

LAAAMP Updates for C&CC Meeting October 2018
Extracted from 2018 Annual Report to the International Science Council
C13 Commission

1. Statement of objectives

The objectives of this project, called *Lightsources for Africa, the Americas, Asia and Middle East Project (LAAAMP)*, are the following: (1) ascertain the level of advanced light source (AdLS) and crystallography usage among researchers in Africa, the Caribbean, Mexico, Southeast Asia and Middle East, and develop *Strategic Plans* for those regions; (2) institute a Colloquium Programme that sends AdLS and crystallography users to universities and other institutions to give lectures and interact with researchers, students, secondary schools, governmental officials, and the general public; (3) publish a brochure that explains in layperson's terms what AdLSs and crystallography are and how they have revolutionized many disciplines; (4) grow and enhance the use of AdLSs and crystallography among researchers in those regions; and (5) plan for a meeting of AdLS and crystallography users, government officials, and other stakeholders and interested parties at UNESCO's Headquarters in Paris during 2019 to launch a *Strategic Plan* for each of the above regions, including plans for the possible construction of AdLSs in regions where they do not yet exist. To achieve its objectives, *LAAAMP* has partnered with 32 international organisations, including 16 advanced light sources. Finally, there is a Steering Committee of international experts that provides important input as to the overall operation of the project.

2. Major outcomes / achievements

LAAAMP is managed by an Executive Committee (EC), which consists of Sekazi Mtingwa (Chair of EC, Chair of IUPAP C13 Commission for Physics for Development, Principal Consultant at TriSEED Consultants USA), Sandro Scandolo (Head of Scientific Programmes & Outreach, Abdus Salam International Centre for Theoretical Physics (ICTP)), and Michele Zema (*LAAAMP* Webmaster, University of Pavia, and IUCr Executive Outreach Officer). The EC met monthly via Skype and reported regularly to the Presidents of IUPAP (Dr. Kennedy Reed) and IUCr (Prof. Sven Lidin). *LAAAMP*'s finances are managed by Maitri Bobba (IUPAP Chef d'IUPAP Secrétariat). Working closely with the EC are the Chairs of the *LAAAMP Regional Usage and Strategic Plan Committees*, which consist of Carlos Cabrera (University of Puerto Rico at Río Piedras, Caribbean), Simon Connell (University of Johannesburg, Africa), Matías Moreno (Universidad Nacional Autónoma de México), Özgül Öztürk (Universität Siegen in Germany, Middle East), and Rungrueang Phatthanakun (Synchrotron Light Research Institute, Thailand). The major outcomes/achievements are now described.

Objective 1

Lawrence Norris in the USA has developed a survey of AdLS and crystallography usage and local instrumentation availability and usage, and Michele Zema has implemented it on the *LAAAMP* Website. Researchers throughout the *LAAAMP* targeted regions currently are responding to the survey so that each Regional Usage & Strategic Plan Committee can develop a database leading to a *Strategic Plan* to guide regional activities forward.

Objective 2

The Colloquium Programme has a number of significant achievements. An example is the recent visit by Thierry d'Almeida, who is a seasoned AdLS user and currently Senior Research Engineer at Commissariat à l'Energie Atomique (CEA) in France, to his home country of Benin during May 2018 to give university lectures on synchrotron radiation and crystallography and their many applications in biochemistry, agriculture, and materials science. That visit led to a subsequent two-week return visit to Benin in September 2018, where he met with Benin's President Patrice Talon, his Cabinet Ministers and numerous other dignitaries to discuss both *LAAAMP* and the newly proposed *LAAAMP* co-sponsored crystallography lab and training program called *X-Ray Techniques for Sustainable Development (XTech-SD)*, which will offer crystallography training to approximately 100 students per year, with many coming from neighboring countries, including Nigeria, Togo, Burkina Faso, and Niger. President Talon has pledged to provide substantial support to this initiative, which will involve the purchase of a series of state-of-the-art single crystal and powder diffractometers.

Following up on the Colloquium Programme visit by Prosper Ngabonziza during December 2017 to his hometown of Kigali, Rwanda, both Sekazi Mtingwa and Sandro Scandolo from the *LAAAMP* Executive Committee traveled to Kigali during 16-19 October 2018 to participate in three meetings: *Women in Science Workshop* (<https://eaifr.org/events/women-in-science/>), *Reviving the African Physical Society* (<https://eaifr.org/events/reviving-the-african-physical-society-a-tribute-to-professor-francis-allotey/>), and the *Inauguration Ceremonies for the Abdus Salam ICTP-Affiliated East African Institute for Fundamental Research* (<https://eaifr.org/events/ictp-eaifr-inauguration/>). At the inauguration, Mtingwa gave a presentation on *LAAAMP* and both he and Scandolo met with government officials to further the goals of *LAAAMP* in enhancing science and technology in Rwanda and surrounding countries.

In other work, Michele Zema organised a session at CiLAC 2018 (<http://forocilac.org/en/>) entitled *Implementing Advanced Light Source Facilities in Latin America and the Caribbean for Sustainable Socio-Economic Development*, which was co-sponsored by UNESCO.

As a final example, Mtingwa, Zema and Scandolo are taking leading roles in organising the upcoming Joint Pan-African Conference on Crystallography (PCCr)/African Light Source (AfLS) Conference to be held in Accra, Ghana during 28 January – 2 February 2019. *LAAAMP* will be a co-sponsor of that event, and Mtingwa is serving as the Chair of the International Scientific Advisory Committee of the AfLS meeting and Zema is taking the lead on the crystallography OpenLab installation activities and course that will be offered in connection with the PCCr meeting.

Objective 3

There have been two printings of a 24-page *LAAAMP* Brochure entitled, *Advanced Light Sources and Crystallography: Tools of Discovery and Innovation*, which was edited by Ernie Malamud, who is currently living in Paris and who is a retired professor and researcher from Fermi National Accelerator Laboratory and the University of Nevada-Reno in the USA. He 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. During 2018, there was a second printing of the *LAAAMP* Brochure, this time in three languages: English, Spanish and French, with the translations for the latter two versions being donated by the International Atomic Energy Agency. The *LAAAMP* Brochure played an important role in convincing the government of Benin to invest in the *LAAAMP*-inspired XTech-SD.

Objective 4

LAAAMP annually issues a *Call for Applications* for Faculty-Student (FAST) teams, consisting of one faculty and one graduate student to spend two months at participating AdLSs. To be eligible, applicants must have less than a year's experience in conducting research at AdLSs. For 2017, *LAAAMP* funded seven teams, namely 14 individual grants of 1,818 Euros each, mainly for airline travel expenses, which were arranged through the Abdus Salam ICTP. The host AdLSs provided all lodging and meal expenses not covered by the *LAAAMP* grant. For 2018, *LAAAMP* issued two *Calls for Applications* and funded 18 FAST Teams from Botswana, Cyprus, Egypt, Kenya, Mexico, Senegal, South Africa, Thailand, Trinidad and Tobago, and Uganda to visit the following partnering AdLSs: ALBA (Spain) Canadian Light Source, Delta (Germany), Elettra (Italy), European Synchrotron Radiation Facility (France), National Synchrotron Light Source-II (USA), Siam Photon Source (Thailand), National Synchrotron Radiation Research Center (Taiwan), and Stanford Synchrotron Radiation Lightsource (USA). Thus, more than 30 researchers were trained at AdLSs around the world during 2018.

Objective 5

Discussions have begun with UNESCO to convene a meeting in December 2019 at UNESCO Headquarters in Paris consisting of the *LAAAMP* participants; 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 driving the *Business Plan* forward.

To assess its progress, *LAAAMP* convened a Midterm Workshop at the Abdus Salam ICTP in conjunction with the Annual Meeting of the IUPAP C13 Commission on Physics for Development. In addition to the detailed discussions of *LAAAMP*'s activities, there were reports on the current status and future plans of three *LAAAMP*

partners, namely Elettra (Italy), SESAME (Jordan), and the Siam Photon Source (Thailand). Finally, there were reports on the African and Mexican Light Source initiatives.

To conclude, *LAAAMP* has achieved tremendous success on a number of fronts. The Colloquium Programme has yielded the government of Benin's buy-in to providing substantial funding and other resources for a new crystallography training program for itself and nearby countries. The nontechnical informational Brochure on AdLSs has been a tremendous hit at conferences and visits to universities and governmental officials, and the FAST Teams have provided unique opportunities for students and faculty from developing countries to acquire the basic skills needed to conduct world-class research at the very best facilities. Indeed, the future is bright for what *LAAAMP* will eventually accomplish.

3. Value of collaborative partnerships and benefits to the scientific community and other stakeholders

Advanced Light Sources (AdLSs) are among the most multidisciplinary and transformational scientific tools available, empowering studies in a myriad of disciplines from physics, chemistry and biology to palaeontology and cultural heritage studies. Thus, collaborative partnerships centered around these facilities could play a crucial role in improving developing countries' educational institutions, economies, social structures, health and world competitiveness. *LAAAMP* partnerships with AdLSs and other organisations will greatly expand the number of AdLS and crystallography users and contribute to improve the smaller laboratory-scale AdLS feeder infrastructures at universities and other research and educational institutions in developing countries. Due to these enhancements, developing countries will be in a position to partner with other countries to construct additional beamlines at AdLSs to target particular challenges that they face, such as malaria, HIV and Ebola-type diseases. Finally, the enhancements should lead to developing countries' becoming formal dues-paying affiliates of international AdLSs, such as South Africa did in 2013 when it became the twentieth country to join the ESRF.

4. Follow-up activities and future implications

LAAAMP will continue enthusiastically pursuing its five objectives. The upcoming year will see completion of the online survey of the availability and usage of AdLS and crystallography facilities, leading to the formulation of a *Strategic Plans* for each of the targeted regions. Those *Strategic Plans* will be presented and discussed at a December 2019 *LAAAMP* meeting at UNESCO to conclude this phase of the project's funding. Based upon those *Strategic Plans*, more detailed *Business Plans* will be launched at the meeting together with a *Roadmap* for each region to drive the *LAAAMP* programs forward. On another front, there are plans to publish the *LAAAMP* AdLS and Crystallography Brochure in more languages, beginning with Arabic, which is consistent with the goal of using the Brochure to educate government policymakers and the public on the necessity of investing in these infrastructures. For the OpenLabs program, we will pursue co-sponsoring the establishment of regional crystallography training centers in strategic locations to serve neighboring countries, beginning with *Xtech-SD* in Benin.

This will most surely lead to a rapidly increasing utilisation of AdLSs to understand the structures of critical materials for a variety of applications, including the deciphering of bacteria, virus and parasite molecular structures to design better drugs to fight such critical challenges as Ebola, HIV and malaria. To date, the Colloquium Programme has yielded tremendous benefits, such as the go-ahead to establish *Xtech-SD* in Benin, and hence it will be continued to initiate other such ventures. As for training at AdLSs, the FAST Team Programme has been a tremendous international success and thus will be optimised and continued. A number of AdLSs have asked to join this exciting initiative, and the positive feedback from former faculty/student participants has been overwhelming. Finally, in order to continue these programmes beyond the conclusion of ISC funding in 2019, *LAAAMP* has already launched a fundraising campaign that will be intensified. It is targeting such nonprofit funders as the Ford Foundation and making connections with various international funding entities.