Science Conferences (AT-RASC) to recognize an international group of individuals that has made innovative contributions and discoveries in multidisciplinary research related to electromagnetic fields and waves.

The PhD journey has not been easy for Aziz, as he has had many interruptions due to his illness. Aziz was born with a hereditary condition called sickle cell disease, a crippling ailment that can manifest at any time. When he had his attacks, the most serious ones could keep him in bed for two months. Two months without being able to make any progress with his research. It was difficult, but he managed to overcome it all.

This was also an enriching experience for Aziz, as during his PhD studies, he participated in several conferences in countries such as Italy, India, the United States, Cyprus, Austria, China, and Kenya. These conferences enabled him to forge links with many researchers around the world, which will be of great use to him in the rest of his career.

In 2021, Aziz Diaby took the initiative to establish an association in response to the lack of knowledge of space science among the people around him. With the help of his laboratory colleagues, he created the Ivorian Association of Astronomy [4]. The aim of the Association

is to promote science in general through astronomy. Why astronomy? Because astronomy is a science that encompasses fields such as computing, mathematics, physics, chemistry, biology, and beyond. The activities of this association include engaging with pupils, students, and the general public to help them discover astronomy through lectures and debates, training workshops, and telescope observations of the sky. Additionally, Aziz and his association actively participate in international campaigns to locate asteroids. To date, they have discovered approximately ten asteroids.

For all his efforts to promote space science through astronomy in his country, Aziz Diaby was appointed as Astronomy National Outreach Coordinator by the International Astronomical Union (IAU) in 2022. Today, he is a lecturer-researcher in the physics department at the Université Félix Houphouët-Boigny in Abidjan and divides his time between teaching and research at the university, and promoting astronomy.

Through all his efforts, he hopes to inspire young people to pursue studies in science, particularly space science, so that one day Côte d'Ivoire can enter the space race.



Figure 2: Aziz (beige pants) in an observation session with students. (Photo Credit: Alain Martial Ahondjon)

References:

- [1] <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2004SW000095>
- [2] <https://www.sciencedirect.com/science/article/abs/pii/S0273117720301472>
- [3] https://www.ursi.org/young_scientists.php
- [4] <https://www.facebook.com/Association.Ivoirienne.Astronomie>



African School of Physics Alumnus Diallo Boye Awarded the Goldhaber Fellowship

From the African School of Physics to excellence at Brookhaven National Laboratory.



(Photo Credit: Diallo Boye)

Every year, the U.S. Department of Energy (DOE) at Brookhaven National Laboratory (BNL) awards, up to two recipients, the Goldhaber Distinguished Fellowship. This prestigious distinction is awarded to exceptional early-career scientists who have completed their PhD within the last three years at the time of application, work at the frontiers of their respective fields with a proven track record, and demonstrate a strong ability for performing independent research.

The Goldhaber Fellowship entails a three-year appointment with a starting annual salary of \$100,400. The Fellowship is named after Maurice Goldhaber and his wife, Gertrude Scharff-Goldhaber, who have not only contributed in shaping BNL but also significantly impacted the field of nuclear physics as scientists. The program is designed to perpetuate a culture of scientific excellence at BNL and pave the way for the next generation of scientists at BNL. It predisposes the awardees to staff positions at BNL, upon successful completion of their appointment.

**AUTHOR & CONTRIBUTING
EDITOR**

Stephane Kenmoe

This year, Dr. Diallo Boye of Senegal is one of the happy recipients of the Goldhaber Distinguished Fellowship. Dr. Boye, a particle physicist employed as a postdoctoral researcher at BNL, is currently based at CERN (The European Organization for Nuclear Research) in Switzerland where he is conducting his research, utilizing the ATLAS experiment facility. His research focuses on Higgs decays into invisible particles and the exploration of dark sector states.

Boye's journey into particle physics started upon completing his master's degree in theoretical physics at the University of Cheikh Anta Diop in Dakar, Senegal. His curiosity was piqued and his passion for delving into the intricacies of matter through particle physics was ignited during the African School of Physics (ASP) held in Ghana in 2012. Subsequently, in 2013, he traveled to France to complete a master's degree in subatomic physics astroparticle at the University of Strasbourg.

His stay in France provided the opportunity to strengthen his expertise in the field of particle physics through several research visits to prestigious institutions across Europe. Notable projects Boye contributed to include collaborating with the University of Manchester team on the alignment of LHCb-TimePix3-Telescope at CERN, completing a master's degree in physics of energy and energy transition at the University Paul Sabatier in Toulouse, France, and participating in the measurement of the W boson mass in the electron channel using the Compact Muon Solenoid (CMS) detector at the Atomic Energy Commission (CEA) in Paris-Saclay.

Following these enriching experiences, Boye initiated his PhD studies on the search for a dark vector boson and a new scalar utilizing the ATLAS detector within the ATLAS experiment at CERN. In 2020, he successfully completed his PhD before joining the ATLAS group at BNL to conduct postdoctoral research. The move to BNL afforded Boye the opportunity to reconnect with his early mentor, Dr. Kétévi Assamagan. Dr. Assamagan, a particle physicist from Togo, serves as senior researcher at BNL and main promoter of the ASP, where they met for the first time in 2012.

For the past 15 years, Dr. Assamagan's credo has been to encourage vocations, build capacities through the ASP, and, above all, provide young participants with exposure to opportunities. Hundreds of young Africans have seized these opportunities, enhancing the contribution of African physicists towards global scientific production. Dr. Boye's success is the most recent illustration of this contribution, further reinforcing Dr. Assamagan's conviction in the merits of these initiatives and his dedication to nurturing African youth:

"It has been a pleasure to work with Dr. Diallo Boye on the ATLAS Experiment, the African School of Physics, and the African Strategy for Fundamental and Applied Physics. In all these areas, Dr. Boye has shown rapid growth and maturity that have made him [rise] to the top among his peers. I hope our joint path is still long ahead to see him [become] more successful. For then I would savor some pleasure to have aided in the remarkable journey of his own making and of which I remain most proud." - Kétévi Assamagan

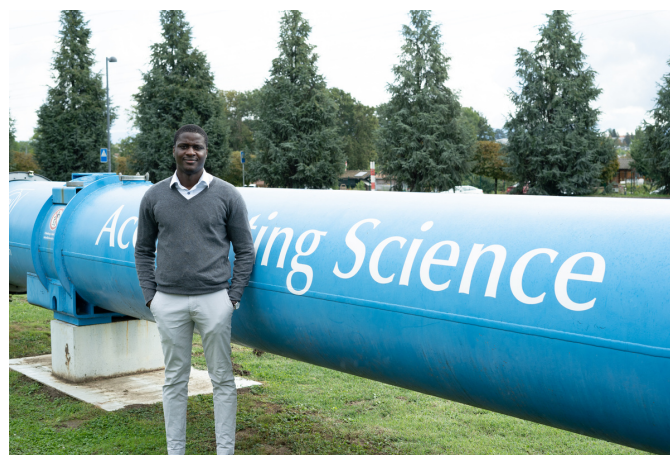
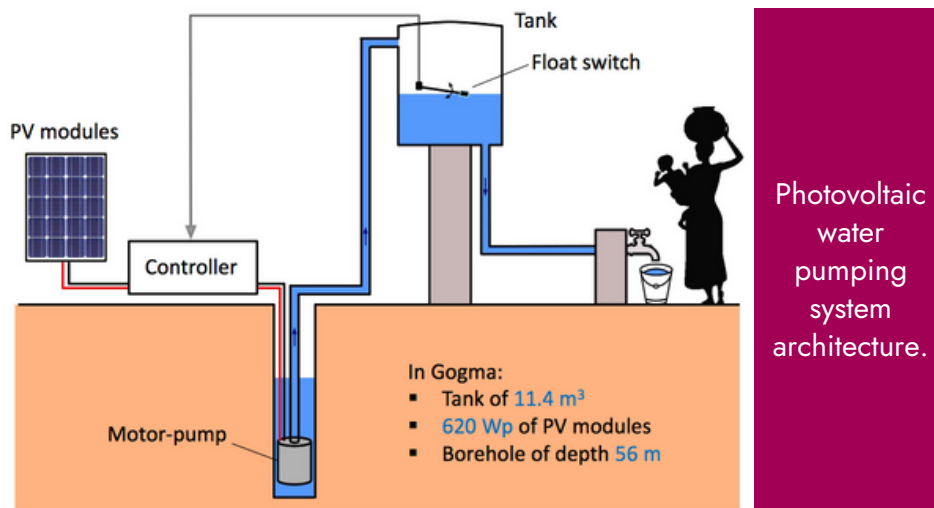


Figure 2: Diallo Boye at CERN. (Photo Credit: Diallo Boye)



Providing Energy Services in Burkina Faso While Conducting Scientific Research

Establishing a collaborative research platform in rural areas with integrated solar photovoltaic energy services.



(Photo Credits: PhD thesis of Simon Meunier [1])

Arouna Darga serves as a senior lecturer in electrical and electronic engineering at the Sorbonne University in Paris, where he teaches electronics and energy conversion at the university's engineering school, Polytec Sorbonne. As a researcher, Arouna has a strong expertise in advanced modeling and characterization of photovoltaic cells and modules, as well as the management of industrial projects. He develops experimental techniques for detecting and quantifying the electronic parameters that limit the performance of photovoltaic cells, modules, and systems. Arouna is passionate about the dissemination of knowledge and promoting scientific-driven development in lagging communities within the realm of science and technology.

Arouna Darga, a native of Ouagadougou, Burkina Faso, embarked on this academic journey by earning a master's degree in pure physics at the Joseph Ki-Zerbo University in his hometown. Subsequently, he relocated to France to study electrical engineering, later receiving a PhD in the specialty from the Sorbonne University. Undoubtedly, the decision to specialize in this field was motivated by his origin and experience in the Sahelian region. Arouna is familiar with how difficult it is to have proper lighting and clean water in this area.

AUTHORS

Stephane Kenmoe,
University of Duisburg-Essen,
Germany

Arouna Darga,
Sorbonne University, France

CONTRIBUTING EDITOR

Stephane Kenmoe

Yet, solar energy and related technologies, areas in which Arouna possesses a wealth of established expertise, are a godsend not only for the supply of electricity but also for drinking water through solar-powered pumps. Making this vision a reality has been the credo of this Burkinabe research physicist for several years now. In addition, Arouna is convinced that it is possible to conduct impactful research while concurrently providing energy solutions to rural areas and low-income communities.

For many years, he has actively participated in many initiatives, including training and exchange programs focused on renewable energy in West Africa. One of these initiatives is the “Turning Sun Into Water” project, which aims to build a collaborative research platform in rural areas to deliver photovoltaic energy services to local residents. The project was successfully launched in 2017, thanks to the support of 280 backers. Since its launch in 2017, the project has provided more than 10,000 cubic meters of clean water for domestic consumption to more than 280 inhabitants in the small village of Gogma in Burkina Faso. Over ten researchers from the UK, USA, and France have collaborated on various aspects of the project, ranging from socio-economic considerations to data analysis using artificial intelligence. This practical, community-driven project addresses local needs and has led to several scientific research papers.

More information on the project can be found at <https://eafildusoleil.blogspot.com>.

You can support the project on this platform: <https://www.helloasso.com/associations/eau-fil-du-soleil>.

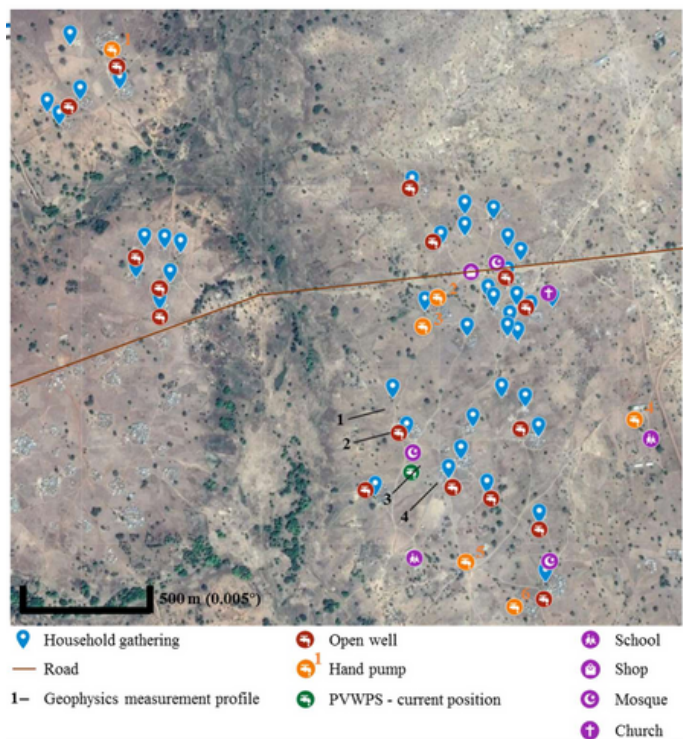


Figure 2: Data collection: GIS data, geophysical measurements, water point account books, household surveys, pumping tests, water quality, on-field observations, Photo-Voltaic Water Pumping Systems (PVWPS) monitoring. (Photo Credits: PhD thesis of Simon Meunier [1])

References:

[1] [1] PhD thesis of Simon Meunier, <https://www.researchgate.net/publication/338035907> Optimal design of photovoltaic water pumping systems for rural communities - a technical economic and social approach

The Journey of Reestablishing a Physics Community in Somalia

Revival of physics curricula in Somalia – where do we stand?

The oldest public university in Somalia, initially established in 1954 as Università Nazionale Somala, was officially founded as the Somalia National University (SNU) in 1971 following the country's independence in 1960. The university offered a diverse range of faculties and disciplines. Throughout the years, the university grew in leaps and bounds, establishing multiple campuses with different faculties and departments. From 1971 to 1990, it remained the sole university in the country. By the late 1980s, the Department of Physics was established under the Faculty of Science, boasting several staff members.

SNU shuttered in 1990 following the collapse of the Somali military government. After closing down for several years, the university reopened in August 2014. Since its reopening, the growth has been slow. As of now, the Faculty of Science at SNU houses only 3 departments: the Department of Geology, the Department of Marine Science, and the Department of Mathematical Sciences. The departments which are earmarked to be established in the near future within the Faculty of Science include the Department of Chemistry, the Department of Physics, the Department of Biology, and potentially others.

In the wake of 1990, following the collapse of the Somali military government, a transitional government was established, leading to the emergence of many private universities. Presently, the country possesses many private universities but only one public university. Currently, there is no dedicated physics department in the country. Physics is only offered as a minor subject within the Faculty of Education. Universities in Somalia that offer physics as a subject include: (i) Somali National University, (ii) Somali International University, (iii) Mogadishu University, (iv) Simad University, (v) Benadir University, and (vi) Somali University.

Editorial note: Since the revival of the Somalian physics community is on the move, we strongly encourage the involvement of those among our readers who might find interest in capacity-building and research initiatives in Somalia. The author can be contacted at tarbiici43@gmail.com; Tel No.: +252617244713

AUTHOR

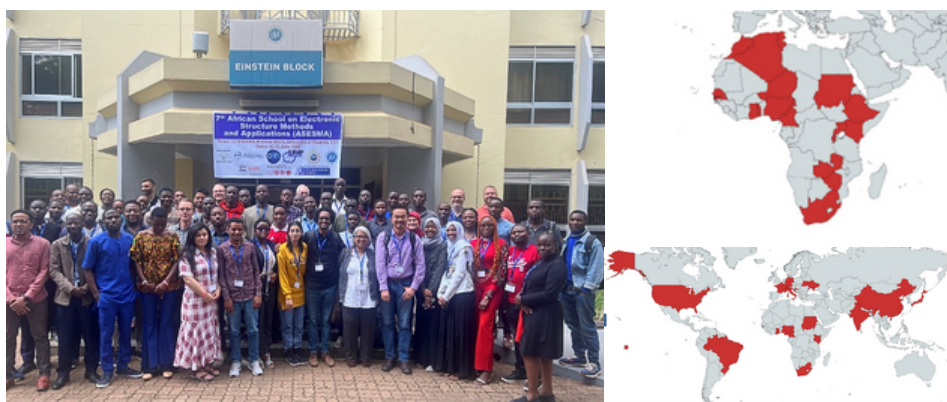
Abdullahi Ali Abdullahi,
Somali National University,
Mogadishu, Somalia

CONTRIBUTING EDITOR

Robinson J. Musembi

The 7th African School on Electronic Structure Methods and Applications

Kigali held the first post-COVID African School on Electronic Structure Methods and Applications (ASESMA) – a successful event marked by an impressive diversity of participants and promising perspectives.



Figures 1,2,3: (Left) Participants at ASESMA 2023, (Right Top) African countries represented by ASESMA students location, (Right Bottom) Countries represented by Lecturers and Tutors
Photo Credits: (Left) Garu Gebreyesus, (Right) Iurii Timrov via LinkedIn

The ICTP East African Institute for Fundamental Research (EAIFR) – located in Kigali, the captivating capital of Rwanda – hosted the 7th African School on Electronic Structure Methods and Applications (ASESMA 2023) from June 12-23. Due to the COVID-19 pandemic, this biennial summer school was held virtually in 2021. The 2023 in-person edition of ASESMA marked the commencement of the second decade in the illustrious history of this African school.

ASESMA 2023 had a thrilling mission – to introduce young African researchers to the fascinating world of computational methods for atomistic simulation and material science. Notably, all selected participants were first-time attendees at the ASESMA workshop. This brought a fresh and vibrant energy to the event.

Figures 1, 2, and 3 capture the students' remarkable diversity, representing a range of African countries. The process of selecting participants was extensive, encompassing nearly the entirety of the African continent. The ASESMA 2023 community consisted of six directors, 15 speakers, eight tutors, and 44 participants actively engaged in scientific interactions at different times during the two-week duration [1]. Upon their arrival at the institute, the participants received a warm welcome from Omololu Akin-Ojo, the director of ICTP-EAIFR, followed by a brief welcome and introduction of the lecturers and guests by Professor Richard Martin, Emeritus Professor, Department of Physics, University of Illinois, Urbana-Champaign, and consulting professor in the Department of Applied Physics at Stanford University.

AUTHOR

Omamuyowwi Rita Jolayemi,
Covenant University, Ota, Ogun
State, Nigeria

To commence the event, Dr. Amal Kasry, a material scientist and Chief of the Section for Basic Science, Research, Innovation, and Engineering at UNESCO, delivered the opening address. During her talk, Dr. Kasry expressed gratitude to ICTP for their ongoing dedication to promoting scientific research in Africa. EAIFR, designated as a Category 2 UNESCO Centre in Rwanda, proved to be an ideal setting for Dr. Kasry to engage with the African Union (AU) Commissioner for Education, Science, Technology, and Innovation (ESTI), Professor Mohammed Belhocine, and the ASESMA organizers. The discussions revolved around potential collaboration between UNESCO and the AU.

The ASESMA 2023 school was an extensive scientific event that commenced with a preliminary course shared via the Slack platform for participants before their arrival in Kigali. This preliminary course included video recordings by Professor Andre Schleife, in which he delved into the theory of band structure and density of states. ASESMA 2023 featured a variety of respected speakers from all around the world. It was fascinating to have pioneers in the field, including Dr. Andrea Marini, the creator of the YAMBO code; Dr. Iurii Timrov, the developer of the hp.x code within the Quantum ESPRESSO package; and Professor Sara Bonella, who crafted the MaZe code for first-principle molecular dynamics.

The teaching sessions covered a wide range of topics, including electronic structure, computational methods, and applications in materials science. The scientific presentations commenced with a lecture by Professor Shobhana Narasimhan on the topic of crystals and Bloch's theorem, followed by an overview of Density Functional Theory (DFT) presented by Professor Richard Martin to the advanced discussions [2]. Participants were immersed in an enriching learning experience. Following a satisfying lunch break, participants delved into a hands-on activity during the computer lab session. Led by Ryo Maezono and a team of instructors, this session explored the fundamentals of Linux.

The subsequent days of ASESMA 2023 followed a similar pattern, featuring engaging topics such as Kohn-Sham equations, magnetism, forces and relaxation, advanced functionals, and more. These lectures were delivered by experts such as Andrea Marini, Matteo Gatti, Nithaya Chetty, Natasa Stojic, Cyrus Eduard Dreyer, Andre Schleife, Iurii Timrov, and Houlong Zhuang.



Figures 4 and 5: Selected pictures of ASESMA 2023. (Photo Credit: (top) Iurii Timrov, (bottom) Amal Kasry via LinkedIn)

Participants were immersed in both theoretical and practical aspects, while evenings provided a blend of intellectual challenges, including a crossword competition and discussions on ethics in science led by Shobhana Narasimhan. Specialized topics, including machine learning in material science, orbital-free DFT (OF-DFT), molecular dynamics, and atomistic simulation in geophysics, were instructed by Alexandra Urban, Michele Pavanello, Sara Bonella, and Renata Wentzcovitch, respectively.

The American Physical Society (APS) was represented by Matteo Rini, who also conducted a session on effective scientific communications. The ASESMA 2023 community was honored by the presence of representatives from the United States Embassy in Kigali, who provided insights into the Embassy's operations and discussed scholarship opportunities, including the Fulbright Scholarship.

Participants were engaged in group projects led by experts and tutors, from first-time users of DFT codes to experienced individuals, depending on their interests. While the hands-on sessions primarily utilized the quantum ESPRESSO code, other codes were also introduced at the group level. Project presentations took place on the final day of the school, with expectations of continued work and the potential for publication of the projects. In addition to the awardees who received pertinent textbooks in the field of condensed matter as gifts, nearly all attendees were gifted a scientific book donated from Professor Richard Martin's personal library. It was particularly thrilling that the "most improved participant" was rewarded with a laptop.

ASESMA 2023 was an absolute blast! Participants left inspired and eager for more information and knowledge following the series of lectures. Yet, what made ASESMA 2023 so special was not only the exceptional content but also the remarkable connections forged among fellow Africans. These bonds formed were instant and profound, reminding us of the power of unity and collaboration.

Included below are quotes from select ASESMA 2023 participants:

"Surrounded by these accomplished peers, I felt invigorated. I now aspire to study harder, dedicating more time to my research to reach beyond."

- Anonymous

"I had the opportunity to share moments with people from different countries, allowing me to diversify my culture and build extraordinary relationships with fellow participants. Moreover, being able to visit Rwanda was an unforgettable experience."

- Samira Boukachabia (Algeria)

"The use of DFT in geophysics was impressive. Through Alexandra Urban's lectures, I [gained a] better understanding of phase diagrams and the stability of materials. My perspective on how to choose materials for research has changed and [improved]."

- Uto Timothy (Gambia)

My most memorable aspect of ASESMA 2023 was forming meaningful connections, meeting renowned researchers like Professor Richard Martin and Professor Shobhana. Interactions at ASESMA, along with hands-on sessions, inspired me to pursue a PhD in condensed matter physics and equipped me with valuable skills for future success."

- Gloria Mule (Kenya)



Figure 6: Selected picture of ASESMA 2023. (Photo Credit: Garu Gebreyesus)

"I gained many nice friends [during the school. Additionally,] the lecturer and tutors were very helpful and friendly. I think [that upon completing my master's exams,] I will be happy to continue in the ASESMA 2023 project. I want to understand more about it."

- Hajer Atitalla (Sudan)

"The lesson on advanced functionals by Dr. Iurii Timrov left a lasting impression on me. It was a deep dive into the density functional theory (DFT) that opened up new perspectives in electronic physics for more precise material property resolutions. Participating in this summer school allowed me to acquire the necessary skills for achieving better results in my calculations. I discovered new tools like the QE input generator and k-path, as well as scripting for automating some DFT calculations. The classes and practical sessions at the computer lab were pivotal for my future research. I am excited to apply these new skills to my upcoming research projects."

- Pape Sene (Senegal)

"ASESMA 2023 has significantly expanded my network within the physics community, and the knowledge gained has bolstered my confidence in pursuing advanced research opportunities. It has paved the way for collaborations and research projects that will undoubtedly shape my academic and professional future." -Jacques Koudzo Kotoko (Togo)



Moroccan Physicist Rajaa Cherkaoui El Moursli Awarded the Prestigious 2023 WiN Global Excellence Award

Moroccan energy and nuclear physicist Rajaa Cherkaoui El Moursli has been awarded the prestigious 2023 WiN (Women in Nuclear) Global Excellence Award celebrating an individual who has communicated consistently, effectively and positively the key messages for nuclear applications.

AUTHOR & CONTRIBUTING EDITOR

Mounia Laassiri,
University of Helsinki, Helsinki, Finland



Rajaa Cherkaoui El Moursli at the Matter and Radiation Science Laboratory (ESMaR), Mohammed V University, Rabat

Figure 1: (Photo Credit: Rajaa Cherkaoui El Moursli)

Rajaa Cherkaoui El Moursli, a distinguished professor of high energy and nuclear physics at the University of Mohammed V in Rabat, Morocco, has been recognized for her exceptional achievements, particularly in advancing physics and nuclear energy education, coupled with her strong dedication to the WiN Morocco and WiN Africa chapters.

Cherkaoui El Moursli [1] was among the early participants representing Morocco in the ATLAS collaboration at the European Organization for Nuclear Research (CERN) in Geneva. She spearheaded a research team at Mohammed V University in Rabat, Morocco, which actively participated in the ATLAS experiment at CERN [2]. The ATLAS experiments played a pivotal role in the discovery of the long-predicted fundamental particle known as the Higgs Boson [4], named in honor of its discoverer, the distinguished British theoretical physicist Peter Higgs, who jointly received the 2013 Nobel Prize in Physics with François Englert.

Cherkaoui El Moursli has held various significant roles throughout her career. She served as the head of the Laboratory of Nuclear Physics from 1996 to 2016 and Vice-President of UM5 from 2013 to 2017. In 1996, she was appointed to the Moroccan Agency for Nuclear and Radiological Safety and Security (AMSSNuR) Board of Trustees, the National Centre for Nuclear Energy, the National Center for Energy, Science and Nuclear Technology (CNESTEN), and the National Center for Scientific and Technical Research (CNRST).

In 2015, Cherkaoui El Moursli received the L'Oréal-UNESCO for Women in Science Award [3], representing Africa and the Arab States, for her key contribution to one of the greatest discoveries in physics: proof of the existence of the Higgs Boson, the particle responsible for the creation of mass in the universe. She was also assigned as a resident member of the Hassan II Academy of Sciences and Technology and, in 2017, Cherkaoui El Moursli was honored by the Organization of Islamic Cooperation (OIC). In 2018, she was assigned as a member of the Jury for the International L'Oréal-UNESCO Awards for Women in Science and was also elected a Fellow of TWAS. In 2019, she was elected Vice-President of the board of the Network of African Science Academies (NASAC) and, in 2022, she was nominated as a member of the European Academy of Science and Art.

Cherkaoui El Moursli has achieved a historic milestone by becoming the first Arab and the second recipient from Africa to be honored with the prestigious WiN (Women in Nuclear) Global Excellence Award. Sponsored by Thomas Thor, this award recognizes individuals who have consistently, effectively, and positively conveyed key messages regarding the nuclear industry and its applications. Cherkaoui El Moursli is set to receive this esteemed accolade during the 30th WiN Global Annual Conference and the inaugural WiN Africa Conference, scheduled to be held in Aswan, Egypt from November 12 to 16, 2023 [5].

"I sincerely thank all board and executive members of WiN Global for their trust and support," expressed Cherkaoui El Moursli. "I am extremely proud and deeply honored to receive the prestigious WiN Global Excellence Award, as it is a testament to over 40 years of hard work and dedication. Most importantly, I believe it will serve as an inspiring example for our young and talented Moroccan physicists."

Cherkaoui El Moursli, a dedicated advocate for advancing scientific research in Morocco, places special emphasis on the inclusion of women in the field of physics. She believes that having role models is crucial and encourages young women to actively seek mentors who can offer guidance and advice. According to Cherkaoui El Moursli, it is imperative to highlight the experiences of female physicists in order to inspire and encourage more young women to pursue careers in physics.

"I consider myself incredibly fortunate to have had Professor Cherkaoui El Moursli as both my professor and academic advisor. Professor Cherkaoui El Moursli is not only an outstanding physics educator but also a truly exceptional human being. Her abundant love, unwavering positivity, and generous spirit have enriched the lives of everyone fortunate enough to know her," remarked Laassiri. "Professor Cherkaoui El Moursli is the woman I deeply admire and aspire to emulate; she is my ultimate inspiration and the embodiment of a pioneering woman physicist."

[1] African Physics Newsletter: September 2021/ Rajaa Cherkaoui El Moursli

[2] ATLAS: "A Toroidal LHC Apparatus", LHC: Large Hadron Collider

[3] <https://www.unesco.org/en/articles/female-scientists-who-are-changing-world>

[4] ATLAS Collaboration. "A detailed map of Higgs boson interactions by the ATLAS experiment ten years after the discovery." Nature volume 607, pages 52–59 (2022)

[5] <https://win-global.org/conference/30th-win-global-annual-conference/>



Upcoming Events and Activities

- Cameroon First School on Nonlinear Dynamic and Complex Systems on Hypergraphs
September 25-28, 2023
University of Dschang, Cameroon
- The 3rd African Conference on Fundamental and Applied Physics (ACP2023)
September 25-29, 2023
Nelson Mandela University at George Campus, George, South Africa
- The Schlumberger Foundation 2024-2025 Faculty for the Future Fellowships:
Fellowships for women in STEM from developing and emerging economies for advanced research at leading research institutes abroad.
Applications open from September 4 to November 10, 2023
- TWAS Visiting Expert Programme
Application deadline: October 9, 2023
- Max Planck-Humboldt Research Units in Africa: New program for the promotion of young talent in Africa.
Proposal deadline: October 15, 2023
- The 5th International Conference on Optics, Photonics, and Their Applications (ICOPA'5)
November 26-28, 2023
USTHB, Algiers, Algeria
- The 7th International Conference on High Level Physics and Appropriate Solutions to Real Life Problems in Developing Countries
December 5-8, 2023
University of Dschang, Cameroon
- The Second US-Africa Frontiers of Science, Engineering, and Medicine Symposium
January 16-18, 2024
Académie Hassan II des Sciences, Rabat, Morocco

Your Online Resources

- [GRE Policies/Application Fees for Physics Graduate Programs in the US and Canada](#)
Compiled by Prof. James Guillochon, this comprehensive table details the GRE requirement policies and application fees for astronomy and physics graduate/PhD programs in the US and Canada.
- [Physics World Webinars](#)
Physics World Webinars from the Institute of Physics
- [APS Webinars](#)
APS Webinars connect you with the expertise of individuals who can offer insight into physics careers, educational programs, and professional development for students, working physicists, and educators.
- [APS Career Guidance Webinar Archive](#)
Career Guidance Webinars Archive of APS
- [Opportunities Available Through APS](#)
- [APS Physics Career Exploration Webinar Series Archive](#)
Features many of the common career paths available to those with physics degrees, as well as many that are “off the beaten path.”
- [SPS Career Webinars](#)
Society of Physics Students Archived Career Webinars
- [ICTP Virtual Seminars](#)
ICTP is expanding its free, online, interactive streaming options for its seminars and colloquia to mitigate some of the effects of isolation during the COVID-19 emergency and beyond.
- [NITheCS Webinars and Mini-schools](#)
The South African National Institute for Theoretical and Computational Sciences offers colloquia, webinars, and mini-schools.
[Upcoming events](#) | [Recordings of past events](#) | [Mini-schools](#)
- [The World Academy of Sciences \(TWAS\)](#)
The TWAS site lists deadlines for Fellowships, Prizes and Awards, Research Grants, Visiting Scientists, and Scientific Meetings.