THE AFRICAN PHYSICS NEWSLETTER

What's New in this Issue of the Newsletter?

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APRIL 2024

As the Regional Editor for Central Africa, it is both an honor and a privilege to introduce the first issue of the African Physics Newsletter (APN) for the year 2024. This edition encapsulates a wide array of groundbreaking scientific endeavors and inspirational journeys that vividly illustrate the vibrancy and diversity of the physics community across Africa. Our contributors, through their relentless pursuit of knowledge and innovation, underscore the importance of physics in shaping our understanding of the universe and driving societal progress.

In this issue, we traverse a spectrum of topics, from the foundational insights into the APN by Dr. Nithaya Chetty and Dr. Jim Gubernatis to cutting-edge research on the East African Nubian Shield's potential for gold mineralization. We delve into Morocco's strategic approaches to energy transition, employing renewable sources and optimizing energy efficiency, reflecting the continent's commitment to sustainable development.

The journey of a Kenyan physicist from the African School of Physics (ASP) to an intern at Brookhaven National Laboratory is particularly moving. It highlights the transformative power of international collaborations and mentorship in fostering scientific talent. Similarly, the Delta State University Faculty of Science International Conference underscores the pivotal role of research and innovation in socio-economic transformation within Africa.

This edition also brings to the fore personal narratives and achievements that inspire. The story of Professor Cláudio Moisés Paulo, for example, provides a profound insight into the challenges and triumphs faced by African scientists. The establishment of the Oyo Centre of Excellence for Renewable Energy and Energy Efficiency in the Republic of Congo marks a significant leap toward sustainability, showcasing Africa's leadership in renewable energy research and implementation.

Moreover, the preparatory visit for the 8th edition of the ASP, ASP2024, and the recognition of Dr. Kétévi Adiklè Assamagan at Brookhaven National Lab's 2023 Pinnacle Awards, exemplify the vibrant and inclusive spirit of our scientific community. The announcement of the 11th Science and Technology Week, bridging scientific communities across continents, further illustrates our shared commitment to leveraging science as a universal language.

Among these remarkable stories, one narrative stands out, embodying the spirit of perseverance, determination, and the quest for excellence in the face of adversity. Dr. Hassnae El Jarrari's journey from a small town in Morocco to

becoming an award-winning researcher at CERN is nothing short of inspirational. Faced with challenges, from navigating unfamiliar cultural norms to keeping pace with rapid advancements in science and technology, Dr. El Jarrari's resilience and unwavering dedication to her research exemplify the indomitable spirit of a scientist. Her story, highlighted by her approach to obstacles as learning opportunities, serves as a beacon of hope and inspiration for young scientists across Africa and the world.

Dr. El Jarrari's accomplishments, from pioneering research on dark matter to her significant contributions to the High Granularity Timing Detector project, reflect her exceptional talent and commitment to pushing the boundaries of high-energy physics. Her work not only advances our understanding of the universe but also fosters a culture of excellence and inclusivity within the scientific community. Her engagement in outreach activities, particularly in introducing the wonders of particle physics to students across Morocco, demonstrates her passion for science communication and her dedication to inspiring the next generation of scientists.

This edition of the African Physics Newsletter is a testament to the remarkable contributions of African physicists to the global scientific community. It is a celebration of the resilience, creativity, and collaborative spirit that define our collective pursuit of knowledge. As we share these stories of achievement and discovery, we hope to inspire continued innovation and exploration in the field of physics, reinforcing the role of science in driving progress and understanding across our continent and beyond.

Dr. El Jarrari's journey, along with the diverse range of topics covered in this issue, underscores the dynamic and evolving landscape of physics in Africa. It is a reflection of our shared aspirations and the boundless possibilities that lie ahead. As we embark on this year's journey through the APN, let us remain committed to fostering an environment of collaboration, innovation, and inclusivity, paving the way for a brighter and more scientifically engaged future.

Raïssa Malu
Editor, Central Africa

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.

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Interview with Jim Gubernatis, APN Co-founder and Immediate Past Advisory Board Chairman

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Jim Gubernatis,
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APRIL 2024

Figure 1: The author. (Photo Credit: Los Alamos Laboratory)

Nithaya:
Dr. Jim Gubernatis, you have just retired from the role of inaugural chair of the Advisory Board of the African Physics Newsletter. We in Africa and the world owe you a huge debt of gratitude for your tremendous efforts in establishing the APN. You led the way from the beginning, and you put a coalition of support around you to make this work. My recollection is that this was not easy from the start, but you persevered, and now when we look back on these almost five years, we can feel very proud of what has been achieved.

You have been involved in several initiatives in Africa that have assisted in the development of physics. What motivated you to get involved in physics in Africa, and what were some of the activities that you were involved in?

Jim:
My first involvement in African physics was initially motivated by the desire to grow computational physics there. I was the Chair of IUPAP's (International Union of Pure and Applied Physics)Commission on Computational Physics, when you, Nithaya, a member of my commission, sent me an email about a proposal for a school to be held in South Africa on electronic structure methods that you wanted to submit to IUPAP. For Africa, I saw computational physics as a badly underutilized but less costly approach to physics than experiment. We linked up with Kennedy Reed, then the chair of IUPAP's commission for physics in developing countries and presented a more expansive proposal that started the now long-standing and highly successful African School of Electronic

Structure Methods and Applications (ASESMA). This experience with African physics led to my being named to the APS's Committee on International Scientific Affairs (CISA), which in turn opened the door to other opportunities for promoting African physics.

Nithaya:
How did the idea of the APN come about, and how did you begin to put this project together back in 2017-18?

Jim:
When I joined CISA, APS's director of international affairs, Dr. Amy Flatten, asked me to think of several projects about physics in Africa that CISA could sponsor. My thinking, bolstered by emails, phone calls, and conversations with others, reached the conclusion that the knowledge of the physics community outside of Africa had about physics inside was limited to specific regions and sub-fields. Additionally, the diversity among countries made it difficult to identify a few "one-size-fits-all" programs. What I suggested was that CISA first sponsor a survey of physics in Africa to identify activity and its needs and then work with the African community to develop specific projects. When completed, one area of need the survey identified was building bridges across various communication gaps via websites, newsletters, conferences, workshops, etc.

Nithaya:
What were some of the daunting challenges that you faced even before the first issue was published?

Jim:
The "daunting" challenges became apparent after we started publishing. You and I went from proposal to the newsletter's first issue in three to four months. There was marvelous enthusiasm and cooperation among the initial editorial board, the people in different departments of APS, and the initial set of authors. The daunting challenge became apparent after the first issue was published. The APN is an all-volunteer operation. The African physics community is responsible for providing the newsletter content. The challenge is getting all the volunteers, that is, the members of the APN's Editorial Board, to deliver their share of the content in a timely manner. Too often people agreed to serve as an editor and never contributed any articles.

Nithaya:
There were many wobbles in the first two to three years after the first publication in February 2019. How were you able to keep the ship steady despite these difficulties?

Jim:
The biggest "wobble" was the pandemic. Many of our articles are about upcoming or just past conferences, schools, workshops, etc. The pandemic shut down most of that activity, in addition to shutting down the countries themselves, their universities, internet services, etc. Serendipity, in the sense of unsolicited articles, helped to provide needed content. Other times, several of us, particularly Dr. Igle Gledhill, our Editor-in-Chief during this time, simply wrote extra articles.

Nithaya:
Africa is a huge continent with many different histories, cultures, economies, etc., and importantly many different levels of physics development in different countries. You understood early on that it is not wise to take a "one-size-fits-all" approach. I think that one of your greatest strengths was being patient and culturally sensitive in dealing with colleagues from so many different backgrounds and getting them to pull in the same direction. What was your strategy for getting the team together?

Jim:
I always had the view that this is not my newsletter but rather it was that of my African colleagues. I tried to be encouraging and to treat everyone even-handedly and respectfully. People either saw the newsletter as being an important opportunity for the African physicist community and contributed, or they said it was so and did not contribute. Fortunately, there have been more of the former. In the long run, you go with the winners.

Nithaya:
Getting APS behind the project was a huge step forward for establishing the APN. What were the critical conversations that you had in getting APS to support publishing the APN?

Jim:
My conversations were with Amy Flatten, who was always supportive of the newsletter. She walked the hallways of the APS and talked with other department heads about their concerns and expectations for it. The most critical issues, as best I can remember, were our wanting a quarterly publication instead of one that was semi-annual or annual, and APS saying it needed to be an all-volunteer operation. It was also emphasized that

the newsletter was to exhibit the same professionalism that other APS newsletters did. Seeing this mainly fell into my lap.

Nithaya:
What in your view were some of the highlights of the APN?

Jim:
If I had to pick one article it would be Baobabs in Trouble: Accelerator Mass Spectrometry Provides Ages of the Most Ancient Trees. I never heard of such trees, let alone had any sense of their practical, cultural, and spiritual significance. At the same time, the article illustrated how science and society can benefit from each other. It is also an example of how climate change is apparently threatening the survival of life that otherwise survived one and perhaps two millennia.

More generally, since our articles are written by the African physicists themselves and not by any staff writers or freelance journalists, they often have a personal perspective, particularly when the article discusses the author's journey to their PhD, current position, promotion, award, etc. What one sees, particularly those of us who sit outside of Africa, are not just the barriers they overcame, which often do not exist elsewhere, but also their grit and determination to overcome them.

Nithaya:
What advice do you give to the current generation of editors insofar as APN is concerned? Is there something specific that you would like to see improved going into the future?

Jim:
The position of an editor of the APN is a leadership position. How one performs in this position can either open or close doors to future leadership positions. Be a leader. Advocate for your colleagues. Enjoy the experience.

Nithaya:
What are your hopes for the APN in, say, ten years from now?

Jim:
I hope the APN becomes even more broadly seen by the African physics community as an important go-to voice for its physics, and instead of waiting to be asked to contribute an article, more people step forward and volunteer to do so. With my stepping aside as the chair of its Advisory Board, its editorial operations are now truly all African. I would hope that one day its publication will become all African.

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East African Nubian Shield: An Active Geophysical Target for Mineralization

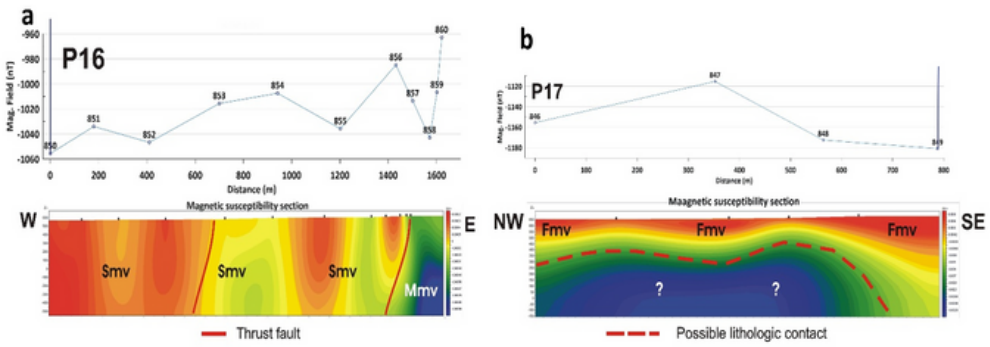

Figure 1: (A and B) Two magnetic susceptibility tomography profiles show the distribution of different rock units in the subsurface and reveal the geologic structures forming them. (Photo Credit: NA)

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Three years of intensive field and office work represent the period of a mega-project, namely "Exploring carbonatized ultramafic rocks (listvenite) for gold occurrences in the Qena-Safaga-Quesir area (Golden Triangle) and its impact on development plans, Eastern Desert, Egypt." The Science, Technology and Innovation Funding Authority (STDF) financed the project. The aim was to use the magnetic field of the earth and its derivatives to study the Precambrian rocks exposed in the area bounded by Qusier, Qena, and Safaga roads (the Golden Triangle). These rocks are mainly represented by ophiolitic ultramafic rocks, their alteration product, and metavolcanic rock intruded by synorogenic granitoid (Qz diorite, Granodiorite), and later by post-orogenic pink granite. The Eastern Desert is part of the Nubian Shield, one of the major exposed gold-rich Precambrian rocks in North East Africa. The Eastern Desert contains many gold occurrences that were mined from the predynastic (about 3000 BCE) through the Pharaonic periods till the end of the Arab times (ca. 1350 CE). The Turin Papyrus Map, drawn around 1150 BCE, documented gold exploitation in the Eastern Desert.

Aeromagnetic surveys are carried out by aircraft carrying or towing a magnetometer sensitive enough to record nanoTesla variations. The results are corrected for the solar wind and aircraft effects.

The project focused on ophiolitic ultramafic rocks and their alteration, the main gold mineralization target. Results indicated that gold mineralization in the study area is linked to the altered ultramafic zones associated with faulting and shearing and characterised by a low magnetic susceptibility anomaly. In south Abu Marawat – the highly potential gold mineralization zone – some strike-slip

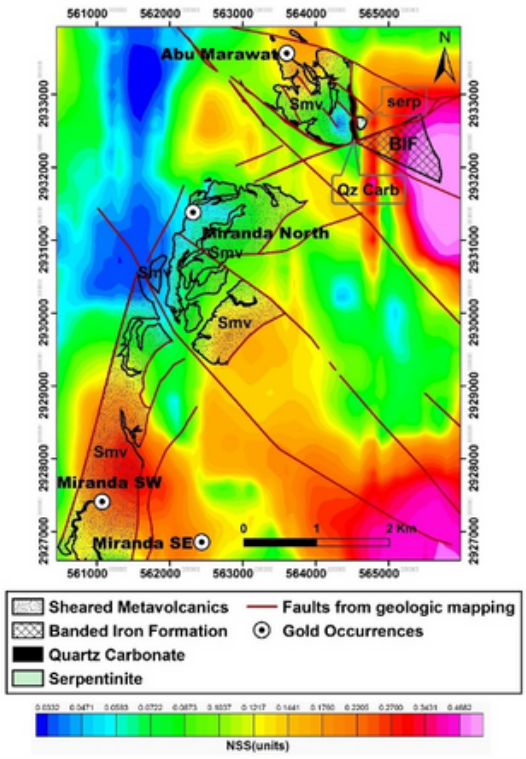

Figure 2: Sheared metavolcanic, serpentinite, quartz carbonates, and banded iron formation posted on normalised source strength transformed reduced to pole aeromagnetic map. (Photo Credit: NA)

faults show high magnetic anomaly due to shearing along fault planes and probable concentration of iron oxides by hydrothermal solutions.

The wadi deposits within the post-orogenic granite at some profiles close to the contact against the basic metavolcanic reflect a high magnetic susceptibility anomaly. These deposits are dark grey in the field and on satellite images. This anomaly is most probably due to the high concentration of iron oxides.

Acknowledgments
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The Moroccan Strategy for Effectiveness in Energetic Transition

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Addressing numerous problems, including those related to the environment and energy consumption, requires tackling the crucial matter of renewable energy. This type of energy can solve several challenges associated with the current production scheme, primarily dependent on fossil fuels. Solar energy, readily available and simple to use, is the ideal substitute for fossil fuels in resolving environmental issues. National demand for electrical energy increased by an average of 4.12% per year between 2009 and 2022 due to the near universalization of rural electrification and the dynamism of our economy, especially the policy of significant projects in infrastructure, industry, agriculture, tourism, social housing, etc [1].

Figure 1: The Noor Ouarzazate complex, spread over 3,000 ha, comprises four solar power plants using different technologies (CSP with parabolic cylindrical mirrors/CSP with tower/Photovoltaic). The installed capacity of the complex is 580 MW. (Photo Credit: Ref. [2])

Introduction

Under the high guidance of His Majesty King Mohammed VI, Morocco announced an energy policy in 2009 that primarily focused on developing energy efficiency, increasing the use of renewable energy sources, and fortifying regional connectivity. This approach, divided into programs with clear goals and combined with specific institutional and legislative reforms, proved effective and relevant in enabling Morocco to transition from a nation that relied solely on imports to one that produced its energy from renewable sources. Morocco's energy strategy heavily relies on renewable energies. By utilizing these resources, the country can replace fossil fuels and meet a significant portion of its growing energy needs. Morocco aims to have more than 52% of installed electrical power from renewable sources by 2030. As part of a major program on the exemplary nature of the state, this new strategy also aims to explore new energy sources, such as the energy transformation of waste

(biomass) in large Moroccan metropolises and the use, as much as possible, of renewable energies, maximizing energy efficiency in public buildings. With 111 finished or in-progress renewable energy projects, this aim is beginning to come to fruition, with 3.95 GW of installed renewable energy sources, or roughly 37% of the total electricity mix, comprising 0.71 GW of solar, 1.43 GW of wind, and 1.77 GW of hydroelectric power.

Strategy

For Morocco, international cooperation is a strategic decision driven by shared interests, fraternity, and solidarity. The country aims to diversify its international partnerships to attract investments, transfer technologies, and carry out development programs while reaffirming its commitment to Africa's development and the expansion of South-South cooperation. This approach has enabled Morocco to reach several cooperative agreements with friendly and strategically important nations, as well as international and regional organizations. These agreements cover training and experience sharing, cooperative program execution, technology and information transfer, and program implementation. Morocco's foreign cooperation policy has set three major goals for the upcoming years:

1. Strengthening and expanding bilateral cooperation:
   - Look for new opportunities to grow and strengthen bilateral cooperation with strategic partner nations.
   - Keep expanding the South-South cooperation model and strengthening aspects of cooperation with African nations.
   - Consolidate and develop cooperation with Arab nations, especially in the Ministry's priority areas (renewable energy, energy efficiency, hydrocarbons, peaceful uses of nuclear energy, etc.).
   - Accomplish the Ministry's obligations under cooperation agreements concluded in the energy and mines sectors.

2. The strengthening and expansion of international organizations, regional alliances, and contributors:
   - Look for fresh chances to expand multilateral collaboration, especially with funders to assist in carrying out various Ministry initiatives.
   - The progression of multilateral collaboration - to boost Morocco's international standing and facilitate the execution of the Ministry's plans.

3. The growth of three-way cooperation (African country - Morocco - Partner country or international organization)
   - Seeking opportunities from international organizations, funders, and advanced partner countries (such as China, Japan, and South Korea in Asia) for tripartite cooperation with African countries.

For example, within the National Program for the Promotion of Solar Pumping in Irrigation (NPPSPI) and to promote energy-efficient techniques in the agricultural sector, the Ministry of Energy Transition and Sustainable Development has undertaken several actions to encourage the use of solar energy systems for water pumping in this sector. These systems have become competitive with traditional pumping systems, characterized by low maintenance and operating costs, thereby providing an alternative solution for the use of butane gas in agriculture.

Figure 1: A photograph presenting water pumping using a photovoltaic system. (Photo Credit: The Author)

The solar pumping market in the agricultural sector has shown significant recovery in recent years, as indicated by a study which revealed that:

- Between 2019 and 2020, approximately 10,000 solar pumping systems were installed in the agricultural sector, increasing from 30,000 to 40,000, representing 8.8 drip irrigation pumps.

- Most large and medium-sized farms have adopted solar energy for water pumping (4/3 self-financing).
- Between 2015 and 2020, the price of photovoltaic solar panels dropped by 50% in the national market.
- The competitive cost of solar water pumping compared to conventional energy sources (0.44 MAD per cubic meter of water) compared to 0.76 MAD for subsidized butane and 1.67 MAD for diesel.

References

[1] https://www.mem.gov.ma/Pages/index.aspx

[2]" Noor Ouarzazate: le plus grand complexe énergétique solaire au Monde," sur Maroc.ma, 5 février 2016 (consulté le 3 mars 2020)

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My Journey from the African School of Physics to an Intern at Brookhaven National Laboratory

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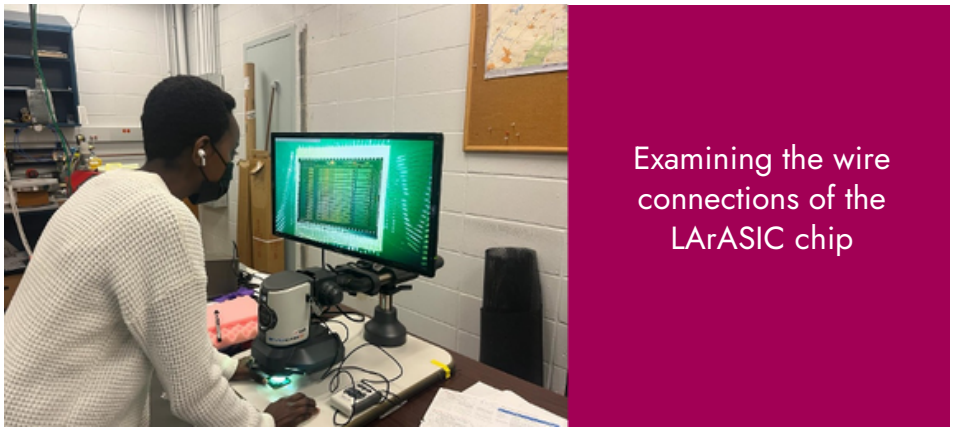
My name is Gloria Maithya, and I was born and raised in the stunning landscapes of Kenya. My venture into the world of physics has been an extraordinary journey, rich with remarkable opportunities. Today, I am excited to share the wonderful story of my life with you.



Examining the wire connections of the LArASIC chip

Figure 1: (Photo Credit: Lingyun Ke, Brookhaven National Laboratory)

In 2016, I enrolled at the esteemed University of Nairobi to pursue my undergraduate studies in the physics department. Following my outstanding performance and attainment of a first-class honors degree, I was honored to receive a scholarship to further my studies at the master's level. Joining this prestigious university was a life-changing opportunity that I will forever cherish. The support I received from the faculty and my peers, coupled with the enriching academic and life experiences, significantly contributed to my growth and development as a scientist.

In 2022, my journey took an unexpected turn when I had the privilege to participate in the African School of Physics (ASP) in South Africa. Initially selected as an online participant, my university graciously offered to support my attendance in person. So, what was I to do? I reached out to the ASP organizers, and to my delight, Dr. Kétévi Assamagan, the founder of the school, approved my request to join the school in person, covering my meals and accommodation while my school covered my travels. I am forever grateful for this opportunity which not only broadened my horizons but also paved the way for further endeavors.

"At Brookhaven, I worked in the physics department on the Deep Underground Neutrino Experiment (DUNE), a groundbreaking project set to launch in the United States."

Following my involvement in the ASP, I was featured in the School's magazine, highlighting the impact on students like myself. Subsequently, I was selected, along with four other African students, for an internship at the prestigious Brookhaven National Laboratory (BNL) in the United States. This internship, which covered all expenses, was a turning point in my career. At Brookhaven, I worked in the physics department on the Deep Underground Neutrino Experiment (DUNE), a groundbreaking project set to launch in the United States. My responsibilities encompassed developing a Python script for quality control and the analysis of data generated from LArASIC chips, crucial components for DUNE. This experience was both exhilarating and enlightening, and I am super thankful to my BNL colleagues and advisors.

On the verge of finishing my internship at Brookhaven, I took the initiative to apply to Ph.D. programs in the United States. I am pleased to announce that I have already received acceptance from one school and look forward to hearing from others. My pursuit of further career development will continue through Fall 2024, filled with excitement and eager anticipation.

I am immensely grateful to all the amazing individuals who have crossed my path, from the supportive community at the University of Nairobi to the mentors and advisors at Brookhaven National Laboratory. Their guidance and encouragement have been instrumental in shaping my journey thus far, and I look forward to the adventures that lie ahead.

Figure 1: Final Presentation of my research findings at BNL. (Photo Credit: ASP colleague.)

Figure 1: Group Photo alongside Dr. Kétévi Assamagan and fellow ASP participants from Africa. (Photo Credit: ASP colleague)

THE AFRICAN PHYSICS NEWSLETTER

Delta State University Faculty of Science International Conference

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It is time for African scientists to be truly engaged in research and innovation focusing on solving our problems using local content, with the goal of transforming solutions into goods and services for national and global consumption. This was the motivation for the Delta State University Faculty of Science International Conference (DELSU FOSIC2023), held from November 6 to 9, 2023 at Delta State University, Abraka, Nigeria. Thus, the theme of the conference was "Unleashing the Potentials of Science for Innovative & Transformative Economic Diversification."

Figure 1: A courtesy visit to the Vice Chancellor of the DELSU, Prof. Andy O. Egwunyenga and the Principal Officers by the DELSU FOSIC2023 invited speakers, led by the Dean of DELSU FOS, and accompanied by the Chairman and members of the Local Organizing Committee. (Photo Credit: DELSU FOSIC2023 LOC)

The main aim of the conference was to mobilize the local scientific community toward driving the commercialization of our research results through creative and innovative applications of science, fostering transformative economic diversification—the wheel of rapid growth and sustainable development. There were three carefully chosen speakers from Nigeria, South Africa, and Taiwan, alongside 153 presentations and a total of 196 participants.

The keynote speaker, Professor Nithaya Chetty of the University of Witwatersrand in Johannesburg, South Africa, advocated for the strategic plan's success through "nurturing entrepreneurial thinking at our universities." He summarized his proposal, derived from his university, as follows:

"Contemporary education aims to equip graduates for the workforce, emphasizing practical skills, an entrepreneurial mindset, and critical thinking.

"The main aim of the conference was to mobilize the local scientific community toward driving the commercialization of our research results through creative and innovative applications of science, fostering transformative economic diversification—the wheel of rapid growth and sustainable development."

Figures 2 (left) and 3 (right): Cross sections of participants. (Photo Credit: DELSU FOSIC2023 LOC)

The delicate balance between job readiness and preserving foundational university values is crucial. This calls for innovation's central role in academic programs, addressing societal challenges and promoting economic growth. The entrepreneurial pipeline, emphasizing idea generation to startup establishment, is crucial for success. The synergy between academia and business should be stressed by urging universities to incentivize innovative ideas.

Postgraduate education, particularly using my university's Dual Study Program as a model, is a potent strategic plan for transformation, fostering innovation and real-world application. The end products are graduates driving substantial change by integrating practical skills, entrepreneurship, and innovation within the university framework.

The first lead speaker, Emeritus Professor Ikenna Onyido, former Vice-Chancellor of Michael Okpara University of Agriculture, Umudike, Nigeria, delved into "Science, Research and Economic Development (and Diversification): The Nigeria Example." He analyzed the impact of science on the destiny of nations and the conditions which enable the power of science to be unleashed to drive economic development, including the relationship between expenditure on research and development (R&D). Professor Onyido also spoke on economic development and human well-being, and fostering partnerships and linkages to deliver innovation for economic development. He reappraised these criteria for the Nigerian context and proposed the way forward. He concluded with the following advice:

"A meaningful start to set a new course for the country must involve science, and research in science that brings forth new knowledge. It must be clear to our political leadership that any effort that proceeds without well-funded and properly functioning universities will be an exercise in futility – pure and simple."

The second lead presentation was delivered by Distinguished Professor Han-Ching Wang from the Department of Biotechnology and Bioindustry Sciences at the National Cheng Kung University, Tainan, Taiwan. Her virtual presentation elaborated on how scientists in Taiwanese universities are partnering with industries to commercialize their research and address the goals of food sufficiency and economic prosperity.

Motivated by the consensus that shrimp aquaculture is one of the important economic activities in East Asia, Professor Wang provided a graphic account of her lifelong scientific findings aimed at addressing shrimp diseases. She highlighted how the shrimp aquaculture industry has profited from implementing some of her discoveries in the development of biosecurity management plans.

The highlight of the conference was the launch of the Delta State University Faculty of Science Business Canvas Model (DELSU-FOS-BCM) Exhibition. This initiative aims to initiate the galvanizing and re-orientation of DELSU-FOS multi-disciplinary research toward developing goods and services that address our local, national, and global challenges, especially those utilizing local resources. The launch served as a prelude to the emergence of small-scale, medium-scale, and even large-scale companies in the future.

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Citizens and Travelers II Series - Episode One: Professor Cláudio Moisés Paulo

In the last APN issue, we introduced "Citizens and Travelers II," featuring stories of African scientists who have overcome challenges to achieve success in their respective fields. Professor Cláudio Moisés Paulo is among these scientists, with his interest in science tracing back to the mid-'80s when he was a primary school student.

Professor Cláudio Moisés Paulo

(Photo Credit: Cláudio Moisés Paulo)

Professor, tell us about yourself.
I was born in Beira City, Mozambique, on August 30, 1979. My parents were married when I was born, but they divorced when I was around 2 years old. Thus, I spent my entire childhood with my mother, residing in a house with her, my elder brother, and some of her brothers. Despite the modest living conditions, the environment was good, and the neighbors were very friendly. I spent my infancy and adolescence with very good friends. My mother engaged in my education, consistently motivating my studies. Life circumstances pushed my commitment to school, and from grade 5 onward, I started taking control of my studies. My mother was the only person who assisted me with homework and school tasks. I dedicated most of my time to reading and completing assignments. By the 7th grade, the limited space in our small house pushed me to seek out a library to study in.

How did your family background affect your career decision?
My mother was involved in educational activities, shaping my perspective to consider school as a tool for future success. Later, around the age of 14, my early convictions were challenged when I met my father, who had a professional background in electronic engineering.

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Please give us a short description of your primary and secondary school academic performance and experience, especially with science subjects. When did the curiosity to understand science develop or become noticeable?
I attended primary school at Heróis Moçambicanos School, followed by secondary school at Mateus Sansão Mutemba Secondary School and Samora Machel Secondary School, both reputable institutions in Beira. I ranked in the top 10 positions as a very good student. With the support of my mother's income, I committed myself to studying and preparing for my future. Excelling in science subjects, it was easy for me to find my future path in science.

Have you ever left your home country for higher education? If yes, why? Then, can you please share some highlights of your stay out of your home country?
Yes. After completing my first honors degree, I sought opportunities for further studies. Thus, I secured a scholarship to go to South Africa, where I earned an honors degree – an MSc and a PhD. From 1979 to date, I have had the opportunity of residing abroad during various periods, including Cape Town (2007–2009) and Johannesburg (2013–2016). During this period, I also had the opportunity to visit Brazil, Italy, Botswana, Namibia, Zimbabwe, São Tomé e Príncipe, Tanzania, Portugal, and the Netherlands. I had contact with people from many countries in Africa during my time in South Africa, which provided a valuable cultural learning experience. The environment was excellent for enhancing my educational skills in my country of origin.

Are you married? Then, how are you able to manage your family and career? Have you also experienced any emotional issues at some point in your career? If yes, how did it affect you? What mistakes did you make as a result of this, and how did you overcome them?
I am married and a lucky guy. I have been in a relationship with the same person since 2004. Throughout this time, she has supported and decided to stay with me, even knowing about my commitment to science. The divorce of my parents when I was young made me grow up with my mother. When I met my father, I decided to live with him. However, it was not easy to live with him and be far away from my mother. At the same time, I had a stepmother who took advantage of this situation to behave badly. These were the emotional issues I faced, and they affected my academic life and growth. The only solution from my end was to always forget about myself and study. This situation was intense from the 10th grade until I finished my first honors degree in Mozambique. Following this milestone, I decided to go back to my mother, where I continued my life plans, ultimately obtaining a second honors degree, an MSc, and a PhD abroad.

Share your doctoral degree experience.
My PhD study was rewarding. I had an exceptionally good supervision team at the University of Witwatersrand in South Africa. We studied diffuse emissions in a sample of galaxy clusters. Despite a conducive research environment, it wasn't easy to come out with our results, requiring over six years on the research. Tragically, my main supervisor passed away in the last year of my studies. This loss pushed me to find solutions with my co-supervisor, and luckily, we obtained them. This experience has molded me into the professional that I am now.

Tell us about your PhD Thesis.
In a few words, it was fulfilling and challenging work. I delved into understanding the origin of diffuse emission on the outskirts of galaxy clusters. For that, compiled a sample of galaxy clusters using data from the literature and studied some correlations of the main important galaxy cluster parameters such as luminosity, cooling time, shock Mach number, Sunyaev-Zeldovich effects, and diffuse emission from the central part of the galaxy clusters. The topic was "the properties of radio relics and the connection with radio halo in galaxy clusters and their correlation with non-thermal phenomena at multi-frequency," which produced two published articles.

In general, the concentration aimed to understand the following: a) the correlations between radio relics [1] and some dynamical parameters of galaxy clusters; b) the origin of radio relics in galaxy clusters: a combined gamma and radio wavelength analysis; c) the correlation between radio power and Mach number for radio relics in a galaxy cluster; and d) the spatial analysis of radio relics in galaxy clusters. Ultimately, my research yielded some good results for the scientific community, including a proposal of a novel model for particle acceleration in galaxy clusters that leads to diffuse emission creation.

Describe your PhD advisors and your relationship with them. How would you advise PhD students on how to deal with the loss of a supervisor or a difficult supervisor?

[1] A radio galaxy is a source of radio waves, generated by the jets emitted by an active galactic nucleus. If the jet source stops emitting, the remains of the jets are called radio relics - they continue to radiate in the radio spectrum. – Ed.

My PhD advisor was a remarkable person, though very busy at the same time. Initially, he was often out of the country, so we had less contact. However, keeping in mind the responsibility to produce results, I persevered. Midway through my PhD studies, my advisor introduced me to a co-advisor who worked with me until the end of my studies. Regarding the loss of a supervisor, after I lost mine, it was painful for me. So, the only advice I can give someone who has lost a supervisor is that you must work as hard as possible to see results and complete your studies.

Tell us about your research achievements and the challenges you have faced so far as a scientist in Africa or an African scientist in the Diaspora.
My research achievements can be found on my website (https://claudiompgalanhane.weebly.com/). I am a professor at Eduardo Mondlane University (UEM) in Mozambique. There, I am the coordinator of the research group named "Astrophysics, Space Sciences and Artificial Intelligence Group" ("Grupo de Astrofísica, Ciências Espaciais e Inteligência Artificial [GACEIA], in Portuguese"). In this role, I organize activities to promote the field among our young students. The results are very good, and from the many projects that I am running, many students have been awarded scholarships for MSc and PhD studies abroad. I coordinate outreach activities in astronomy, visiting many schools with telescopes and organizing astronomy workshops. The GACEIA places our young students in an environment of publication before obtaining their honors degree. However, the big challenge for scientists in Africa is the environment; the lack of funds makes life difficult, which impacts scientific results..

Give a brief description of any discrimination you have previously experienced or are currently facing as an African scientist in the Diaspora.
There have been no problems as of now. The big issue is seeing older people not easily accept the work of the young generation. I face this challenge in-depth, but the solution is to keep working day by day.

Beyond the difficulties, what is the greatest pleasure or advantage of being an African scientist?
Even with the difficulties, the greatest advantage is the opportunity to be an African man. I have the responsibility of influencing my government and young people to pursue careers in fields related to science. This is my greatest pleasure and advantage.

[2] Astrophysics, Space Sciences and Artificial Intelligence Group.

THE AFRICAN PHYSICS NEWSLETTER

The Oyo Centre of Excellence for Renewable Energy and Energy Efficiency

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The Republic of Congo, in collaboration with the United Nations Industrial Development Organization (UNIDO) and Eni Congo, is aiming to establish the Oyo Centre of Excellence for Renewable Energy and Energy Efficiency (Centre d'Excellence d'Oyo pour les Energies Renouvelables et l'Efficacité Énergétique, in French, or "CEO") to contribute to the creation of an integrated and inclusive sustainable energy market in the country and the wider region.

Figure 1: View of the main CEO building. (Photo Credit: Centre d'Excellence d'Oyo pour les Energies Renouvelables et l'Efficacité Énergétique (CEO))

UNIDO, leveraging its experience in establishing similar institutions such as the Global Network of Regional Sustainable Energy Centres (GN-SEC), will support the operationalization of the CEO in the creation of the institution (e.g., establishing a governance structure, building the capacity of the staff, and establishing administrative rules and regulations). Once the CEO is fully operational, the support will take the form of a technical assistance project for the newly established institution. The project will focus on capacity building, research, and policy advice within the water-energy-food nexus. This endeavor will support both local and international researchers and institutional capacity building, contributing to the creation of an integrated and inclusive sustainable energy market in the country and region.

At a regional level, the CEO aims to cooperate in synergy with the Centre for Renewable Energy and Energy Efficiency of Central Africa (CEREEAC) – in particular, as a thematic hub focusing on applied research and capacity building, complementing and supporting CEREEAC's activities.

"This endeavor will support both local and international researchers and institutional capacity building, contributing to the creation of an integrated and inclusive sustainable energy market in the country and region."

Figures 2: Installation of Dr. Maryse D. Nkoua Ngavouka, Executive Director of the CEO by Emmanuel née Adouki Delphine Edith, Ministry of Higher Education, Scientific Research and Innovation of the Republic of Congo, on September 1,,2023. (Photo Credit: CEO)

The CEO's vision aligns with several national and regional policy and planning documents including the National Development Plan (PND) of the Republic of the Congo, the national scientific research and innovation policy, the ECCAS [1] Green Economy and Renewable Energy Vision, the ECCAS Vision 2025, as well as the CEMAC [2] White Paper and Energy Policy 2035.

Following the formal inauguration of the CEO on April 23, 2023, under the patronage of His Excellency Denis Sassou-N'guesso, President of the Republic and Head of State of Congo Brazzaville, and the installation of the Executive Director, the operationalization has formally begun through the Framework Agreement for the Implementation of the CEO. The framework was validated in February 2022 by the Government of the Republic of Congo, UNIDO, and Eni Congo. The activities are based on the following key intervention areas/themes:

- The water-energy-food nexus;
- Rural electrification with renewable energy (RE) and energy efficiency (EE);
- Entrepreneurship and development of the private cleantech sector.

The CEO's key themes help to shape the overall direction and focus of the institution within the broader umbrella of supporting RE and EE in the country and the wider region. The work is structured around a set of outcomes that better target the work under the above themes.

Core funding for the operationalization of the CEO is to be provided by the Republic of Congo, Eni Congo, and UNIDO. In December 2023, the European Union formalized its support to capacity building activities to be implemented by the CEO. This contribution aligns with the objective of the CEO to leverage project-based funding during its operations.

References:

[1] Economic Community of Central African States
[2] Economic and Monetary Community of Central Africa

THE AFRICAN PHYSICS NEWSLETTER

Highlights of the Site Visit in Preparation for the 8th edition of the African School of Physics

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APRIL 2024

The African School of Physics (ASP) [1] is organized periodically in various African countries identified through competitive bids. Morocco was selected to host the 8th edition of ASP, ASP2024, at Cadi Ayyad University in Marrakesh.

Figure 1: ASP2024 Site Visit. (a) meeting at the CNRST. (b) meeting with the President of the Higher Council for Education, Training, and Scientific Research. (Photo Credit: (a) CNRST and (b) CSEFRS)

ASP2024 is planned on two different dates. From April 15–19, 2024, a physics outreach event aimed at motivating high school learners to develop and maintain interest in physics is planned for high schools in the Marrakesh region. This outreach event consists of physics experimentation and hands-on exercises, with the participation of up to 2,000 high school learners. A second set of activities is planned for July 7-21, 2024, featuring intensive physics lectures, tutorials, and experiments designed for university students who have completed a minimum of three years of university education in physics.

About 80 to 100 students, mostly African, are selected to attend the in-person event, with additional participants joining online. In addition, a one-week training session will take place on July 8-12, 2024, aimed at high school teachers from Morocco to support their growth in planning and delivery of physics instruction. About 80 high school teachers, selected nationally by local authorities, are expected to receive this training.

The third activity, planned for July 13, 2024, is the ASP forum—a platform to engage African policymakers and discuss alignment of the ASP program with the strategic priorities of African countries in physics education and research. Additional high school outreach activities are foreseen for the week of July 15-19, 2024.

"This outreach event consists of physics experimentation and hands-on exercises, with the participation of up to 2,000 high school learners."

Figures 2: ASP2024 Site Visit. (a, left) meeting with the Dean of the Faculty of Sciences Semlalia, (b, right) During the meeting with the officials of the Regional Academy of Education. (Photo Credit: Mohamed Chabab)

ASP2024 will be a collection of parallel activities, with many participants, including high school students and teachers, university students, lecturers, organizers, and policymakers. Effective planning and logistical support are the key to a successful ASP2024. To review and improve logistics and secure local support, the ASP International Organizing Committee (IOC) makes a site visit to the host country several months before the start of the ASP. During the visit, an international delegation composed of members of the IOC and International Advisory Committee (IAC) of ASP works in person with the Local Organizing Committee (LOC) to solicit support from the relevant national and regional authorities, review the infrastructure, and identify the improvements needed.

For ASP2024, the site visit took place from February 12-16, 2024. The international delegation consisted of Senior Scientist Emeritus Dr. Herman B. White Jr. (Fermilab) from the IAC as well as Senior Physicist Dr. Kétévi A. Assamagan (Brookhaven National Laboratory) and Early Career Physicist Dr. Mounia Laassiri (Helsinki Institute of Physics), both representing the IOC. Several members of the LOC, led by Professor Farida Fassi (Mohammed V University) and Professor Mohamed Chabab (Cadi Ayyad University), joined the international delegation in all engagements with relevant authorities.

The site visit began in Rabat, where, on February 12–13, 2024, the delegation met with the Director of CNRST (Centre National de la Recherche Scientifique et Technique), the President and the Dean of Science of Mohammed V University, the President of the Higher Council of Education and Scientific Research, cabinet members of the Ministry of Higher Education, Scientific Research and Innovation), the Perpetual Secretary of the Hassan II Academy of Sciences and Technologies, and their support staff. During these engagements, support (both in-kind and financial) was secured for all the planned activities at ASP2024. More details can be found in Refs. [2, 3, 4].

On February 14, 2024, the site visit delegation attended the PhD thesis defense of Zainab Soumaimi, an ASP2021 alumna whose research on the ATLAS Experiment was co-supervised by Professor Farida Fassi and Dr. Kétévi A. Assamagan. After the thesis defense proceedings, the site visit delegation proceeded to Marrakesh, where on February 15–16, 2024, further meetings and a logistics review were conducted. Specifically, the delegation met with the Dean of the Faculty of Science at Cadi Ayyad University, and visited the faculty premises including amphitheaters, seminar rooms, and computing facilities to use during ASP2024. From Marrakesh, the delegation traveled to Ben Guerir to visit Mohammed VI Polytechnic University, aiming to integrate them into the LOC. Further meetings were carried out with the Vice-President of Cadi Ayyad University and officials of the Regional Academy of Education, responsible for the high school learners' affairs. Officials of Cadi Ayyad University provided in-kind support for the usage of the university facilities, whereas the Regional Academy of Education provided support for the high school outreach program, both the scientific and logistical aspects. Figures 1-2 show some highlights of the site

visit. With the successful completion of the ASP2024 site visit, supported by the Moroccan authorities, we continue in earnest the preparation of ASP2024, with the first event being the high school learners' program from April 15–19, 2024.

References:
[1] https://www.africanschoolofphysics.org/
[2] https://www.cnrst.ma/fr/component/k2/item/714-visite-d-une-delegation-de-l-african-school-of-fundamental-physics-and-applications-asp
[3] http://www.fsr.ac.ma/professor/african-school-fundamental-physics-and-applications
[4] https://www.csefrs.ma/le-conseil-superieur-de-leducation-de-la-formation-et-de-la-recherche-scientifique-recoit-lecole-africaine-de-physique-fondamentale-et-appliquee/?lang=fr

THE AFRICAN PHYSICS NEWSLETTER

Brookhaven National Lab's 2023 Pinnacle Awards: Diversity, Equity, & Inclusion Recipient Dr. Kétévi Adiklè Assamagan

Mounia Laassiri an ASP2016 Alumna sits down with the founder of the African School of Physics (ASP), Dr. Kétévi Adiklè Assamagan to talk about his passion for physics, his early career experiences facing racial discrimination and social alienation, as well as his vision for diversity, equity, and inclusion in fundamental and applied physics within Africa

Figure 1: Brookhaven National Lab Director JoAnne Hewett (left) congratulated the Recipient of the Diversity, Equity & Inclusion Award, Dr. Kétévi Adiklè Assamagan. (Photo Credit: The Author)

Mounia Laassiri: Tell us about your career so far, Dr. Assamagan.
I am a physicist at the Brookhaven National Laboratory (BNL). I am from Togo. I went to the U.S. with a scholarship—managed by the African-American Institute—from the U.S. Agency for International Development, and obtained a PhD at the University of Virginia. Then, I completed my postdocs at Hampton University to work at Jefferson Lab and at CERN on the ATLAS Experiment.

At BNL, I continued working on the ATLAS Experiment where I held several positions. First, I was the coordinator of the ATLAS Physics Analysis Tools, then the coordinator of the ATLAS Muon Spectrometer software. Later on, I became the ATLAS Higgs Working Group convener. I am a member of the ATLAS Collaboration that discovered the Higgs boson.

I was a visiting scientist at SACLAY France, the University of Johannesburg, the University of the Witwatersrand, and the University of South Africa. In 2019, I was elected Fellow of the African Academy of Sciences.

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I was subsequently named a Fellow of the South African Institute of Physics (SAIP) in 2020 and a Fellow of the American Physics Society (APS) in 2021. In 2024, I was elected as a Member-at-Large of the Executive Committee of the APS Forum of International Physics. At BNL, I am the Chair-Elect of the Diversity, Equity, Inclusion and Accessibility Council in the Nuclear and Particle Physics Directorate; I am also an elected member of the Brookhaven Council. I am a co-founder of the African School of Physics (ASP) and served as the lead organizer of ASP events in 2012. I was a co-convener of the Community Engagement Frontier in the U.S. Strategy for Particle Physics, also known as Snowmass 2021. My research interests focus on the searches for physics beyond the Standard Model of particle physics. I am a member of NSBP [1], APS, AAAS [2], and SAIP.

Could you share with us the origin of your passion for physics and what motivated you to establish the African School of Physics?
I chose physics and math in high school in Togo simply because I was good at math. The other options were literature and philosophy (which I was not good at) and natural sciences, such as biology, which did not pique my interest.

At the university, I continued my studies in physics, although my father had advised me to consider a path to become a medical doctor. At the time, I preferred physics and math because answers to exam problems were unique, unambiguous, and not subject to philosophical interpretations.

My involvement in the ASP started when I was stationed at CERN and met Dr. Steve Muanza, Christine Darve, and others who initiated a discussion on the necessity of a fundamental and applied physics school for Africa. I was then a part of the core group that organized the first edition of ASP in 2010, with Muanza and Darve as the lead organizers. I have taken the leadership role in ASP since the second edition in 2012. The need to establish a platform to collect and disseminate information to support the academic journeys of African students was my motivation. I did not have that as a struggling African student in search of a higher education opportunity. It was also important to me that ASP be led, organized, and managed by Africans even if financial support is coming from elsewhere.

Have you personally experienced racial discrimination and social alienation in your early career?
Yes, even now. I was a co-convener of the Community Engagement Frontier in the US Strategy for Particle Physics, also known as Snowmass 2021, where we discussed these issues and offered some solutions to improve what we called the "climate" of the field—the set of norms that negatively impact the full participation of minorities. My specific experience is a part of the broad categories of experiences by others like me, collectively referred to as under-represented minorities (URM) in our field.

Reflecting on your early career experiences facing discrimination, how have those challenges shaped your journey and influenced your commitment to promoting diversity and inclusion in physics?
It is not just the early career URM that face discrimination. At every level in our career progression, URM may have to deal with these issues. I have noticed that, as I progress in my career, I see fewer and fewer folks who look like me. There may be several reasons for this; in any case, we cannot expect to have diversity at the tertiary level if work is not done to increase the pipeline earlier, as far back as the primary level. I have focused on dealing with certain aspects of the broader diversity issue, such as improving the "climate" and promoting outreach and support for URM from the universities. At my institute, my role as the Chair-Elect of the Diversity, Equity, Inclusion and Accessibility Council in the Nuclear and Particle Physics Directorate is to work to improve the "climate of the field" to create an inclusive and diverse workforce. My work with the African School of Physics serves to increase the participation of African URM.

In your view, how can fundamental and applied physics engagements contribute to fostering diversity, equity, and inclusion, particularly within the African context?
African participation in large-scale fundamental research, such as those carried out at the Large Hadron Collider, should increase. Mechanisms should be developed to increase the participation of developing or emerging countries. African countries should invest resources to improve their presence and participation in large-scale international projects that offer opportunities

[1] National Society of Black Physicists, USA
[2] American Association for the Advancement of Science

for capacity development. Conversely, the international communities should make efforts to lessen burdens for joining collaborations, such as the requirements of "collaboration joining fees." Then, some bridge programs should be established and supported internationally to encourage the full participation of African expatriates and reduce the so-called "brain drain."

In what ways do you envision the impact of your work extending beyond Brookhaven National Lab and influencing the broader scientific community, particularly in Africa?

The African School of Physics has produced and will continue to produce a large number of alumni with PhD and research capabilities in various fields. Most of these PhDs are early career scientists who, with proper support, can be agents of progress in Africa. Over time, a sizable community of African physicists should develop with significant impact. The challenge is reintegration, such as the issue of "brain drain." The impact of my work, beyond my own research activities, is to increase African capacity in fundamental physics and related applications and create conditions for impactful services for development in Africa.

How do you see the role of mentorship and collaboration in fostering a more inclusive environment for aspiring physicists, particularly in Africa?

Mentorship is important in any case. Mentors can provide a set of prior experiences and provide opportunities for career growth, although it is the mentee who has to tap into these experiences and do the required work to grow. Although I was a good student, I could not have been successful without my mentors. Collaboration is important to grow in academia and research, by providing and exchanging ideas and resources. Collaboration also allows us to work effectively with others to achieve shared objectives that may be unattainable individually regardless of how good one may be. Collaboration may bring the participation of marginalized groups or individuals and in so doing, improve diversity. Effective mentoring may improve the climate of the field, thus encouraging full participation of URM.

As the recipient of the 2023 Pinnacle Award on Diversity, Equity & Inclusion at Brookhaven National Lab, what aspects of your work do you believe contributed significantly to advancing these principles?

All aspects of my work have contributed. First, I need to excel in my own research regardless of issues with climate, under-representation, marginalization, non-inclusion, etc. Second, I need to excel at mentorship to serve as a role model for younger generations of URM. Third, I need to encourage more URM to dive into physics and succeed, through my work in physics education and outreach. Finally, I need to keep working to improve diversity and inclusion because having succeeded personally does not mean there are no issues, quite the contrary. All these are aspects of my work as a physicist, and I hope to bring my contributions to addressing the complex issue of representation and accessibility.

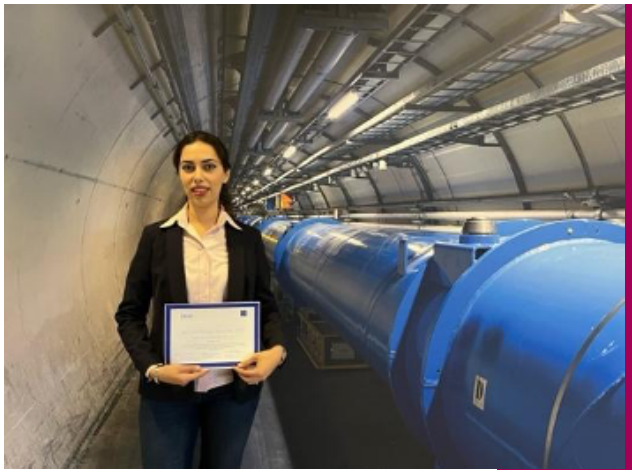
Looking forward, what are your aspirations and goals in continuing to champion diversity, equity, and inclusion in the field of physics, both at Brookhaven National Lab and on a broader scale?

We would like to increase the number of URM in our field by improving outreach and physics education, developing a career pipeline to retain these educated URM, and improving the climate of the field for equal access, participation, excellence, and equity. In addition, we need to improve international diversity in the context of international outreach. We need to create collaborations with developing and/or emerging countries, develop mechanisms to benefit their communities, serve as agents for further community improvements, and lessen the burden for developing countries to join and thrive in international projects.

THE AFRICAN PHYSICS NEWSLETTER

The Inspiring Journey of Dr. Hassnae El Jarrari from a Developing Country to an Award-Winning Young Researcher

Mounia Laassiri an ASP2016 Alumna sits down with the founder of the African School of Physics (ASP), Dr. Kétévi Adiklè Assamagan to talk about his passion for physics, his early career experiences facing racial discrimination and social alienation, as well as his vision for diversity, equity, and inclusion in fundamental and applied physics within Africa



Dr. El Jarrari holding the ATLAS thesis award certificate during the award ceremony at CERN in 2024.

Figure 1: (Photo Credit: The Author)

In the world of academia, recognition is often bestowed upon those who demonstrate exceptional dedication, passion, and innovation in their fields. Dr. Hassnae El Jarrari, a young scientist hailing from Morocco, recently emerged as a shining example of such excellence, earning the prestigious award for one of the best PhD theses in her entire collaborative research efforts for the year 2024. Her remarkable journey, from humble beginnings to international acclaim, serves as an inspiring testament to the power of perseverance and the limitless potential of individuals regardless of their origins.

Dr. El Jarrari was born and raised in Nador, a small town on the Mediterranean coast of Morocco. Her passion for science started at an early age, despite facing many challenges, including limited access to resources and educational opportunities. However, she remained determined to pursue knowledge and embarked on a journey that would eventually lead her to the forefront of scientific research on the global stage. Driven by her passion for discovery, she seized every opportunity to expand her expertise and broaden her horizons.

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"Driven by her passion for discovery, she seized every opportunity to expand her expertise and broaden her horizons."

After completing her undergraduate studies with distinction, she made the bold decision to pursue further education in international collaborations. This decision had a profound impact on her future. She moved from Fes, where she received her master's degree in nuclear engineering with honors, to Rabat, where she began her new journey of striving for excellence. To find information about possible PhD programs on experimental particle physics, Dr. El Jarrari worked hard and succeeded in getting an interview at Mohammed V University in Rabat with her future PhD advisor, Professor Yahya Tayalati. This marked the beginning of another chapter in her life, which was full of challenges and perseverance. She started her PhD working on the ATLAS experiment at the Large Hadron Collider at CERN, but with very limited support, she sought opportunities abroad. Being part of an international collaboration helped her realize that she had what it takes to stand out among thousands of PhD students in her field.

Dr. El Jarrari's academic journey took her to various parts of the world, where she participated in research internships in leading laboratories, academic conferences, and scientific activities. Her eagerness to learn and willingness to embrace new perspectives led her to be selected for prestigious programs such as the JSA/HUGS [1] International Fellowship at Jefferson Laboratory in Virginia in 2019. She was also selected for the first edition of internships for African School of Physics (ASP) alumni to work closely with scientists at Brookhaven National Laboratory. In addition, she was selected for the excellent STEP [2] program organized between the ICTP [3] and the IAEA [4]. With every experience, Dr. El Jarrari contributed valuable insights to the scientific community while enriching her academic journey.

Her desire to seek more opportunities within her collaboration led her to win the ATLAS PhD Grant in 2020, which she described as the most valuable prize in her life as a PhD student. She credits the creators of the grant, Dr. Peter Jenni, the former ATLAS collaboration spokesperson, and Dr. Fabiola Gianotti, the CERN Director-General, for giving her the opportunity to work in an amazing environment. Without the ATLAS PhD Grant, she would never have had the chance to participate in such a fantastic opportunity. Dr. El Jarrari had set her aim at CERN, a globally recognized laboratory renowned for its rich scientific heritage and collaborative research environment. After arriving at CERN, she was faced with several challenges, ranging from unfamiliar cultural norms to fast-paced advancements in science and technology. However, rather than getting disheartened, she chose to face every obstacle head-on, considering each one as a learning opportunity. With a resilient attitude and strong determination, she dedicated countless hours to her studies, engaging in rigorous research and academic pursuits to broaden her knowledge and skills.

Throughout her PhD program, Dr. El Jarrari was distinguished as a trailblazing young researcher, making significant contributions to a diverse array of scientific projects. From searching for unknown dark matter signs to detector research and development, her work transcended traditional boundaries, bridging gaps between seemingly disparate topics, and paving the way for significant contributions. Her interdisciplinary approach not only enriched her understanding of complex scientific phenomena in high-energy physics, but also fostered constructive collaboration with her colleagues in ATLAS. Among her remarkable achievements was pioneering research on dark photon searches with the ATLAS experiment. Her co-adviser, Dr. Rachid Mazini, led the research, and Dr. El Jarrari is grateful for all the things she learned from him. The research explored the Higgs boson portal to the dark matter sector and resulted in the best experimental limit so far for this particular scenario. Dr. El Jarrari's contributions to research and development of the High Granularity Timing Detector (HGTD) earned her widespread acknowledgment within the collaboration for her role in advancing this project. The HGTD is a future detector of the ATLAS detector upgrade planned for the High Luminosity LHC program.

Dr. El Jarrari's involvement in international activities and collaborations allowed her to enhance her research skills and develop a deeper understanding of the interconnectivity of scientific inquiry across borders.

[1] Jefferson Labs Hampton University Graduate Studies Program
[2] Sandwich Training Education Program
[3] Abdus Salam International Centre for Theoretical Physics
[4] International Atomic Energy Agency

Figure 2: Dr. El Jarrari at CERN, next to the HGTD Poster after winning the best poster prize at the lepton photon international conference (left), in the ATLAS Control Room supervising the status of the Inner detector (middle), in the ATLAS experiment cavern at – 82 m underground next to the muon spectrometer guiding a group of visitors. (Photo Credit: The Author)

Along the way, she was motivated by the diversity of ideas and approaches she encountered and became a strong advocate for global cooperation and knowledge sharing, recognizing the potential of collective action in addressing the world's most pressing challenges. Dr. El Jarrari is committed to promoting diversity and inclusivity within the scientific community, inspiring many individuals to pursue their passions and overcome the odds. She has also made significant contributions to outreach activities in the Experimental High Energy Physics community. One of her most memorable moments involved warmly welcoming diverse groups of visitors from different parts of the world to share her passion and introduce them to the experiments at CERN. Dr. El Jarrari has also initiated virtual tours of the ATLAS experiment for Moroccan universities, providing students from different grades and universities with an opportunity to see the detector and learn more about the physics programs at CERN, as well as the latest developments in particle physics.

In 2023, Dr. El Jarrari was selected for the highly competitive CERN research fellow position, which is considered the most challenging opportunity for young scientists in the experimental particle physics community. News of her remarkable achievements quickly spread among her peers. Currently, she is working as a research fellow at CERN and making significant contributions to the search for dark matter, in addition to contributing to the development and commissioning of the new silicon-based tracker for the high luminosity LHC upgrade.

Dr. Hassnae El Jarrari's inspiring journey from a small town in a developing nation to the forefront of scientific research serves as a testament to the transformative power of education and the limitless potential that lies within each of us. Her international experiences have broadened her intellectual horizons and instilled in her a profound sense of humility and empathy, reinforcing her commitment to making a positive impact on the world through science. Her story is an inspiration to all, reminding us that with hard work and dedication, we, too, can achieve greatness and make a meaningful contribution to the world around us.

THE AFRICAN PHYSICS NEWSLETTER

Advancing Nuclear Physics: A Journey from Zambia to Michigan State University

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Dr. Mounia Laassiri

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Dr. George Zimba is a nuclear physicist from Zambia and an alumnus of ASP2016, the 4th edition of the African School of Physics (ASP) [1]. He is a Research Associate at the Facility for Rare Isotope Beams (FRIB) at Michigan State University (MSU) in the US. MSU operates FRIB as a user facility for the US Department of Energy's Office of Science (DOE-SC), supporting the mission of the DOE-SC Office of Nuclear Physics. Zimba holds a PhD in physics from the University of Jyväskylä in Finland. Additionally, he earned degrees from the University of Zambia and the University of Johannesburg. Zimba's research focuses on the nuclear structure of nuclei with an equal number of protons and neutrons. Furthermore, his research includes nuclei with neutron numbers between 20 and 28, below an atomic mass of 46.

George Zimba at the University of Jyväskylä

Figure 1: (Photo Credit: Marjut Hukkanen and Daniel Söderström)

Mounia Laassiri: How did you get started in science? Specifically, in this field?
My introduction to nuclear physics began during my final year at the University of Zambia, where I embarked on a project focused on measuring naturally occurring radioactive nuclides in building stones. This initial foray into the field sparked my curiosity and ignited a passion for nuclear physics that continues to drive my academic pursuits today.

Who inspired or influenced you to make this transition?
My mother has been a steadfast source of inspiration throughout my academic journey. Her unwavering support and encouragement have played a pivotal role in shaping my aspirations and determination to succeed. Furthermore,

Professor Sharpey-Schafer instilled in me a passion for my field and encouraged me to pursue further education and expand my horizons through a PhD program. His influence continues to resonate in my life, constantly reminding me of the importance of dedication and perseverance. I am immensely grateful to Professor Sharpey-Schafe for his mentorship and support, which have been instrumental in my personal and academic growth.

The topic of Blacks in science is important, given the underrepresentation of Black physicists. How do you contribute to the promotion of young African scientists?
I am deeply dedicated to supporting the future leaders of African science through my involvement in networking and mentorship endeavors. Nevertheless, I recognize the challenges early-career researchers face in balancing numerous commitments. As part of my efforts, I consistently acknowledge, celebrate, and promote the achievements of young African scientists. I firmly believe that increasing their visibility inspires others and works to combat stereotypes and address the underrepresentation of Black physicists within the field.

Can you describe the responsibilities and duties of a research scientist?
In my current role, my responsibilities include writing research proposals, conducting data analysis, and advising students within my research group.

Can you describe your area of research to someone who isn't familiar with it?
My research focuses on the structures of atomic nuclei, with an almost equal number of protons and neutrons and nuclei with a higher ratio of neutrons to protons. These nuclei provide opportunities to investigate fundamental properties of nuclear physics, such as isospin breaking [1] and shell-inversion [3]. In my research, I use data obtained from gamma-ray spectroscopy to study the properties of these nuclei and compare them with theoretical models. This work is crucial for scrutinizing and refining various theoretical models, thus enhancing our understanding of the origin of the universe.

What are the remaining big mysteries in your field?
There are many super-heavy nuclei that are predicted to exist but have not yet been experimentally observed. Apart from super-heavy nuclei, nuclei close to the proton drip line and very neutron-rich nuclei remain a challenge to study due to the low production cross-section. The current development of new radioactive beam facilities, such as FRIB, will make it possible for me to see the discovery of many of these new isotopes in my lifetime.

Can you discuss any recent advancements or discoveries in nuclear physics that have particularly excited or intrigued you?
One area that particularly intrigues me is the study of exotic nuclei, especially those in neutron-rich or proton-rich regions of the nuclear chart. The development of new experiment techniques makes studying these nuclei possible, allowing us to try to answer questions such as the role of the strong isoscalar pairing in nuclei or isospin breaking in nuclei close to the proton drip line. My PhD thesis covers some of these questions, but it opens many more questions about these physics phenomena in the proton-rich region. In addition, discovering new magic numbers and the disappearance of magic numbers in neutron-rich regions is fascinating research.

How does the academic culture differ between your current institution and your previous one?
I had an opportunity to work on three different continents: Africa, Europe, and now North America. Although there is a difference in culture among these places, the primary goal within our universities and laboratories is the drive to advance science. People are always ready to help when you have a problem or question.

As someone who has experienced academia on multiple continents, do you see any unique advantages or challenges for scientists working in Africa compared to other regions?
Africa's rich cultural and ecological diversity provides a unique environment for scientific research, offering opportunities for interdisciplinary collaboration and exploration across a wide range of fields. However, funding constraints remain the most significant problem that leads to "brain drain."

What are your aspirations for nuclear physics in Africa?
My aspiration for nuclear physics in Africa is to see collaborative research initiatives flourish among African

[1] National Society of Black Physicists, USA
[2] American Association for the Advancement of Science

countries, fostering a sense of unity and shared expertise within the continent. I envision Africa becoming a hub for scientific conferences and symposiums, providing a platform for scholars to exchange ideas and showcase groundbreaking research. Moreover, I hope to witness increased investment by African governments in research and higher education, enabling universities across the continent to expand their research capabilities and attract top talent. Ultimately, by nurturing a vibrant scientific community and supporting innovative research endeavors, Africa can make significant contributions to the advancement of nuclear physics on a global scale.

What advice would you give to young scientists, particularly those from African or underrepresented backgrounds, who aspire to pursue a career in nuclear physics?

Understand that the journey will be challenging, but every obstacle can be overcome with resilience and determination. Feel free to ask for guidance or clarification when needed. It would help if you never were intimidated to speak up.

References

[1] African School of Physics, https://www.africanschoolofphysics.org/asp-2016/

[2] Lenzi, S., Bentley, M. (2009). "Test of Isospin Symmetryisospin symmetry Along the N=Z Line." Al-Khalili, J., Roeckl, E. (eds) The Euroschool Lectures on Physics with Exotic Beams, Vol. III. Lecture Notes in Physics, vol 764, https://doi.org/10.1007/978-3-540-85839-3_3. https://link.springer.com/chapter/10.1007/978-3-540-85839-3_3

[3] Brown, Alex B. (2010) "Islands of insight in the nuclear chart." APS Physics. https://physics.aps.org/articles/v3/104.

THE AFRICAN PHYSICS NEWSLETTER

The 11th Bridging Scientific Communities for a Sustainable Future

Save-the-date flyer for the 11th edition of Science and Technology Week

(Photo Credit: Investing In People ASBL)

The 11th edition of Science and Technology Week (SST11) will be held from April 6-10, 2024 in Kinshasa and from April 27-29, 2024 in Brussels. Under the theme "Science as a Common Language," SST11 aims to create links between different scientific communities and promote science as a tool for solving global challenges.

Since its first edition in 2014, Science and Technology Week has seen significant growth in its impact. The figures speak for themselves: 77,938 visitors, 450 trained student facilitators, 36 dedicated trainers, 203 interactive scientific workshops, 174 exhibitors, 134 internationally renowned speakers, and numerous direct-impact initiatives (e.g., hackathons, competitions, scholarships).

The event has three main objectives: 1). to create an environment where science and technology are seen as tools for development and innovation; 2). to highlight African contributions to world science, notably through conferences and exhibitions; and 3). to inspire the next generation of scientists and engineers.

SST11 has two notable features. Firstly, it will take place outside the DRC, in Belgium to be precise, underlining its international scope for the first time. Secondly, an innovative and crucial element of this edition is the establishment of the Catalyst Network of Science and Technology Week.

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"The event has three main objectives: 1). to create an environment where science and technology are seen as tools for development and innovation; 2). to highlight African contributions to world science, notably through conferences and exhibitions; and 3). to inspire the next generation of scientists and engineers."

The network is made up of determined youth scattered across different provinces of the DRC. Their mission is to act as agents of change in their local communities, organizing a range of activities including scientific animations, conferences, and guided tours.

These Catalysts are our local partners in the dissemination of knowledge and innovation. Their role is essential in generating a concrete and lasting impact. They form the link between Science and Technology Week and local communities, and through their actions, they contribute directly to the democratization of science and technology.

In line with the main theme, two sub-themes will be explored. The first, "climate change," aims to assess its impact on communities and economies, facilitate the sharing of adaptation and mitigation strategies, and establish a collaborative network between researchers, decision-makers, and citizens. The second sub-theme, "nuclear energy," aims to demystify preconceived ideas, highlight its benefits and risks, and stimulate debate on sustainable energy policies in Africa and Europe.

The main program of this 11th edition is as follows:
In Kinshasa:
- April 6: Launch in the evening
- April 8: Conferences
- April 9 and 10: Science Village

In Brussels:
- April 27: Conferences and mini Science Village
- April 29: Visit to the Botanical Gardens of Meise

In addition, throughout April, the teams making up the Catalyst network will be organizing various activities in their respective towns. These include Kinshasa, Kisantu, Mbanza-Ngungu, Boma, Inkisi, Kikwit, Mbuji-Mayi, Kalemie, Moba, Béni, Butembo, Bukavu, Lubumbashi, and Kolwezi.

Science and Technology Week plays a crucial role in the DRC's achievement of Sustainable Development Goal 4 (SDG 4)—which aims to ensure equal access to quality education for all, and to promote lifelong learning opportunities—and SDG 5, which aspires to achieve gender equality and empower all women and girls.

At the continental level, Science and Technology Week contributes to Aspiration 6 of the African Union's Agenda 2063, which envisions an Africa whose development is driven by its citizens, building on the potential of African people, especially women and youth, and caring for children. It also contributes to Aspiration 7, which sees Africa as a strong, united, resilient, and influential global player and partner.

In conclusion, Science and Technology Week is a unique opportunity to celebrate science, promote education, and strengthen links between scientific communities. We invite you to join us, whether by attending the conferences, visiting the Science Village, or supporting the Catalysts network in their local communities. Together, we can make science an inclusive tool for development and innovation. Join us for the 11th edition and help shape the future of science in Africa and beyond. Your presence and support can make all the difference. See you soon in Kinshasa and Brussels!

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Upcoming Events and Activities

- The 8th African School of Fundamental and Applied Physics, ASP2024
  July 7-21, 2024
  Cadi Ayyad University, Marrakesh, Morocco

- The 33rd/35th International Colloquium on Group Theory Methods in Physics GroupJuly 15-19, 2024
  Cotonou, Benin