



An IUPAP-IUCr project within the 2016-2019 ICSU Grants Programme

# LAAAMP

Lightsources for **A**frica, the **A**mericas, **A**sia and **M**iddle East Project



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Chair, LAAAMP Exec. Comm.  
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<http://laaamp.iucr.org/>



2016: ~ 50 Synchrotrons in the world

(Adapted from "AfLS Roadmap", C. Biscari, 2016)

## The 2016-2019 ICSU Grants Programme

*The **ICSU Grants Programme** is a competitive, peer-reviewed programme that supports innovative collaborative scientific initiatives of relevance to science and society.*

*The programme seeks to facilitate **active collaboration between Scientific Unions** and other members of the ICSU community (for example ICSU Regional Offices, Interdisciplinary Bodies, Joint Initiatives, Networks etc.) by addressing long-standing priorities for ICSU members in **developing science education, outreach and public engagement activities**, and to mobilise resources for international scientific collaboration.*

Three Projects have been awarded a Grant for 2016-2019.

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

## **Full project title:**

*Utilisation of Light Source and Crystallographic Sciences to Facilitate the Enhancement of Knowledge and Improve the Economic and Social Conditions in Targeted Regions of the World*

## **Lead applicants:**

International Union of Pure and Applied Physics, IUPAP  
International Union of Crystallography, IUCr

**Grant awarded:** € 300,000

**Grant period:** 3 years (2017-2019)

## **LAAAMP > Structure > Partnering Advanced Light Sources (AdLSs)**

**Advanced Photon Source (APS), Argonne National Lab (Outside Chicago, USA)**

**ALBA Light Source (Barcelona, Spain)**

**Canadian Light Source (Saskatoon, Canada)**

**DELTA Light Source (Dortmund, Germany)**

**Elettra Light Source (Trieste, Italy)**

**European Synchrotron Radiation Facility (ESRF) (Grenoble, France)**

**Nat'l Synchrotron Light Source-II (NSLS-II), Brookhaven Nat. Lab (Long Is, NY, USA)**

**Photon Factory, Institute of Materials Structure Science, KEK (Tsukuba, Japan)**

**SESAME Light Source (Allan, Jordan)**

**SLAC National Accelerator Laboratory (Stanford University, USA)**

**Taiwan Photon Source (TPS), National Synchrotron Radiation Research Center**

**(~10 Additional AdLSs are being invited to become partners.)**

## LAAAMP > Tasks

- TASK 1 Regional Committees take **AdLS and Crystallography Usage Surveys** and develop **Strategic Plans** for each Region.
- TASK 2 Establish an AdLS/Crystallography **Colloquium Programme** in each Region.
- TASK 3 Publish and Disseminate an AdLS/Crystallography **Information Brochure** for government officials and public.
- TASK 4 Promote and Facilitate Researcher and Student **Short- & Long-Term Visits/ Study** at International AdLS and Crystallography Facilities and Schools (*including establishing new IUCr-UNESCO OpenLabs*).
- TASK 5 Convene a **Meeting at UNESCO** HQs in Paris in Dec 2019 to Present the *Strategic Plans* for the Regions and Launch the *Business Plans*.

## LAAAMP > Tasks > 1. Regional Strategic Plans

### Africa

**Simon Connell** (*Chair*), Univ. of Johannesburg, South Africa  
**Ahmadou Wague**, University of Cheikh Anta Diop, Senegal  
**Brian Masara**, SA Inst of Physics, Zimbabwe  
**Prosper Ngabonziza**, Max Planck Institute, Rwanda  
**George Amulele** (*tbc*), Macquarie University, Australia  
**Ernie Malamud**, Fermilab, University of Nevada, USA  
**Djamel Bradai**, Univ. of S&T Houari Boumediene, Algeria  
**Jean-Pierre Ezin**, Université d'Abomey-Calabi, Benin  
**Claude Lecomte**, Chair of IUCr *Cryst. in Africa*, France

### Caribbean

**Carlos Cabrera** (*Chair*), Univ. of Puerto Rico at Río Piedras  
**Fidel Antonio Castro Smirnov**, Advisor to the President of the Univ. of Informatics Sciences, Cuba  
**Noel Blackburn**, Brookhaven National Laboratory, USA  
(from Trinidad and Tobago)  
**Eric Sheppard**, Hampton University, USA

### Mexico

**Matías Moreno** (*Chair*), Univ. Nacional Autón. de México  
**Mayra Cuellar**, Universidad de Guanajuato  
**Tomás Viveros**, Univ. Autón. Metropolitana-Iztapalapa  
**José Ignacio Jiménez**, UNAM  
**Abel Moreno Cárcamo**, Coord. of RedTULS and UNAM  
**José Reyes Gasga**, Pres. of Soc. Mex. de Crist. And UNAM

### Middle East

**Özgül Öztürk** (*Chair*), Universität Siegen, Turkey  
**Roy Beck-Barkai**, Tel-Aviv University, Israel  
**Musa Mutlu Can**, Istanbul University, Turkey  
**Ahmed Farghaly**, Cryst. Lab., Nat'l Research, Ctr., Egypt  
**Jamal Ghabboun**, Bethlehem University, Palestine  
**Kirsi Lorentz**, The Cyprus Institute, Nicosia, Cyprus

### *African Laser Centre (ALC): Early Advocate for a Multinational AfLS*

Headquartered in Pretoria, South Africa, it is an organization that consists of over 30 laser laboratories from across the African continent.

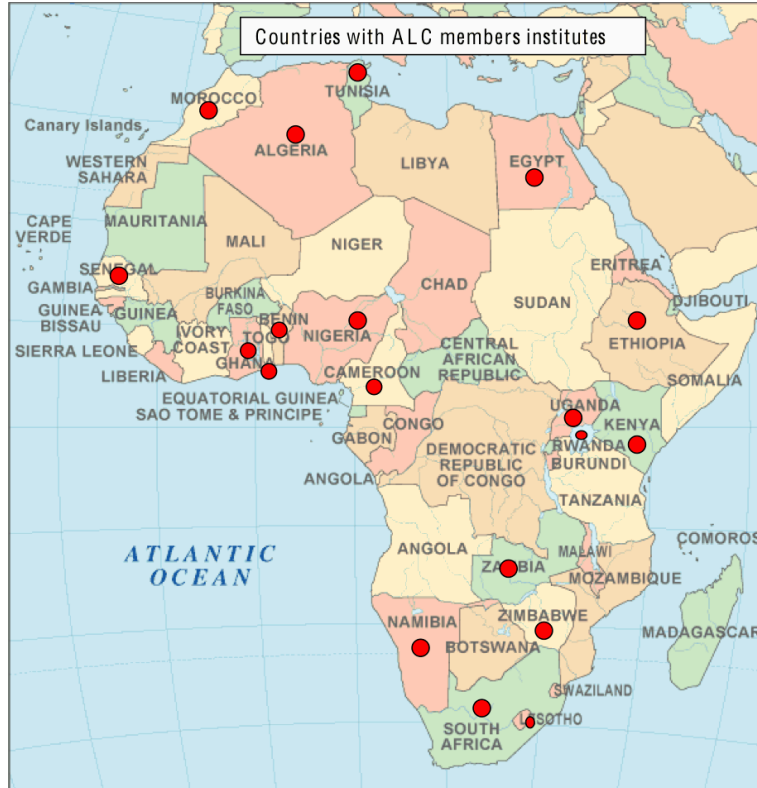
Launched in 2003 to enhance laser research and training in Africa.

First organization to call for an African multinational synchrotron light source, as specified as a long-term goal in its *2002 Strategy and Business Plan*.

Model for Pan-African cooperation towards an African Light Source (AfLS).



## Locations of ALC Institutions



## *ALC Founders (Pretoria, 2003)*



## ALC Outputs during 2006-2013

Output	Quantity	Comments
Publications in refereed journals	151	Annual Report for period 2006 – 2013
Popular journal articles	13	Annual Report for period 2006 - 2013
Publications in conference proceedings	210	Annual Report for period 2006 - 2013
Chapters in books	12	Annual Report for period 2006 - 2013
Theses completed	59	Annual Report for period 2006 - 2013
Masters scholarships awarded	38	This represents total the number of scholarship grants that were awarded within the period 2007-2013.
PhD scholarships awarded	78	This represents the total number of scholarship grants that were awarded within the period 2007-2013.
Training events (workshops/conferences/symposia, short courses) supported	33	2005-2013
Number of students trained at workshops, symposia and short courses	1249	Number of beneficiaries to ALC training since inception to 2013
Masters Students supported	141	This represents the total number of MSc students working within the supported collaboration projects.
PhD Students supported	165	This represents the total number of PhD students working within the supported collaboration projects.

## 2nd US-Africa Advanced Studies Institute, iThemba LABS (Cape Town, Nov 2007)



## Brief History of Synchrotron Science in Africa

The largest light source user community on the continent is in South Africa, and Simon Connell (University of Johannesburg) has documented that history.

The first were Trevor Derry and Jacques Pierre Friederich “Friedel” Sellschop, both from the University of the Witwatersrand (Wits).

In 1994, Derry performed studies of diamond surfaces at both the Synchrotron Radiation Source-Daresbury Laboratory and ESRF.

During the same year, Sellschop participated in other diamond studies at ESRF.

In 1996, Giovanni Hearne, currently at the University of Johannesburg, used the facility at the ESRF to study materials under extreme pressures.

Bryan Doyle, now at the University of Johannesburg, served as a postdoctoral researcher at ESRF around 1999.

From those early efforts, the synchrotron light source user community in SA started to grow.

## Synchrotron Science Workshop, Pretoria, 1-2 December 2011



## Major Outcome Was Strategic Plan Adopted by South African Government

**As recommended by Strategic Plan, on 21 May, 2013, South Africa signed a medium-term arrangement with the ESRF at a level of 0.3% and became the 20th country to join the ESRF.**

## Signing ceremony for South Africa joining the ESRF (2013)





## 1<sup>st</sup> AfLS Conference & Workshop

(<http://www.saip.org.za/AfLS2015/>)

**Venue: ESRF (Grenoble, France)**

**Dates: 16-20 November 2015**

**First in a series of conferences**

**Venue was selected to be on the site of a premier international advanced light source facility.**

**Future conferences preferably will be held in Africa.**

**Purpose was to develop a Roadmap and replace the Interim AfLS-SC with a fully mandated Steering Committee.**

## 1<sup>st</sup> AfLS Conference & Workshop Participants

**African researchers and students**

**Representatives from international light sources**

**European Commission, IUPAP-C13 Commission,  
International Union of Crystallography**

**Government Policymakers**

**Industrial representatives**

**Friends of Africa who support the vision for an African Light Source.**

## Several Researcher & Student Participants, 1st AfLS Conference & Workshop ESRF, Grenoble, France, November 2015



## **LAAAMP > Tasks > 2. Colloquium Programme**

This Programme dispatches experienced advanced light source users and crystallographers to universities and other institutions and private enterprises in the targeted regions for 3-day visits to give presentations, to engage in discussions, and to visit government officials and schools.

## LAAAMP > Tasks > 2. Colloquium Programme

**Dr. Prosper Ngabonziza** (Max-Planck-Institute for Solid State Research, Department of Solid State Quantum Electronics, Stuttgart, Germany), who is from Kigali, Rwanda, delivered a presentation entitled *Synchrotron Light Sources and Their Diverse Applications* at the following two venues in Kigali:

Friday, 15th December: **African Institute for Mathematical Sciences-AIMS**

Wed, 20th December: **ICTP-Affiliated East African Institute for Fund. Research,**  
University of Rwanda, Nyarugenge Campus

Met with four government officials

Dep. Vice-Chancellor for Academic Affairs & Research, UR

Principal of College of Science & Technology, UR

Dir-General for Science, Tech & Research in the Ministry of Education

Top Advisor to Minister of Education

## LAAAMP > Tasks > 3. Information Brochure

LAAAMP has published a professional quality color brochure (hard copy and online) containing information on the various AdLS components, disciplines impacted by AdLSs and crystallography, and experimental beamline techniques .

*Editor:* **Ernie Malamud**

Fermilab and University of Nevada, Reno (Retired)

Design: Atelier Christian Millet

Cover: Flore Garcia & Atelier Christian Millet

Printer: Imprimerie Launay

First printing in December 2017

Second printing in early 2018

Translations into **French** and **Spanish** in 2018

## LAAAMP > Tasks > 4. Faculty-Student (FAST) Teams to AdLSs and Crystallography Facilities

### Eligibility

**Faculty** members at universities in Africa, the Caribbean, Mexico, Southeast Asia or the Middle East. Interested in using AdLSs to further their research and training. Previous experience with using AdLSs is limited to a year or less. Ability to spend 2 months as a full-time visitor in residence at an AdLS that is a LAAAMP collaborative partner.

**Student:** Registered as full-time Ph.D. student and supervised by the Faculty member

### Financial Support

LAAAMP provides 1,818 Euros per person to cover transportation and (partially) accommodation costs. The remainder of accommodation and subsistence is negotiated with the host AdLS and other sources of support.

**First call:** Deadline 21 April 2017, Awards announced June 2017,  
7 FAST Teams (14 individuals), Period of visits: June-December 2017

**Second call:** Deadline 15 November, period of visits: January-December 2018  
16 FAST Teams (32 individuals), visits anytime in 2018.  
New call for 3 FAST Teams from SE Asia coming soon for visits in 2018.

## LAAAMP > Tasks > 4. Faculty/student visits at AdLSs and crystallography facilities/schools

### Jun-Dec 2017 Awardees

#### Africa

**Faculty: Kobor, Diouma (University Assane Seck of Ziguinchor, Senegal)**

Student: Ndèye Coumba Yandé, Fall

***Project title: Multiferroic Behaviour Investigation of PZN-PT Perovskite Thin Film Deposit on Nanostructured p-type Silicon Surface and on ITO substrate.***

Visiting facility: **ESRF**, Grenoble (France)

**Faculty: Oladijo, Oluseyi Philip (Botswana Int'l Univ. of Science and Technology)**

Student: Setswalo, Keagisitswe

***Project title: Residual stress distribution of cold sprayed coatings on metal substrates***

Visiting facility: **Photon Factory**/Institute of Materials Structure Science/KEK, Tsukuba (Japan)

#### Caribbean

**Faculty: Taylor, Richard (University of the West Indies, Trinidad and Tobago)**

Student: Phillips, Reco

***Project title: Transition Metal Biphenyl Schiff's Base Liquid Crystal (LC) Compounds for LC Applications***

Visiting facility: **National Synchrotron Light Source-II/ Brookhaven National Laboratory**, Upton, New York (USA)



## LAAAMP > Tasks > 4. Faculty/student visits at AdLSs and crystallography facilities/schools

### Jun-Dec 2017 Awardees

#### Middle East

**Faculty: Lorentz, Kirsi (The Cyprus Institute)**

Student: Ioannou, Grigoria

**Project title: SR-IR, SR-XAFS/XRF, SR phase contrast microCT, Project title: The Structure-Antioxidant Activity Relationship and other SR enabled approaches as enablers of analyses of Polyphenols**

**ancient human remains from the Middle East: identification, characterisation, imaging, and exploration of preservation status**

Visiting facility: **ESRF, Grenoble (France)** and **SESAME, Allan (Jordan)**

**Faculty: Ali, Shehab (Suez Canal University, Egypt)**

Student: Ibrahim, Ahmed Hassan

**Project title: Investigation of Structural and Magnetic Properties of YxLa1-xFeO3 Synthesized through Citrate Auto-Combustion Technique**

Visiting facility: **ELETTRA, Trieste (Italy)**

#### Mexico

**Faculty: Salas Muñoz, Erika (Univ. of Chihuahua, Mexico)**

Student: Lerma Hernández, Julio César

**Project title: The Structure-Antioxidant Activity Relationship**

Visiting facility: **ESRF, Grenoble (France)**

**Faculty: Serroukh, Ibrahim (Autonomous University of Queretaro, Mexico)**

Student: Gardunio Ramón, Marco Antonio

**Project title: Image quality and dose for conventional and synchrotron mammography in early stage**

Visiting facility: **ESRF, Grenoble (France)**

## **LAAAMP > Tasks > 4. Faculty/student visits at AdLSs and crystallography facilities/schools**

### **Jan-Dec 2018 Awardees**

**(Expecting 19 FAST Teams, 38 Awardees )**

<b>Africa</b>	3 New FAST Teams	2 Continuing Teams
<b>Caribbean</b>	1 New FAST Team	1 Continuing Team
<b>Mexico</b>	3 New FAST Teams	1 Continuing Team
<b>Middle East</b>	3 New FAST Teams	2 Continuing Teams
<b>SE Asia</b>	3 New FAST Teams	(To be announced)

## 2018 LAAAMP Continuing FAST Team Awardees

<u>FAST Team</u>	<u>Institution/Department</u>	<u>Requested AdLS</u>
<b>Ibrahim Serroukh</b> Marco Antonio Garduño Ramón	<b>University Autonomous of Querétaro (Mexico)</b> <b>Faculty of Engineering</b>	<b>TBA</b> <b>TBA</b>
<b>Richard Taylor</b> Reco Phillips	<b>University of the West Indies (Trinidad and Tobago)</b> <b>Chemistry</b>	<b>NLSL-II</b> <b>USA</b>
<b>Shehab E. Ali</b> Ahmed Hassan Ibrahim	<b>Suez Canal University (Egypt)</b> <b>Physics</b>	<b>ELLETRA</b> <b>Italy</b>
<b>Kirsi Lorentz</b> Grigoria Ioannou	<b>The Cyprus Institute</b> <b>Science and Technology in Archaeology Research Ctr</b>	<b>ESRF</b> <b>France</b>
<b>Diouma Kobor</b> Ndèye Coumba Yandé FALL	<b>University Assane Seck of Ziguinchor (Senegal)</b> <b>Physics</b>	<b>TBA</b> <b>TBA</b>
<b>Oluseyi Philip Oladijo</b> Keagisitswe Setswalo	<b>Botswana Int'l Univ. of Science &amp; Technology</b> <b>Chemical, Material and Metallurgical Engineering</b>	<b>CLS</b> <b>Canada</b>

## 2018 LAAAMP New FAST Team Awardees

### FAST Team

**Gabriela Díaz**  
Daniel G. Araiza

**María Josefina Robles-Águila**  
Noemí Díaz-Corona

**René Loredó-Portales**  
Joel Martínez Estrada

**Michael Forde**  
Ashley St. Clair-Smith

**EISayed Mohamed EISayed Shalaby**  
Wafaa Ibrahim Emam

**Abdallah A. M. Shaltout**  
Safaa S. M. Ali

**Ahmed El-Hussein**  
Mostafa Zeidan

**Saphina Biira**  
Bosco Oryema

**Kalambuka Hudson Angeyo**  
Justus Okonda

**Thulani Hlatshwayo**  
Thabsile Thabethe

### Institution/Department

Universidad Nacional Autónoma de México  
Física Química

Benemérita Universidad Autónoma de Puebla (Mexico)  
Research Center for Semiconductor Devices

Universidad Nacional Autónoma de México  
Instituto de Geología

University of the West Indies (Trinidad and Tobago)  
Chemistry

National Research Centre (Egypt)  
Solid State Physics, X-Ray Crystallography Lab

National Research Center (Egypt)  
Spectroscopy

Cairo University  
National Institute of Laser Enhanced Sciences

Busitema University (Uganda)  
Physics

University of Nairobi  
Physics

University of Pretoria  
Physics

### Light Source

SSRL  
USA

Elettra  
Italy

Elettra  
Italy

NSLS-II  
USA

ESRF  
France

CLS  
Canada

APS  
USA

NSLS-II  
USA

TBA  
TBA

DELTA  
Germany

# Science

EDITORIAL

## SESAME and beyond

### SESAME and beyond

Sekazi K. Mtingwa and Herman Winick

Science 356 (6340), 785.  
DOI: 10.1126/science.aan6880

Last week, Cyprus, Egypt, Iran, Israel, Jordan, Pakistan, the Palestinian Authority, and Turkey, as well as other nations and international organizations, gathered in Jordan to inaugurate the Synchrotron-light for Experimental Science and Applications in the Middle East (SESAME) project. Having persevered through two decades of political and financial challenges, this complex machine is poised to run its first experiments this year.

Indeed, SESAME represents the power of science in bringing together countries—even those with frayed relations—under a common goal of advancing knowledge for the benefit of all humankind. The triumph of SESAME, and the outpouring of research results from other light sources around the world, have spurred interest in building synchrotrons in developing countries.

Synchrotron light sources have revolutionized basic and applied research. At a facility such as SESAME, electrons are accelerated and injected into a storage ring, producing light over a broad spectral range with intensity a million times greater than that

of conventional light sources. The SESAME project is a joint effort of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and modeled after the European Organization for Nuclear Research (CERN), the SESAME Council was eventually formed and assumed governance over the project. As the large potential user community in the Middle East became clearer, SESAME evolved into a third-generation, 2.5-GeV light source.

Despite political and funding obstacles, and a roof collapse by unprecedented snowfall, nations and organizations rallied to see SESAME succeed through leadership by former CERN directors-general and support from Jordan, CERN, the European Union, the International Atomic Energy Agency, Italy, and the Japan Society for the Promotion of Science. Other synchrotron light sources allowed Middle East scientists to gain experience at their facilities during SESAME's construction.

UNESCO described SESAME as a quintessential project, "combining capacity building with vital peace-building through science" and "a model project for other regions." Today, Iran, Turkey, and Pakistan are considering national light sources. *Markus Le*



*"...SESAME represents the power of science in bringing together countries...for the benefit of all..."*



*Sekazi K. Mtingwa is a principal consultant at Triangle Science, Education & Economic Development, LLC, Hillsborough, NC, USA. sekazi.mtingwa@gmail.com*



*Herman Winick is professor emeritus at the SLAC National Accelerator Laboratory,*

These new endeavors will face challenges. But they share with SESAME the goals of building regional capacity and promoting understanding, friendship, and peace by bringing together scientists from different countries and ethnicities to perform world-class science.

**—Sekazi K. Mtingwa and Herman Winick**



# THANK YOU!

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