IUPAP C13 COMMISSION REPORT

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for the

Meeting of the IUPAP Executive Council and Commission Chairs

April 2018

I. Celebrating the Life of Francis Kofi Ampenyin Allotey (1932-2017)

Professor Francis Allotey

The C13 Commission salutes the life of our dear colleague and former IUPAP Vice-President, Francis Kofi Ampenyin Allotey, who passed away on 2 November 2017 at the age of 85. He was truly a GIANT on the world stage and did more than anyone to boost the development of science and technology in Africa and other developing countries.

Francis received his early education at the Ghana National College in Cape Coast. He pursued further studies in London at the University Tutorial College, Borough Polytechnic Institute (now called London South Bank University), and Imperial College where he obtained the Diploma. He proceeded to obtain his physics Master's degree and

then Ph.D. from Princeton University in 1966, being the first African person to receive a physics Ph.D. from that institution. Francis' research specialty was in theoretical studies of soft X-ray scattering on metals, and he received the Ghana Academy of Arts and Sciences' Prince Philip Gold Medal for his contributions.

In addition to serving as Professor and Head of the Department of Mathematics at the Kwame Nkrumah University of Science and Technology (KNUST), he also served as KNUST's Dean of the Faculty of Science and Pro-Vice Chancellor. For decades, Francis was a true leader of science and technology in Ghana, having served in many capacities, including Chair of Ghana's Atomic Energy Commission, Chair of Ghana's Council for Scientific and Industrial Research, and President of the Mathematical Association of Ghana.

Over the years, Francis was instrumental in founding a number of organizations, including the African Physical Society in 2010, African Optics and Photonics Society in 2014, and African Institute for Mathematical Sciences (AIMS-Ghana) in the town of Biriwa in 2012. He served as President of AIMS-Ghana until his passing. In another important initiative, Francis took a leading role in influencing UNESCO to declare 2015 the International Year of Light, which was celebrated around the world.

Francis was a quiet, soft-spoken man, but a true revolutionary for science. He will continue to inspire generations.

Commencement at AIMS-Ghana

II. Inaugural IUPAP Medal for Outstanding Contributions to the Enhancement of Physics in Developing Countries

Professor Flores Valdes of Mexico received the inaugural 2014-2017 Medal during the 29th General Assembly in Sao Paulo with the citation:

> ***For his outstanding work over 50 years towards the development of physics and scientific institutions and the popularization of science in Mexico.***

As reported in the December 2017 IUPAP Newsletter,

> *He is considered 'the towering figure in Mexican physics of his generation'. He has excelled in all academic activities: research, teaching, outreach and the creation and consolidation of institutions.*
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> *As a researcher he has many major contributions in nuclear physics, and as an important contribution, he has the Brody, Flores et al. paper in Reviews of Modern Physics (1981) that has received close to 2,000 references in specialized literature.*
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> *He is one of the most motivating teachers and has directed 30 theses at different levels. Many of his students are now key players in Mexican science. He was one of the first important researchers who started emphasizing the importance of popularization and outreach at a time (the 1970s) when these activities were considered to be more of a liability than an asset in Mexico. He has given a large number of lectures and published several popular books that have reached a vast non-specialized audience.*

The C13 Commission salutes the many lifetime achievements of Professor Valdes.

III. C13 Annual Meeting Activities (ICTP, Trieste, 25-26 August 2017)

At its Annual Meeting, the C13 Commission did the following:

1. Awarded 21,000 Euros to support conferences in Namibia (7K), Tanzania (4K), Ethiopia (7K), and Vietnam (3K).

2. Visited the synchrotron light source and X-ray free-electron laser facilities at Elettra.

3. Visited the University of Trieste and discussed with faculty and administrators the doctoral program and recruitment of foreign students.

Group Photo of C13 Commission at Annual Meeting

IV. Lightsources for Africa, the Americas, Asia and Middle East Project (*LAAAMP*)

ICSU awarded a team led by IUPAP and IUCr a € 300,000 grant to fund *LAAAMP (*laaamp.iucr.org*)* with the goal of enhancing Advanced Light Source (AdLS) science and crystallography in Africa, the Caribbean, Mexico, Southeast Asia and Middle East. *LAAAMP's* tasks are the following:

Task 1. Develop a ***Strategic Plan*** for each region to grow and enhance its AdLS and crystallography user communities.

Task 2. Establish a **Colloquium Programme** for each region to recruit new AdLS and crystallography users and to advertise *LAAAMP* projects via invited talks at targeted venues. Also, launch a series of new *IUCr-UNESCO OpenLabs*, which is a network of operational crystallography laboratories in developing countries aimed at increasing the access to, and utilization of, crystallography in all regions of the world.

Task 3. Publish an **Informational Brochure** that describes AdLSs, crystallography, and the many fields that they impact.

Task 4. Facilitate **researchers' visits** to AdLS and crystallography facilities.

Task 5. Convene a **meeting at UNESCO** to present the regions' *Strategic Plans* and define the charge for more detailed *Business Plans* that include feasibility studies of constructing AdLSs in regions where they do not yet exist.

To accomplish these objectives, IUPAP and IUCr took the lead in partnership with fourteen world AdLSs and over fifteen international organizations, including the Association of Asia Pacific Physical Societies, European Physical Society, Mexican Physical Society, UNESCO, TWAS, ICSU Regional Offices, and ICTP. The *LAAAMP* Executive Committee consists of Sandro Scandolo (Chair during 2017), Sekazi Mtingwa (Chair for 2018-2021), and Michele Zema. They work closely with the Budget Manager, Maitri Bobbi, who is in the IUPAP Secretariat in Singapore. Much of the on-the-ground work is performed by the AdLS Usage and Strategic Plan Committees in each of the four regions, chaired by Simon Connell (University of Johannesburg) for Africa, Carlos Cabrera (University of Puerto Rico at Río Piedras) for the Caribbean, Matías Moreno (Universidad Nacional Autónoma de México) for Mexico, Rungrueang Phatthanakun (Synchrotron Light Research Institute in Thailand) for Southeast Asia, and Özgül Öztürk (Universität Siegen, originally from Turkey), for the Middle East. The expansion to Southeast Asia was concluded in early 2018.

Progress to Date

The first element of **Task 1** is the development of a database of AdLS and crystallography users in the regions. Lawrence Norris in the USA has developed a survey of instrumentation availability and usage, which can be accessed on the *LAAAMP* Website. Once completed, the database will form the basis for the development of a *Strategic Plan* in each region that will describe the present state of AdLS and crystallographic sciences in the region and short-, medium- and long-term goals for enhancing them. This will lead to the development of more detailed ***Business Plans***, which will include studying the possibility of constructing an AdLS in each region if one does not already exist there. The experience of SESAME will be crucial for such studies.

Task 2 is being fully implemented. Prosper Ngabonziza, who is an AdLS user employed at the Max-Planck-Institute for Solid State Research, spent several days in his hometown of Kigali, Rwanda. He gave Colloquium presentations at AIMS-Rwanda and at the ICTP-affiliated East African Institute for Fundamental Research, which is located in the College of Science and Technology (CST) at the University of Rwanda (UR). In addition to interacting with many students who were excited about the possibility of training at AdLSs under the *LAAAMP* initiative, Ngabonziza held discussions with a number of top university and governmental officials, including UR's Deputy Vice-Chancellor for Academic Affairs and Research, the Principal of its CST, and the Director-General for

Science, Technology and Research in the Rwandan Ministry of Education. Rwanda has been making tremendous strides in science and technology in recent years and it will be important for *LAAAMP* to follow up on the doors that Ngabonziza was able to open.

LAAAMP established its first *OpenLab* in San José, Costa Rica during 4-9 December 2017, led by Executive Committee member, Michele Zema, with aapproximately 80 students in attendance. There was a Colloquium on the first day introduced by Zema and given by Diego G. Lamas from Universidad Nacional del Comahue in Argentina on *Técnicas de luz sincrotrón para caracterización avanzada de materiales*. The Director of Scientific and Technological Development of Costa Rica's Ministry of Science and Technology; the Director of the Natural Science sector from UNESCO's Office for Costa Rica, El Salvador, Honduras, Nicaragua and Panama; the President of the National Research Council; and top officials from local universities and other academic institutions were among those attending the Colloquium and providing welcomes. Starting on the second day, the students were split into two courses, one on single crystal diffraction and the other on powder diffraction. Many countries, especially from throughout Central America, were represented.

Other *LAAAMP* events held during 2017 were the following:

1. Two *LAAAMP* Kick-Off events during the *24th Congress and General Assembly of the IUCr* (Hyderabad, India, 21-28 August 2017) organized by Michele Zema and the *29th IUPAP General Assembly* (São Paulo, Brazil, 11-13 October 2017) organized by Sandro Scandolo;
2. A thematic session entitled "*Light Sources and Crystallographic Sciences for Sustainable Development*", proposed and sponsored by *LAAAMP* in collaboration with UNESCO, at the *World Science Forum 2017*, Jordan, 7-11 November 2017, with the *LAAAMP* lead being Michele Zema, who partnered with UNESCO's Juste Jean-Paul Ngome Abiaga from its Division of Science Policy and Capacity-Building. Sekazi Mtingwa co-chaired the session and was among the speakers.

For **Task 3**, a 24-page *LAAAMP* Brochure entitled *Advanced Light Sources and Crystallography: Tools of Discovery and Innovation* has undergone its first printing of 500 copies in addition to being posted on the *LAAAMP* and partner organizations' Websites. The Editor is Ernie Malamud, a retired researcher from Fermilab and the University of Nevada in Reno, who has extensive experience producing high quality publications, including one for the American Physical Society entitled *Accelerators and Beams, Tools of Discovery and Innovation*, which is currently in its 4th Edition. Malamud has received feedback from the initial printing and soon will produce a larger printing and distribution during 2018. Moreover, Spanish and French versions will be made available later this year as a contribution from the International Atomic Energy Agency.

Task 4 also has enjoyed tremendous success. The first *Call for Applications* for FAculty-STudent (FAST) Teams, consisting of one faculty and one graduate student to spend two months at participating AdLSs, was closed on 21 April 2017. To be eligible,

the applicants had to have less than a year's experience in conducting research at an AdLS. Each of the four regions was awarded grants for two teams, for a total of eight teams, namely 16 individual grants of approximately € 2,000 each, mainly for airline travel expenses, which were arranged through ICTP. The host AdLSs provided all lodging and meal expenses not covered by the *LAAAMP* grant. All visits were successfully completed. In particular, the ESRF published an interesting newsletter article about its FAST Team visitors that can be viewed at http://www.esrf.eu/sites/www/home/news/general/content-news/general/esrf-trains-synchrotron-scientists-from-africa-the-americas-and-the-middle-east.html. A new *Call for Applications* for 2018 FAST Teams ended on 15 November 2017 and the new awardees have been announced on the *LAAAMP* Website. They consist of a total of 16 FAST Teams, or 32 individual grantees. With the current expansion of *LAAAMP* to Southeast Asia, a new *Call for Applications* has been issued for three additional FAST Teams from that region, bringing the total number of individual trainees to 38.

Finally for **Task 5**, discussions have begun with UNESCO to convene a meeting in December 2019 at UNESCO Headquarters in Paris consisting of the *LAAAMP* team; Ministers of Science, Technology, Health, Education, Energy and Natural Resources; representatives from each region's research community; and other international stakeholders and interested parties. The purpose of the meeting will be to present the *Strategic Plan* for each region; set the charge for more detailed *Business Plans* with short-, medium- and long-term goals, including the charge to ascertain the feasibility of constructing an AdLS in each region that does not have one; and finalize a roadmap for moving the *Business Plan* forward.

V. Upcoming Activities

C13 plans to pursue the following during the current year:

1. Provide funding for international conferences.

2. Explore an initiative to increase the availability of scientific instruments in developing countries, and possibly collaborate with the nonprofit *Seeding Labs* (seedinglabs.org) to facilitate such donations of equipment.

3. Continue pursuing the five *LAAAMP* tasks enumerated above.

4. Host a *LAAAMP* Midterm Workshop on 24 August 2018 at ICTP in Trieste.

5. Collaborate with the American Physical Society's new *Physics in Africa* project. Joseph Niemela, the C13 Secretary, is one of the leaders of that project.

6. Assist with the 29th General Assembly's resolution to pursue and strongly support the plan to establish 2022 as the International Year of Basic Sciences for Development.

7. Participate in the International Conference on Physics Education (ICPE2018), Johannesburg, South Africa, 1-5 October 2018.

8. Address the problem of plagiarism in scholarly publications, perhaps with an educational campaign made available to students in developing countries.