



**The Africa Light Source Foundation**  
Towards a Lightsource for the African Continent



## **AfLS7**

# **Updates on Synchrotron and Crystallography Human Capacity and Infrastructure Building in Developing Countries**

**Sekazi K. Mtingwa**

**Chair, Executive Committee, *LAAAMP***

**Member, Executive Committee, AfLS**

**19 November 2024**



<https://laaamp.iucr.org/>

## EXECUTIVE COMMITTEE



**Sekazi Mtingwa (Chair)**  
IUPAP delegate

**Director of Synchrotron Training**  
TriSEED Consultants, LLC, Hillsborough, NC, USA



**Graciela Diaz de Delgado**  
IUCr delegate

**Director of Fundraising and Manager of Website**  
Universidad de Los Andes, Mérida, Venezuela



**Sandro Scandolo**  
ICTP delegate

**Director of Finance and Co-Manager of Social Media**  
Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy



**Marielle Agbahoungbata**

**Coordinator of X-TechLab**  
Coordinator, X-TechLab, Cotonou, Benin



**Özgül Öztürk**

**Director of High School Programs and Co-Manager of Social Media**  
University of Siegen, Germany  
Chair of SESAME Users' Committee



**Michele Zema**

**Director of New Crystallography Facilities and Training**  
University of Bari, Italy



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## **LAAAMP Participating Advanced Light Sources**

**Advanced Light Source (ALS), Lawrence Berkeley National Laboratory (LBNL)**

**Advanced Photon Source (APS), Argonne National Lab (ANL)**

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

**Australian Synchrotron, Australian Nuclear S&T Org. (ANSTO), (Clayton, Melbourne)**

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

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

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

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

**MAX IV Laboratory (Lund, Sweden)**

**National Synchrotron Light Source-II (NSLS-II), Brookhaven National Lab (BNL)**

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

**Pohang Accelerator Laboratory (Pohang, Republic of Korea)**

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

**SIAM Photon Source (SPS), Synchrotron Light Research Inst. (Nakhon Ratchasima, Thailand )**

**Sirius Light Source (Campinas, Brazil)**

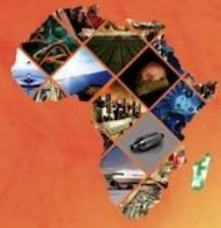
**SLAC National Accelerator Laboratory**

**Taiwan Photon Source (TPS), Nat'l Synch. Radiation Res. Center (NSRRC, Hsinchu, Taiwan)**



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## LAAAMP Tasks

Regional Committees develop <b>Strategic Plans</b> for each Region	TASK 1
Establish an AdLS/Crystallography <b>Colloquium Programme</b> , leading to Regional Crystallography Research & Hubs	TASK 2
Publish and Disseminate an AdLS/Crystallography <b>Information Brochure</b>	TASK 3
Promote and Facilitate Researcher and Student <b>Short- &amp; Long-Term Visits/Study</b> at International AdLS and Crystallography Facilities and Schools ( <i>including IUCr-UNESCO OpenLabs</i> )	TASK 4



# The Africa Light Source Foundation



Lightsources for Africa, the Americas, Asia and Middle East Project  
An IUPAP-IUCr project within the Grants Programme of the ISC  
Executive Committee: Michele Zema (Chair), Sekazi Mtingwa, Sandro Scandolo

## Strategic Plan for Africa

The African Light Source I (AfLS1) and AfLS2 Conferences had three major outputs: (1) a set of overarching statements, called the *Grenoble Resolutions*, that provide the *WHY* for an AfLS, (2) a *Roadmap* to guide future activities, and (3) the election of a fully mandated Executive Steering Committee of the AfLS Foundation, a legal nonprofit under South African law.

For the first output, we have the following AfLS1 **Grenoble Resolutions**:

1. *Advanced light sources are the most transformative scientific instruments similar to the invention of conventional lasers and computers.*



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## Strategic Plan for South East Asia Including the Strategic Plan for the Siam Photon Source II



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## Strategic Plan for Mexico

Mexican region endorses the following **Universal Grenoble Resolutions**:



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## Strategic Plan for the Middle East

The Middle East region endorses the following **Universal Grenoble Resolutions**:

1. *Advanced light sources are the most transformative scientific instruments similar to the invention of conventional lasers and computers.*

2. *Advanced light sources are revolutionizing a myriad of fundamental and applied sciences, including agriculture, biology, biomedicine, chemistry, climate and environmental systems science, cultural heritage studies, energy, engineering, geology, materials science, nanotechnology, palaeontology, pharmaceutical discoveries, and physics, with an accompanying impact on sustainable industry.*



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## Strategic Plan for the Caribbean

1. The Caribbean region endorses the following **Universal Grenoble Resolutions**:

1. *Advanced light sources are the most transformative scientific instruments similar to the invention of conventional lasers and computers.*

2. *Advanced light sources are revolutionizing a myriad of fundamental and applied sciences, including agriculture, biology, biomedicine, chemistry, climate and environmental systems science, cultural heritage studies, energy, engineering, geology, materials science, nanotechnology, palaeontology, pharmaceutical discoveries, and physics, with an accompanying impact on sustainable industry.*

<https://laaamp.iucr.org/tasks/strategic-plans>



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## X-TechLab at Sèmè City, Benin



*Thierry d'Almeida presenting LAAAMP and the X-TechLab project to the Cabinet of the Government of Benin.*

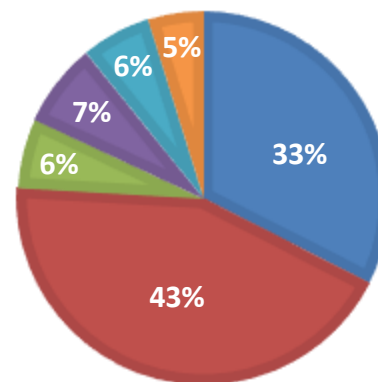
X-TechLab is aimed at **training** Faculty and Master's and Ph.D. students from African countries every year, and at **establishing a permanent user research facility** with experienced, permanent staff to act as a hub for the region.





## X-TechLab at Sèmè City, Benin

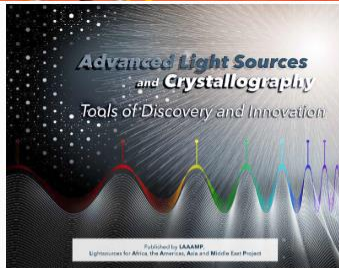
**3 training sessions in 2019-2020:** 84 learners from 12 African countries: Benin, Burkina Faso, Burundi, Cameroon, Congo-Brazzaville, the Democratic Republic of Congo, Senegal, Togo, Ghana, Ethiopia, Nigeria and Côte d'Ivoire. 20 invited experts.





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LAAAMP Brochure, Version 2  
Language: English  
(PDF file, 5.4 MB)



LAAAMP Brochure, Version 2  
Language: Spanish  
(PDF file, 4.7 MB)



LAAAMP Brochure, Version 2  
Language: French  
(PDF file, 4.7 MB)



LAAAMP Brochure, Version 2  
Language: Arabic  
(PDF file, 9.2 MB)



LAAAMP Brochure, Version 2  
Language: Portuguese  
(PDF file, 5.1 MB)

The *LAAAMP* brochure “*Advanced Light Sources and Crystallography: Tools of Discovery and Innovation*” is available in **English, Spanish, French, Arabic** and **Portuguese**.

Translations have been made available thanks to a collaboration with the International Atomic Energy Agency (IAEA).

Brochure editor: **Ernie Malamud**

**DOWNLOAD FOR FREE at**  
<https://laaamp.iucr.org/tasks/brochure>





## **TASK 4: Faculty-STudent (FAST) teams visits at AdLSs**

### Eligibility

**Faculty** members at universities in Africa, the Caribbean, Latin America, Central Asia, SE Asia, Middle East, and Pacific. Interested in using AdLSs to further one's research and training endeavors. 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 *LAAMP* collaborative partner.

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

### Categories

**Continuing** and **New** applications are considered.

### Financial Support

*LAAMP* provides **2,000 Euros per person** to cover transportation and (partially) accommodation costs. The remainder of accommodation and subsistence should be negotiated with the host AdLS and other sources of support.

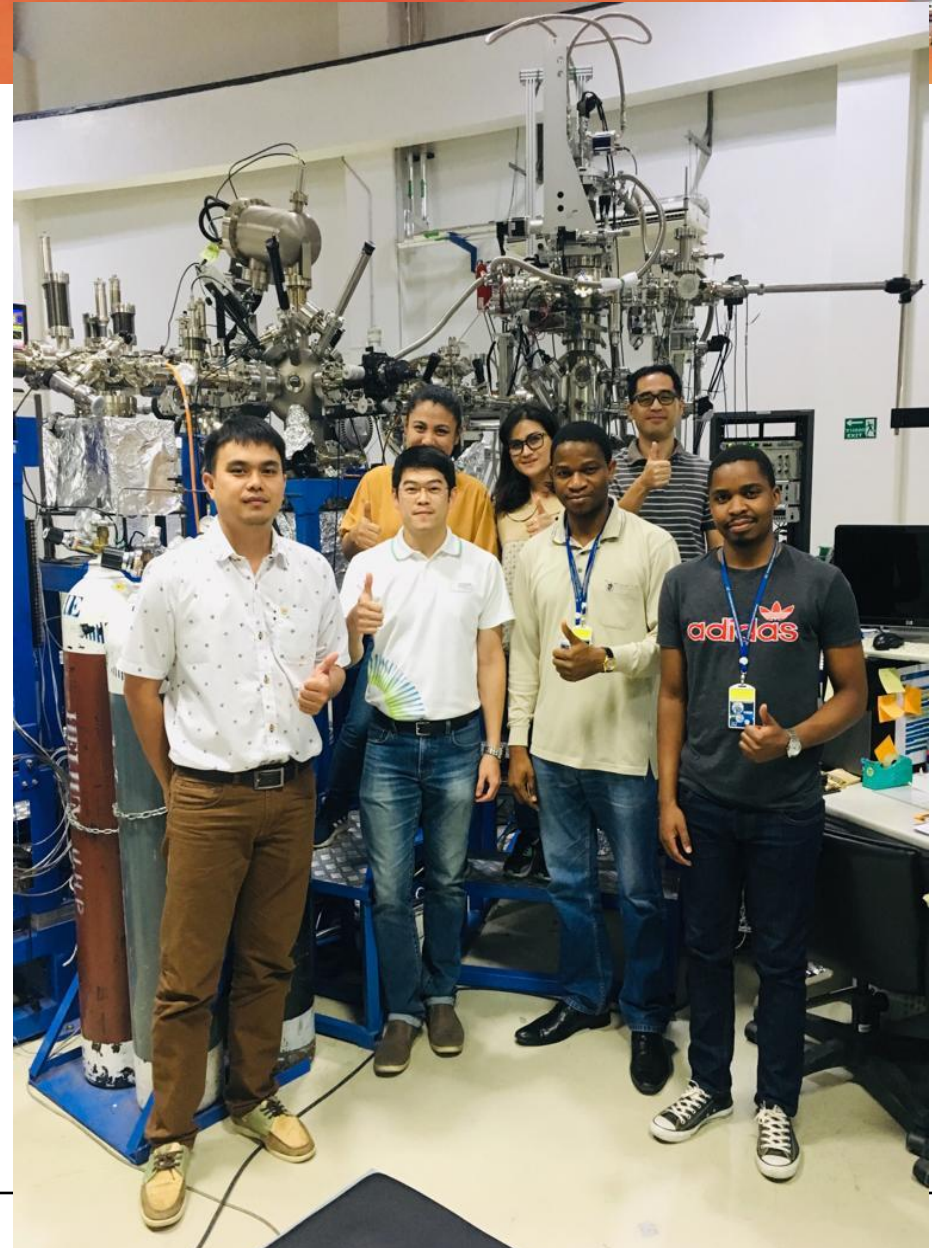


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**Dr. Philip Oladijo and graduate student from Botswana International University of Science and Technology trained for 2 months at Thailand's Synchrotron Light Research Institute with Dr. Hideki Nakajima.**





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## FAST Teams for 2024

<b>CONTINUING FAST TEAMS</b>	<b>Home Institution</b>	<b>Department</b>	<b>Advanced Light Source</b>	<b>Host</b>	<b>Dates</b>
<b>Celine Omondi Miller Shatsala</b>	<b>Masinde Muliro Univ of S&amp;T Kenya</b>	<b>Physics</b>	<b>Advanced Light Source USA</b>	<b>Chenhui Zu</b>	<b>14 Oct - 13 Dec 09 Sept - Aug 31, 2025</b>
<b>NEW FAST TEAMS</b>					
<b>Alassane Traore Student: Nogaye Ndiaye</b>	<b>Cheikh Anta Diop Senegal</b>	<b>Physics</b>			
<b>Patrice Kenfack Tsobnang Student: M. Toupka Abdou Azizi</b>	<b>University of Dschang Cameroon</b>	<b>Chemistry</b>	<b>Elettra Italy</b>	<b>Giuliani Aquilanti</b>	<b>16 April - 16 June</b>
<b>David Chavez Flores Student: Hector Mario Heras Martinez</b>	<b>Univ Autónoma de Chihuahua Mexico</b>	<b>Chemistry</b>	<b>ESRF France</b>	<b>Hiram Castillo</b>	<b>17 Oct - 12 Dec</b>
<b>Hossam Taha Mohamed Abdel Moneam Student: Aya Ali Mohamed</b>	<b>October Univ for Mod Science &amp; Arts Egypt</b>	<b>Biotechnology</b>	<b>SESAME Jordan</b>	<b>Gihan Kamel</b>	<b>2 Nov - 31 Dec</b>





# The Africa Light Source Foundation

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8/21/24, 11:56 AM

School on Synchrotron Light Sources and Their Applications | (smr 3917) (15-26 January 2024)



### School on Synchrotron Light Sources and Their Applications | (smr 3917)

🕒 Starts 15 Jan 2024  
Ends 26 Jan 2024  
Central European Time

📍 Online - Online

#### Secretariat:

✉ [smr3917@ictp.it](mailto:smr3917@ictp.it)



#### An ICTP Online Meeting

The School will introduce young scientists to the design, operation, and research opportunities offered at a modern synchrotron light source and how such sources are realized.

The school will be held over two weeks and will consist of three modules: (1) Physical aspects concerning the design and function of the main components: accelerators, insertion devices and beamline optics; (2) Overview of the arguments that can be made in order to fund and build a synchrotron light source, including socioeconomic benefits, stakeholder engagement, communication; and (3) Overview of common beamline techniques, including those utilizing X-rays and infrared radiation.

#### Topics:

- Fundamentals of synchrotron radiation from storage rings
- Fundamentals of X-ray interactions with matter
- Design and operation of storage rings
- Beamline design: Photon transport and optics
- Bending magnets and insertion devices
- Project management at a large facility
- Ancillary devices for light sources
- Socioeconomic justification
- Cultural heritage
- Stakeholder engagement/communications
- Starting up user operations at a new facility
- Industrial Applications
- IR microscopy
- Basics of X-ray crystallography and powder diffraction
- Basics of structural biology
- Fundamentals of X-ray absorption: EXAFS and XANES
- XRF, TXRF, GXRF and their applications in materials and life sciences
- Tomography

#### Organizers

Marie-Je AGBAHOUNGRATA (X-TechLab, Benin), Simon CONNELL (University of Johannesburg, South Africa), Messaoud HARFOUCHE (SFSAME, Jordan), Gihan KAMEL (SESAME, Jordan), Andrea LAUSI (SFSAME, Jordan), Kirsi O. LORENTZ (Cyprus Institute, Cyprus), Alessandro MIGLIORI (IAEA, Austria), Edward MITCHELL (ESRF, France), Sekazi MTINGWA (Triseed Consultants LLC, USA), Prosper NGARONZIZA (Louisiana State University, USA), Ozgul OZTURK (University of Siegen, Germany), Sandro SCANDOLÒ (ICTP, Italy), Michèle ZEMA (University of Bari, Italy), Local Organizer: Nadia Binggeli (ICTP)

#### Co-sponsors





## **Caribbean Regional X-ray Science toward Advancement Laboratory (crXstal)**

- **Located in Dept of Chemistry at U of West Indies in Jamaica**
- **Single crystal diffractometer from Bruker was installed.**
- **Marvadeen Singh-Wilmot (Manager) in discussions with IAEA about crXstal and other items.**
- **Michele Zema (*LAAAMP*) went to Jamaica in Oct 2024 and spent a couple of weeks there to start training faculty and students.**

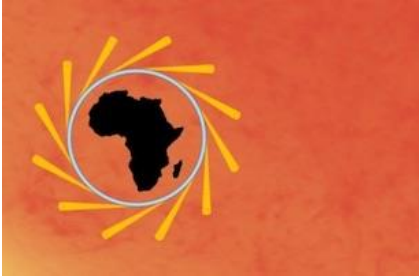


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FACULTY OF  
SCIENCE AND TECHNOLOGY

The Department of Chemistry  
invites you to the

# GRAND OPENING AND LAUNCH OF

## crXstal

Caribbean Regional X-ray Science Toward Advancement  
Laboratory

THURSDAY, OCTOBER 3, 2024  
11:00AM - 2:00PM (JA TIME)

### 11:00AM: SEMINAR

Chemistry Lecture Theatre 2 and  
via ZOOM @ [https://bit.ly/FST\\_crXstal](https://bit.ly/FST_crXstal)  
Meeting ID: 913 6336 0098 Passcode: 245130

**Crystallography as a Vehicle for Stimulating  
Research and Education in the Developing World**

**Professor Michele Zema**

University of Bari; Light Sources for Africa,  
the Americas, Asia, the Middle East and  
the Pacific (LAAAMP)

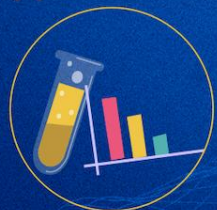
### 12:00PM: LAUNCH OF CRXSTAL LAB AND COMMISSIONING OF SINGLE CRYSTAL X-RAY DIFFRACTOMETER

**Bruker D8 Quest Eco  
crXstal**

### 1:00PM: CRYSTALLOGRAPHY LECTURE Chemistry Lecture Theatre 3 Symmetry in Crystals (CHEM3312)

Thank you to our external partners:

LAAAMP | IUCR | ROYAL SOCIETY OF CHEMISTRY | UNESCO  
BRISTOL MYERS SQUIBB | CARIBBEAN ACADEMY OF SCIENCES, JAMAICA | JUICI PATTIES  
THE UWI CAVE HILL







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## Central Asian Light Source Initiative

*National University of Uzbekistan, Sept 2023*





## **Crystallography Research & Training Hub in Uzbekistan**

- **Michele Zema traveled to Uzbekistan to initiate the training program there during Oct 2024.**
- **Goal is to establish a crystallography research and training hub in Uzbekistan.**
- **This center and crXstal are both based on the X-Tech model that serves all of Africa.**





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**THANKS FOR YOUR KIND ATTENTION!**

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