The Africa Light Source Foundation

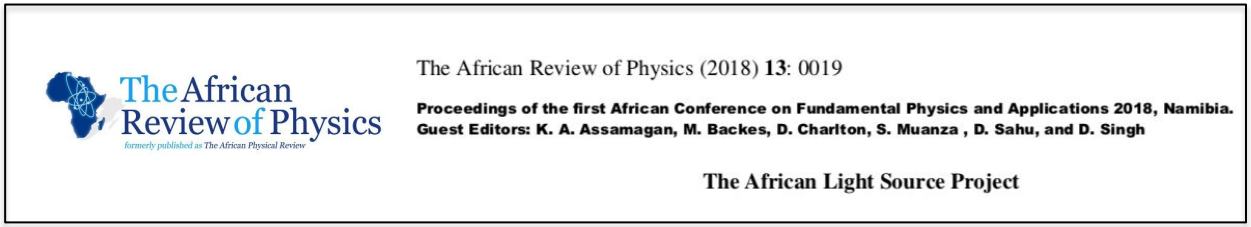
Towards a Lightsource for the African Continent

Prof SH Connell

WG14 – Accelerator Science

1. AfLS History : 2 decades □ AfLS □ IAC, LoS / MoU, CDR
2. AfLS Motivations and Science
3. Formal Roadmap in progress since 2015
   - Bottom Up: Training, User Base, W/S, Conferences, Networks
   - Top Down: Governments, AU, National & Pan African VAs, PBs, Stakeholders
4. Conference
5. Perspectives
6. Upcoming

https://www.worldscientific.com/doi/abs/10.1142/S0217732318300033



http://lamp.ictp.it/index.php/aphysrev/article/view/1610/586

Useful Websites

- AfLS Website http://africanlightsource.org
- AfLS3 2021 https://events.saip.org.za/e/AFLS3
- AfLS4 2022 https://events.saip.org.za/e/AfLS2022

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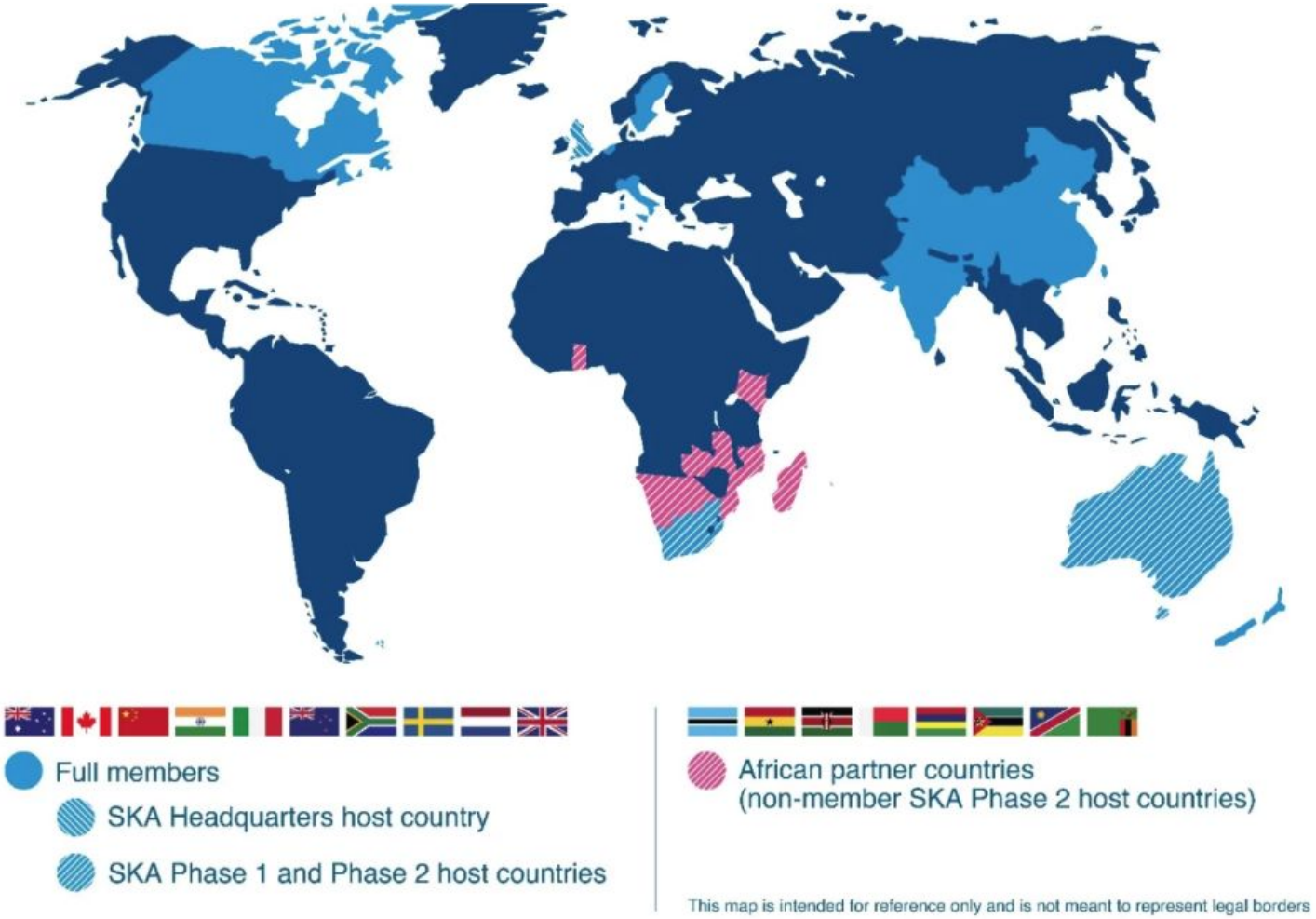
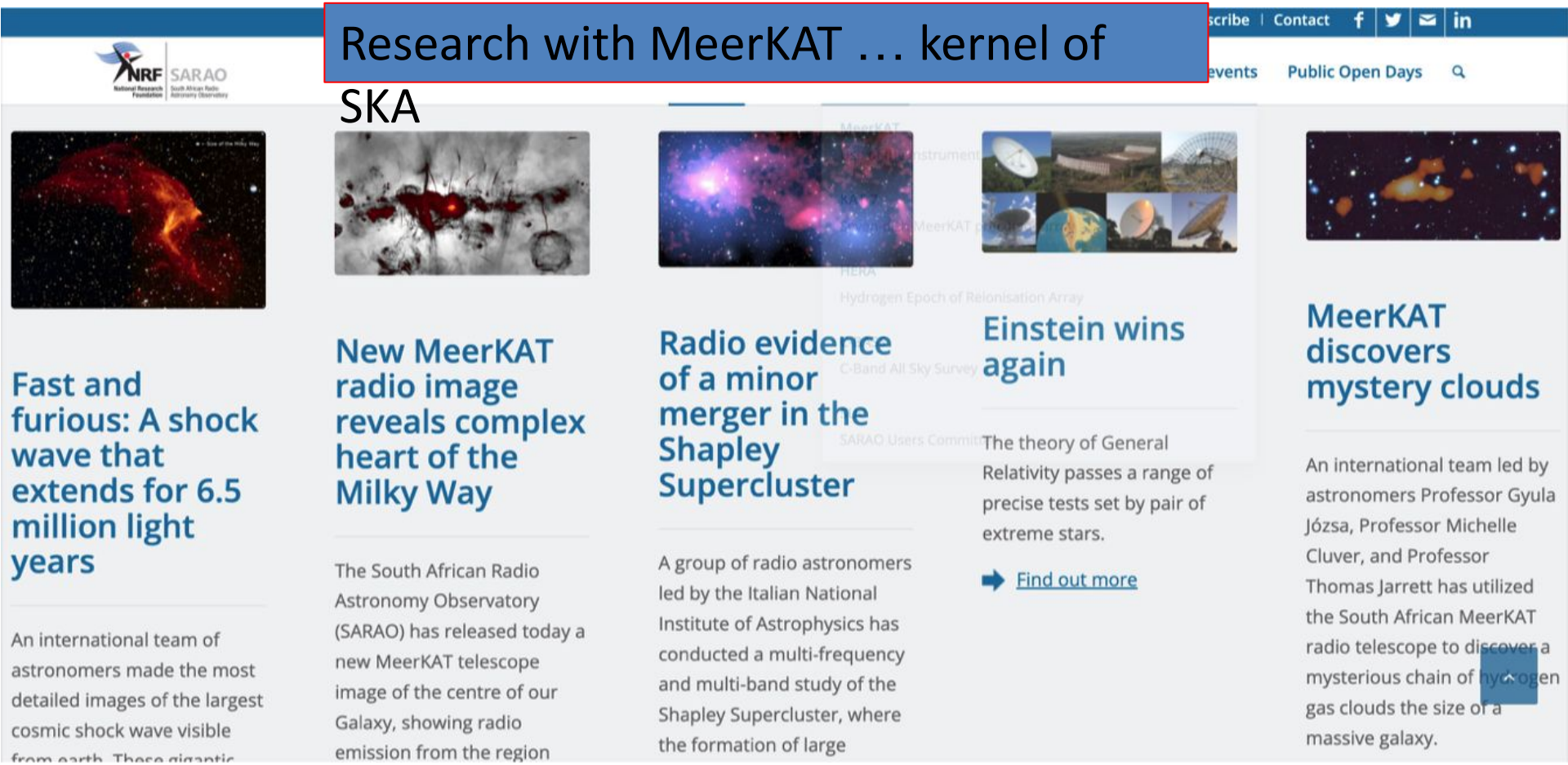
Towards a Lightsource for the African Continent

Africa already has experience in International Large-Scale Research Infrastructures

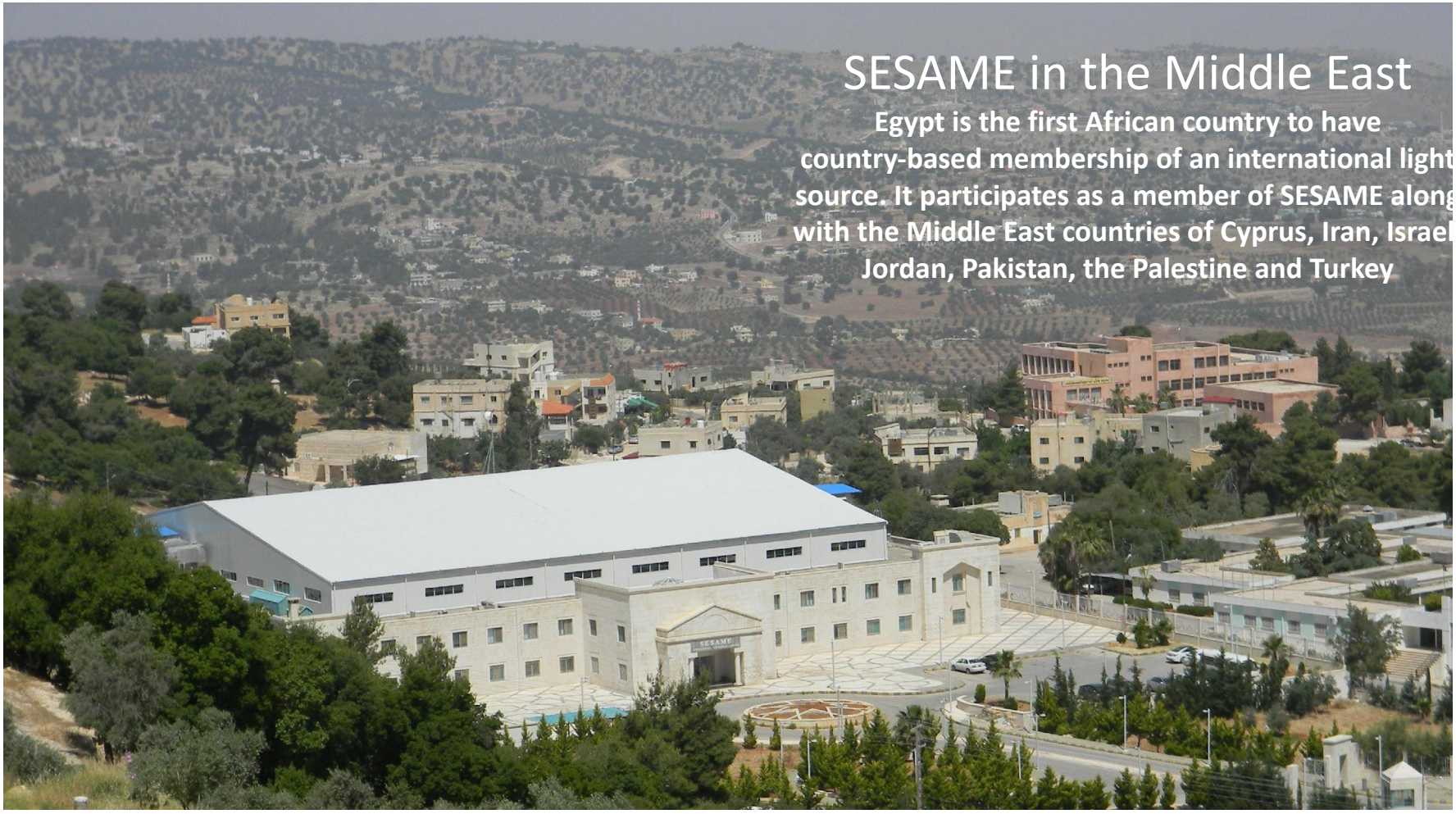


Africa already has experience in International Large-Scale Research Infrastructures

Research with MeerKAT … kernel of SKA



What is a synchrotron



What is a synchrotron

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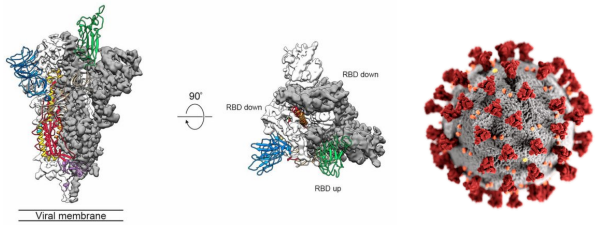
Towards a Lightsource for the African Continent

Advanced Light Sources

- 50 World Wide
- Remain open during Lockdown
- Essential Service - Determine the SARS CoV 2 Structure
- Function from form
- **Determine drug targets test medical interventions vaccines**



African Disease Burden

Already African scientists produce excellence

1. TB
2. Malaria
3. HIV Aids
4. Ebola
5. SARS-CoV-2
6. Many others

https://www.africanlightsource.org
$2B large scale multi-disciplinary research infrastructure

The Light Source
Typically seeding a mega science and innovation park
one of many examples

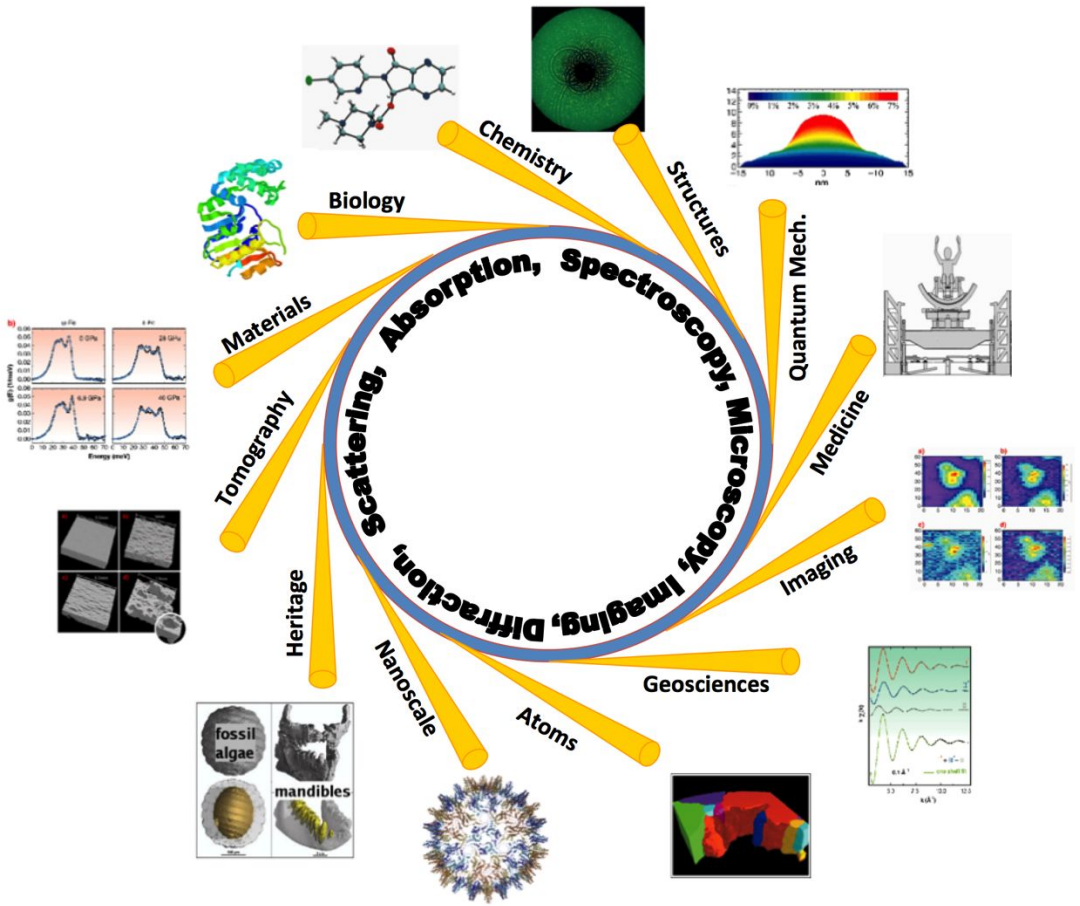
The alba synchrotron is located in very special surroundings: in the Barcelona synchrotron park. home to not only the synchrotron itself, it is in its own right a science and technology park with 400,000 m^2 of productive floor space, with 55 plots from 2,100 to 36,000 m^2. Its mission is to offer innovative companies a unique ecosystem in which to concentrate on both growth and production.

What is a synchrotron

Some examples of Science with Synchrotrons

Multidisciplinary

- **Research**
- **Technology**
- **Industry**



*** Credit inferred from each slide**

Why the AfLS ?

1. **African Challenges □ Identify Science □ Identify RI □ AfLS**
   a) Examples in these slides
   b) Health (African vaccine IP), Big Data Analytics, Others □ All RIs
2. **Insist on evolution towards major African funding**
3. **RI for Science Diplomacy** □ Developing Pan Africanism
   a) SESAME
   b) CERN
4. AfLS profile for **African Government Science Policy**, Regional Science Policy
   □ Leave no country behind
5. **Governance** □ African participation on RI Councils
6. **African User Base development** (Training, Youth)
   a) Schools, Workshops,
   b) Medium term visits,
   c) Sandwich programmes

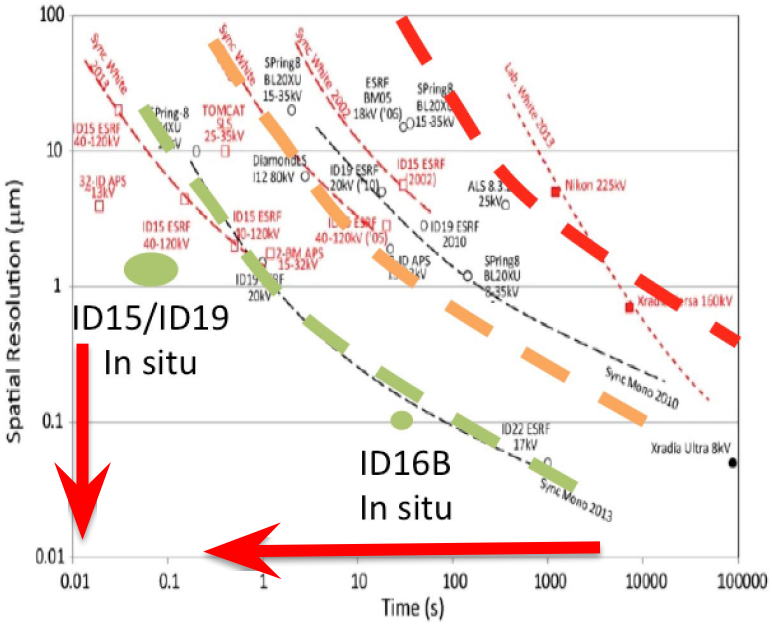
What is a synchrotron

Socio-economic benefits

- Boost African Scientific Research, Research Capacity (Continent, regions, Institutes), Capacity Building - African Science Renaissance
- Global Research Community
- Tackling Diseases (Malaria, TB, Aids, Ebola ....)
- Unique African Research Opportunities attracting international collaboration : Energy opportunities, African Environment, Cradle of Humankind, Cradle of Culture, Mineral beneficiation, Agriculture.
- Mobility, Conferences, Schools, International Mentoring partnerships in student training, Regional Centres of Excellence, Local feeder instrumentation
- Build Research capacity in Industry, competitive industry
- **Science for Peace (eg CERN, SESAME)**
- **Return of the African Science Diaspora - new opportunities for young excellent scientists**
- **For African countries to take control of their destinies and become major players in the international community**

- **Technological Advances □ Now at 4th Gen □ FoM x 10000 □ Urgent for Africa to get in the game**

What is a synchrotron – Technological Advances



1 measured point □
4D data
(3 space and time)
improvements
of 10^2 - 10^4

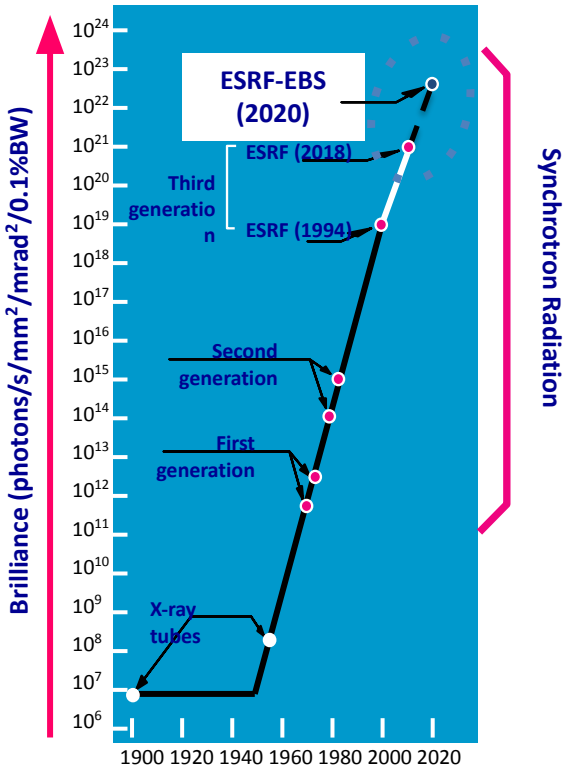
- 4D tomography helps understanding material science phenomena if you like to see things !!
- Scans in less than 1s with 1µm resolution can be done
- Scans in less than 30s with 100nm resolution can be done
- It can help to validate numerical modelling
- Various set up have been developed for thermal treatment or mechanical testing
- Trends : faster and / or higher spatial resolution and multi resolution

What is a synchrotron – Technological Advances

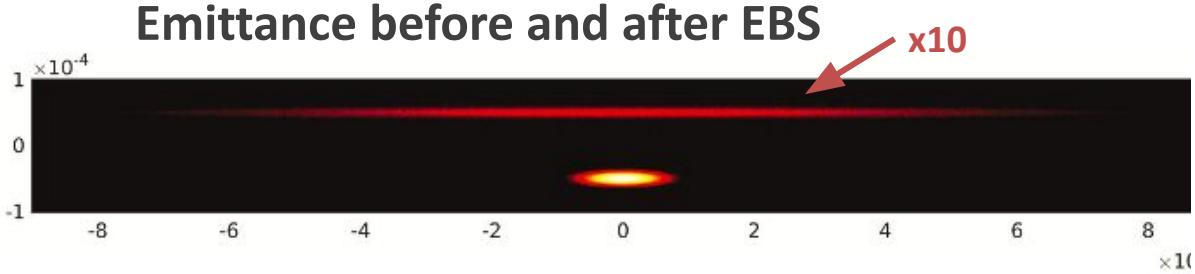
ESRF Extremely Brilliant Source
The 1st high-energy 4th-generation synchrotron light source

Pantaleo Raimondi wins the Gersch Budker IPAC17 Prize

For his invention of the "Hybrid Multi Bend Achromat" (HMBA) lattice, which has become the design basis of most future "fourth generation" synchrotron sources in the world



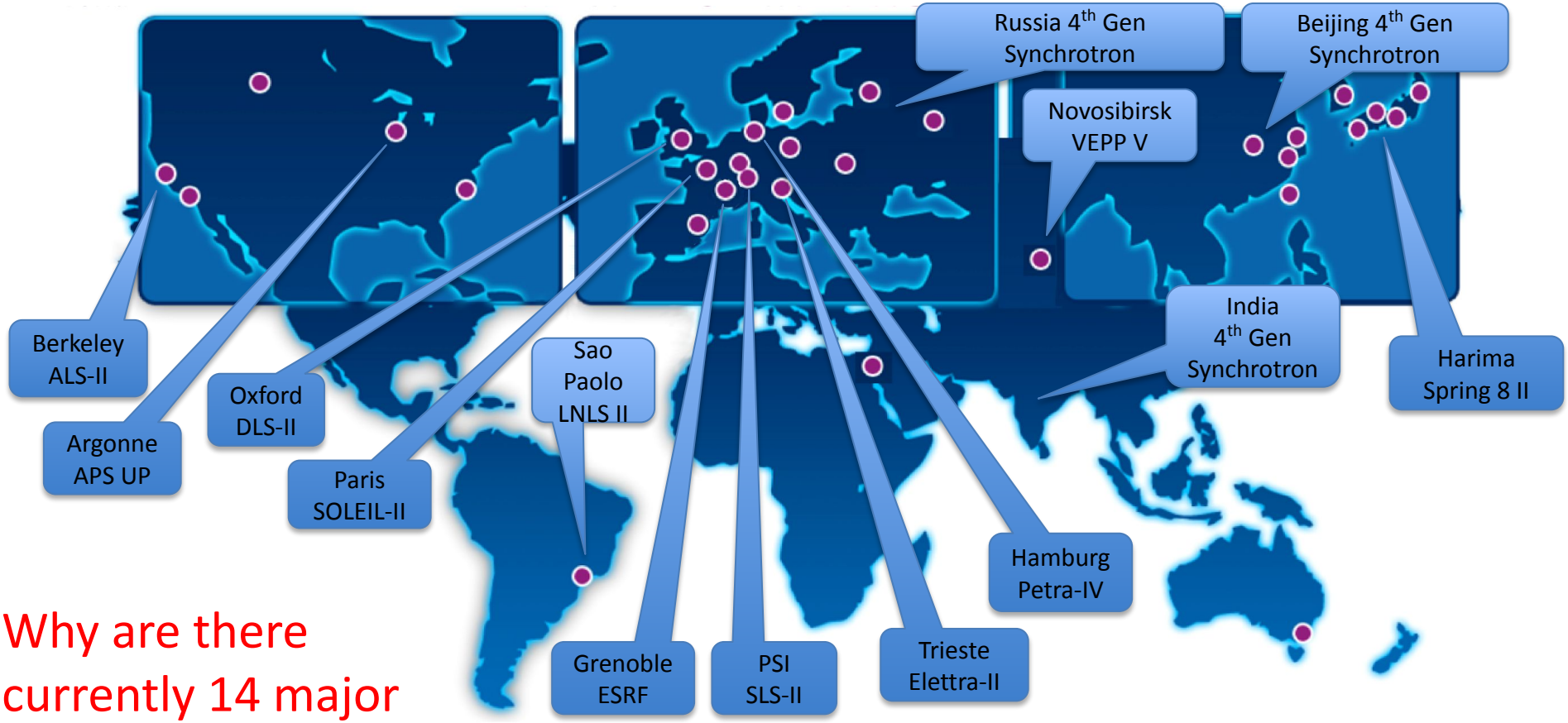
Emittance before and after EBS



X 100 improvement in beam emittance, **x100** improvement in detectors

X 10000 Figure of Merit improvement

What is a synchrotron

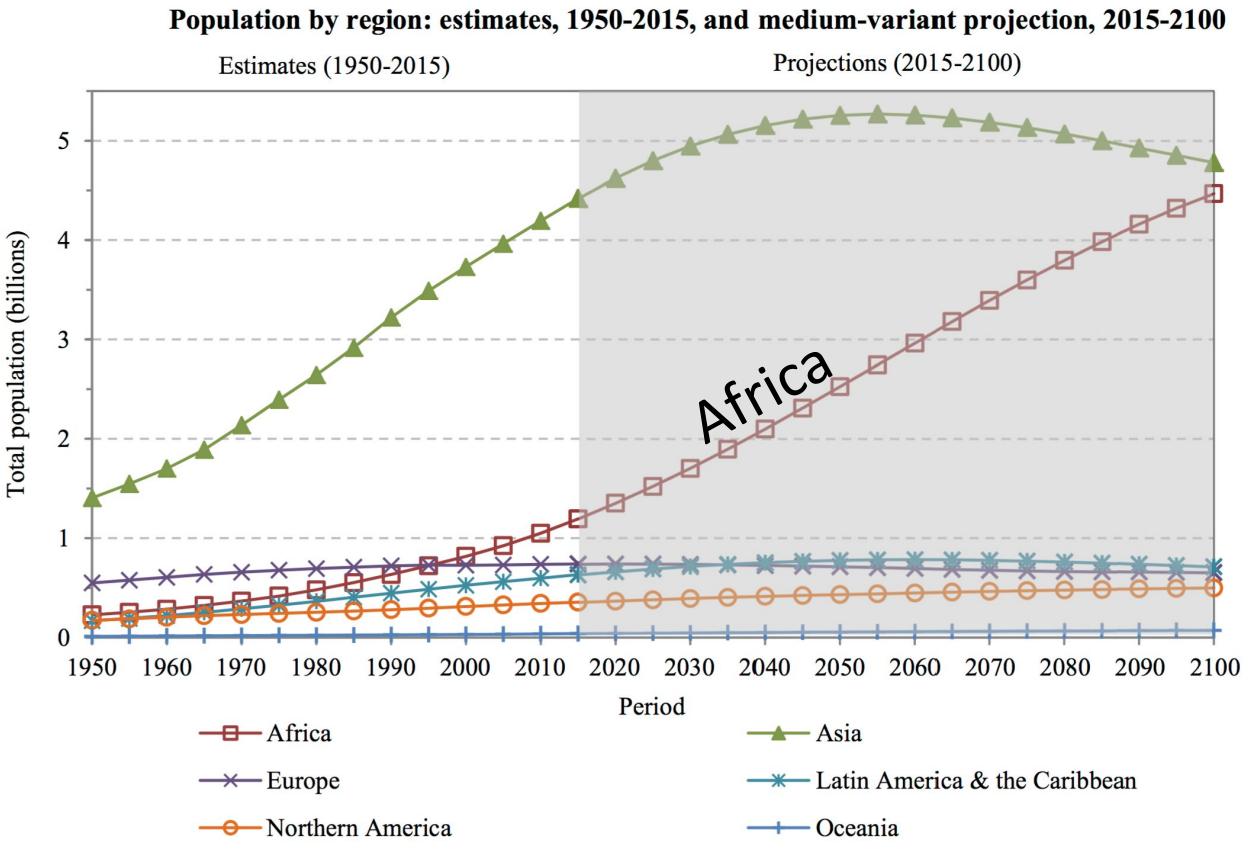


Why are there currently 14 major upgrades / new builds ?

Graphic adapted from ESRF source

What is a synchrotron – Africa needs it yesterday !

UN Report "World Population Prospects" (2017)
More than half of global population growth by 2050 will happen in Africa
This means a lot of young people, and points to an urgent need for human capacity building



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). *World Population Prospects: The 2017 Revision*. New York: United Nations.

What is a synchrotron – Africa needs it yesterday !

Africa has 1.2 billion people
169 scientists per million people (UNESCO Science Report 2015)

Italy : 2600/million
Germany : 7600/million

Africa needs at least ……

1 000 000 scientists to get 1/6 of <1st world>

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Who is African ?

Someone born in Africa
African Ancestry
African Diaspora

……. and ……

To be an African,
you do not need to be born in Africa,
….. Africa must be born in you

Arikana Chihombori-Quao
AU representative to USA 2017-2019

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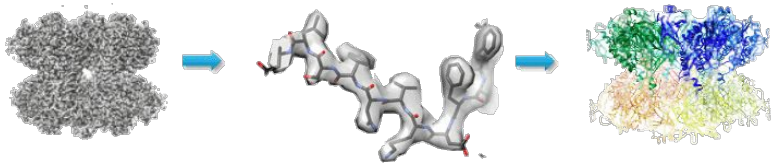
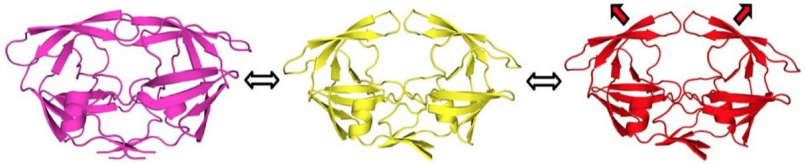
Towards a Lightsource for the African Continent

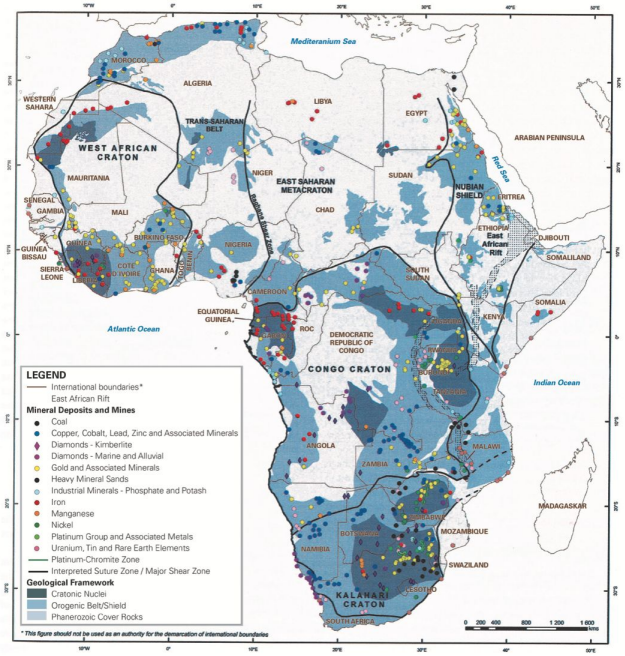
Global and Africa relevant Research and Innovation – by Africans and partners

African Cultural and Paleo Heritage



Developing medical interventions for Africa's disease burden, Malaria, HIV, TB, Ebola ….





Beneficiating Africa's mineral wealth: Mining Review Africa

AfLS-CDR Conceptual Design Report

Energy Materials

Innovations

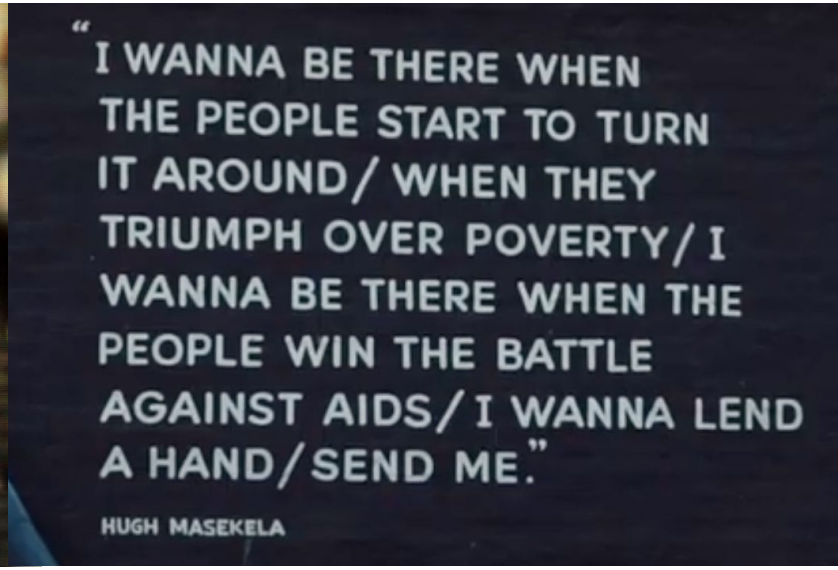
….. and much more

Thuma mina – Send Me

https://www.youtube.com/watch?v=d4Bwux-btq0

Musician Hugh Masekela

Inspiring Africa and the World



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Towards a Lightsource for the African Continent

First publications from Egypt then SA

1st formal Pan-African call. AfLS is in the ALC launch docs

Global conversations about the AfLS

Formation of AfLS Interim Steering Committee

AfLS1 Conference and AfLS SC

AfLS2020 IAC, LoS/MoU CDR Process

AfLS2 Conference

1990 1995 2000 2005 2010 2015 2020

Letter to SA-NRF

SA Synchrotron Initiative

1st African HE Summit : AfLS in the Declaration

AU: STC-EST, AAS call to support AfLS as a Pan African initiative

Many AfLS Roadmap related activities

AU: Exec Council call to support AfLS as a Pan African initiative

AfLS Foundation Legal Entity

Ghana Govt support

The Africa Light Source Foundation

Towards a Lightsource for the African Continent

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Visit us at : http://www.africanlightsource.org

THE AFRICAN LIGHTSOURCE

Towards a Lightsource for the African Continent

Visit us at : http://www.africanlightsource.org

Home

AFLS ROADMAP: CONFERENCES, SCHOOLS

Conferences and Schools that focus on building awareness of the benefits of light source based research; enhancing education; developing human capacity; developing international collaborations, linkages and partnerships related to light sources. **See Projects here.**

AFLS ROADMAP: TRAINING AND MOBILITY

Promoting mobility and access to current light sources to develop deep training. Visits can be from weeks to years. Develop human capacity and establish longer term international collaborations, linkages and partnerships related to light sources. **See projects here.**

AFLS ROADMAP: LOCAL AND REGIONAL RESOURCES

Promote the development of local and regional facilities that act as research facilities in their own right, as well as training, support and feeder infrastructure enabling successful programs at light sources.but also as training. **See projects here.**

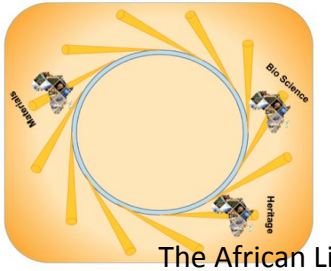
AFLS IN THE NEWS

1. **Ghana will champion the African Light Source** (AfLS) Ghana Business News Jan 30 (2019).
2. The University of Ghana has hosted the Joint 2nd African light source (Afls2) and Pan African Conference on Crystallography (Pccr2) - **News section of the website of the Un iversity of Ghana**
3. **African Light Source Garners Critical Political Backing** APS News 28/3 March 2019 : International News
4. Via PhysicsWorld **Physicists urged to back plans for Africa's first synchrotron**
5. Via BBC Science & Technology **African**

AFLS ROADMAP: POLITICAL SUPPORT

The Advisory Committee is working to make the AfLS a priority for

AFLS ROADMAP: AFRICAN CONSORTIA



AfLS team is working on the

AFLS ROADMAP : CDR

Search ...

FUNDING FLASH

1 year training + MSc for SA Engineering students at ESRF

UPCOMING EVENTS

1. The **African Calling Stick** is Calling all stakeholders to **AfLS 3 in Kigali, Rwanda** from 16-20 November 2020 in Africa
2. **School on Biophysical Approaches to Macromolecules and Cells**: Integrated Tools for Life Sciences and Medicine, 9 - 20 September 2019 NM-AIST, Arusha, Tanzania.

PREVIOUS EVENTS

1. **START Launch Event** 27-28 Mar 2019
2. **AfIS 2 Accra, Ghana** 28 Jan - 2 Feb 2019
3. **Biophysics & Structural Biology at Synchrotrons** 17-24 Jan 2019

Roadmap : AfLS Conference 2015

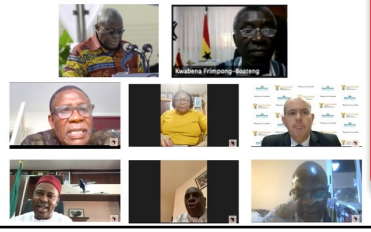
http://events.saip.org.za/conferenceDisplay.py/getPic?picId=66&confId=61

Bottom Up

1. Human Capacity: scientists, engineers, technicians
2. African scientists access existing LSs
3. African relationships with existing LSs.
4. Involvement of industry
5. Community for the African light source Users
6. Outreach

Top Down

1. Strategic approach to African Governments and (Pan) African orgs.
2. Conceptual Design Report (CDR)
3. Inter-African co-operation on Local / Regional feeder infrastructure
4. African multinational beamlines at existing LSs
5. Regional / Pan African membership of existing LSs
6. Technical Design Report (TDR)



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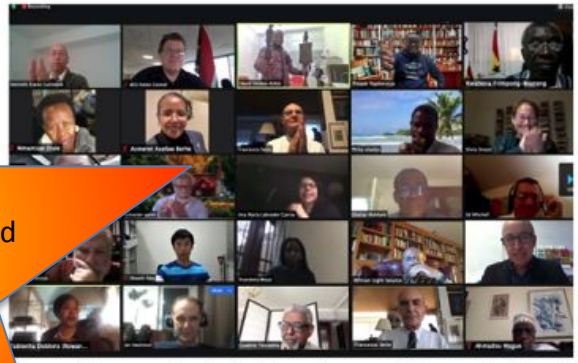
Towards a Lightsource for the African Continent

Conferences

2015, 2019, 2020,

2021, 2022

2021
Now 5 African
Governments involved
Many co-conveners
Prof bodies
Academies



s stored on on YouT

2021
>500 registrations

- AfLS1 2015
https://events.saip.org.za/event/61/
- AfLS 2019
https://events.saip.org.za/event/145/
- AfLS 2020
https://events.saip.org.za/event/211/
- AfLS3 2021
https://events.saip.org.za/e/AFLS3
- AfLS4 2022
https://events.saip.org.za/e/AfLS2022

Conceptual Design Review

CDR 5 Volumes

Volume I.
Scientific, Socio-Economic, Educational and Political Benefits
Volume II.
Machine Design Concepts
Volume III.
Scientific Capabilities and Beamline Technical Concepts
Volume IV.
Building Design and Infrastructure
Volume V.
Finance, Governance

https://events.saip.org.za/e/events.saip.org.za/e/AfLS-CDR-TownHall

CDR for AfLS

The AfLS should be seen in the context of

1. Pan Africanism
2. Science as a Global Endeavour
3. Science for Development
4. Science for Innovation
5. Innovation for Wealth Generation
6. Decolonisation of Africa
7. Massive training
8. Africa must sustain costs ($1Bn + $2BN over 20 years)
9. Competitive machine (no pass-offs)

Requirement	Applicability	Description
Stable power	AfLS site	Consider including onsite green power plant 50 MW in the TDR
Stable politics	AfLS country and region	For local and regional African governments
Good connections for travel	AfLS site	International, regional, and local
African government funding	Pan-African requirement	Assured for 80% of construction and operational costs (as stakeholders)
African users	Pan-African requirement	300 established scientists in the AdLS user base from throughout Africa
Industry users	Pan-African requirement	More than five large companies with synchrotron user experience
Human capacity training program	Pan-African requirement	More than a hundred students per year, local and international in science and a good fraction of that in engineering
Sufficient site space	AfLS site	For hi-tech Mega-science and Industry industrial park to develop alongside the AdLS
African industry participation	Pan-African requirement)	Willing to up-skill and innovate across local and Africa-wide industry through procurement of AdLS components
High-bandwidth Internet connectivity	AfLS site	At least 10 GB/s capacity
Safe environment	AfLS site	Good policing, low criminal activity
Completed CDR and TDR phases	Pan-African requirement	Conceptual and technical design reports

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Towards a Lightsource for the African Continent

Memoranda of Understanding

Advanced Light Source Facilities

- Synchrotron-Light for Experimental Science and Applications in the Middle East (SESAME)

International Institutions / Organisations

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

Letters of Support

African Institutions / Organisations

- African Crystallography Association Steering Committee (AfCA-SC), Africa
- Ghana Academy of Arts and Sciences, Ghana
- African Seismological Commission (AfSC), Africa
- International Union of Geodesy and Geophysics (IUGG), Africa
- Network of African Science Academies (NASAC), Africa
- South African Institute of Physics (SAIP), South Africa
- Ministry of Environment, Science, Technology & Innovation (MESTI), Ghana
- Federation of African Medical Physics Organizations, FAMPO, Africa
- Mbarara University of Science and Technology, Faculty of Science, Uganda
- African Physical Society (AfPS)
- BioStruct Africa, Africa
- African Materials Research Society (AMRS), Africa

Advanced Light Source Facilities

- Diamond Light Source, UK
- Centre for Advanced Microstructures and Devices (CAMD) Louisiana State University, USA
- European XFEL,Europe
- Paul Scherrer Institute (PSI), Switzerland
- Elettra Sincrotrone Trieste, Italy
- European Organization for Nuclear Research (CERN)
- The European Synchrotron Radiation Facility (ESRF)
- MAX IV laboratory, Sweden
- Synchrotron SOLEIL, France
- National Synchrotron Light Source II (NSLS II), USA
- Australian Synchrotron (ANSTO), Australia
- Singapore Synchrotron Light Source NUS
- National Synchrotron Radiation Research Center (NSRRC),Taiwan

International Institutions / Organisations

- International Center for Theoretical Physics (ICTP)
- International Union of Pure and Applied Chemistry (IUPAC)
- International Union of Pure an Applied Physics, (IUPAP)
- International Union of Crystallography (IUCr)

External National Institutions / Organisations

- The Cockroft Institute of Accelerator Science and Technology, UK)
- US Particle Accelerator School (USPAS), USA
- National Society of Black Physicists (NSBP), USA

AfLS Profile – Authoring – Website – Social Media

Institute of Physics
Learned society

IOP Institute of Physics

Debating the Societal Impact of Big Science in the 21st Century

Recent Progress Towards an African Light Source

Simon Connell[1,*], Katharina C. Cramer[2], Ed Mitchell[3,‡], Sekazi K. Mtingwa[4], Prosper Ngabonziza[5,6,#]

To appear soon …..

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© World Scientific Publishing Company
DOI: 10.1142/S0217732318300033

World Scientific
www.worldscientific.com

Synchrotron light sources in developing countries

Sekazi K. Mtingwa

Herman Winick*

https://www.worldscientific.com/doi/abs/10.1142/S0217732318300033

*ResearchProfessional News

African Light Source aims for science with ubuntu

By Katharina Cramer et al

Share

The African Review of Physics
formerly published as The African Physical Review

The African Review of Physics (2018) **13**: 0019

Proceedings of the first African Conference on Fundamental Physics and Applications 2018, Namibia.
Guest Editors: K. A. Assamagan, M. Backes, D. Charlton, S. Muanza , D. Sahu, and D. Singh

The African Light Source Project

http://lamp.ictp.it/index.php/aphysrev/article/view/1610/586

Biophysical Reviews
pp 1–9 | Cite as

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Modern Physics Letters A | Vol. 33, No. 09, 1830003 (2018)
| Brief Review No Access

Synchrotron light sources in developing countries

Sekazi K. Mtingwa and Herman Winick

Example motivation based on Bio Science

- Structural information helps to elucidate function, the mechanisms of enzymes inspires the design of new drugs.
- Africa should lead research of this nature cures for diseases of particular relevance to Africa
- Synchrotrons are extremely important facilities for the imaging of bio-molecules.
- Development of 210 new drugs that depended on protein structural information [Westbrook et al. 2019].
- Development of drugs for treating HIV-AIDS, [Wlodawer et al. 1998].
- Listing of about drugs, their targets "*Practical Fragments*" Website [Prac. Frag 2018].
- Development of new treatments for tuberculosis [Blundell 2017a].
- Interplay between academia and industry [Blundell 2017b].
- **See Light Sources for vaccine development for the current Pandemic [AfLS web page]**

African Light Source Based Science

Science of special interest to Africa - some examples, of many

1. Materials

- Very many examples

  See talk of Prof Diale "Energy Materials – nano science"
  http://events.saip.org.za/conferenceTimeTable.py?confId=211#20201118.detailed

2. Paleo Science

- See talk of Dr Kudakwashe "3D Phase Contrast Tomography– heritage science"

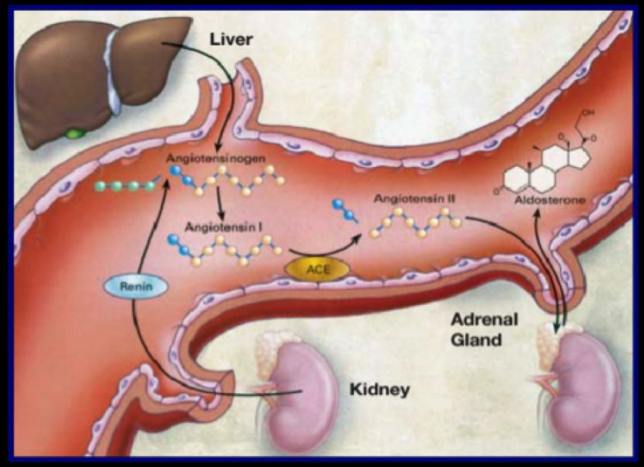
  http://events.saip.org.za/conferenceTimeTable.py?confId=211#20201118.detailed

3. Bio Science

- See talk of Dr Thandeka Moyo "Structural Biology – health sciences"
  http://events.saip.org.za/conferenceTimeTable.py?confId=211#20201118.detailed

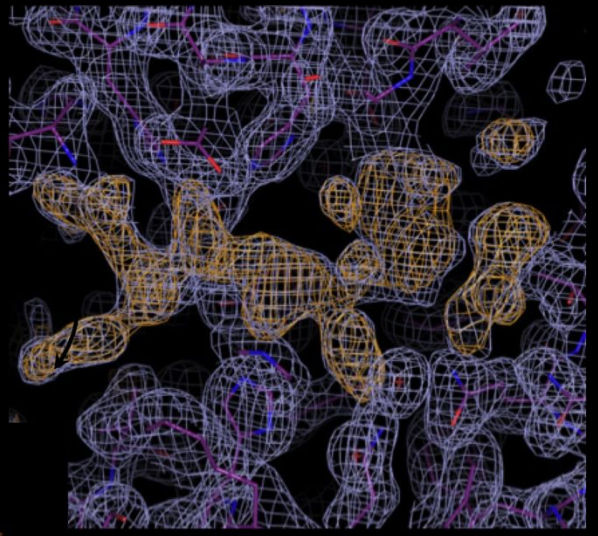
Drug design for hypertension

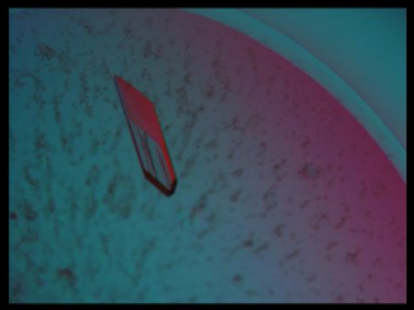
Dr. Jean Watermeyer

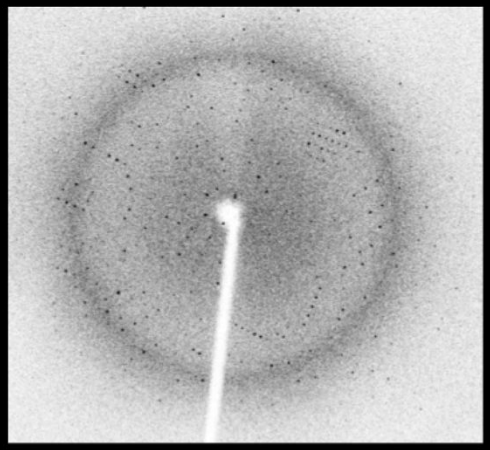


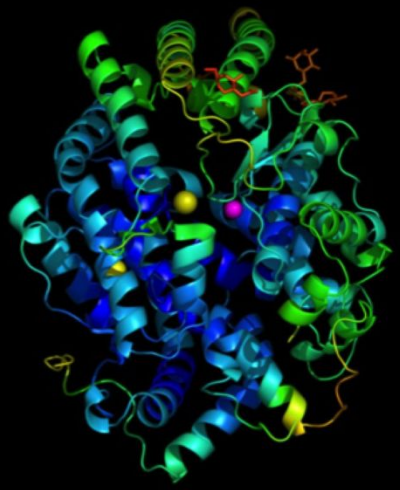
High blood pressure is treated using inhibitors of angiotensin-converting enzyme.

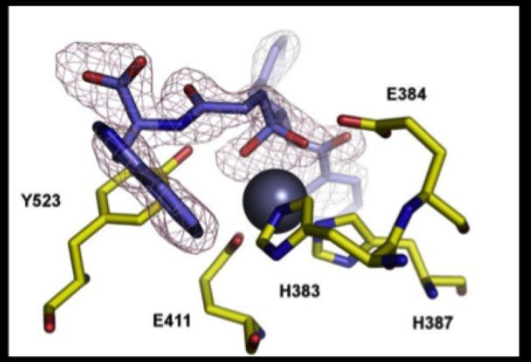
X-ray crystallography allows visualisation of locally-designed, novel inhibitors binding to the enzyme.



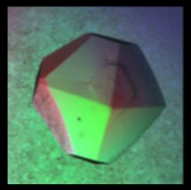




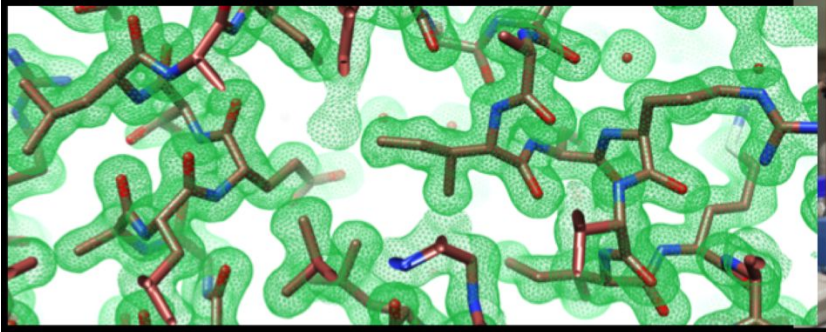




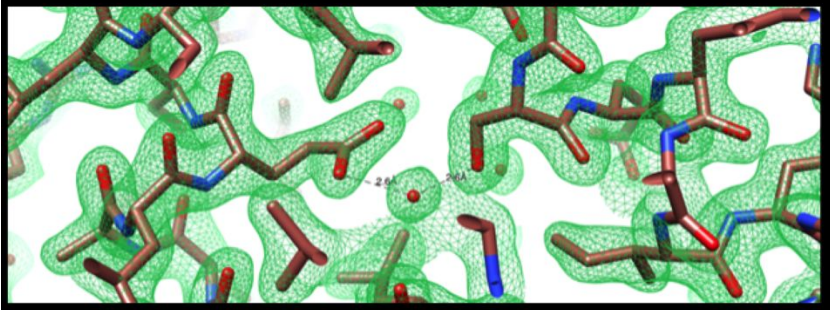
Water purification is achieved through polyacrylamide flocculation
Acrylamide is made in kiloton quantities using nitrile hydratase



Dr Jennifer van Wyk



Naturally occurring nitrile hydratase



Enzyme modified for greater thermostability

Better enzymes for acrylamide manufacture are designed using structural knowledge

INSTITUT MAX VON LAUE - PAUL LANGEVIN

NEUTRONS FOR SCIENCE®

Structural biology: A powerful tool to gain insight into the biology of the malaria parasite, *Plasmodium falciparum*

Theresa L. Coetzer[a], Manuel Blanc[b], Daniel R Meyersfeld[a], Juliette Devos[b], Kubendran Naidoo[a], Malene Ringkjøbing Jensen[c], Sonja B Lauterbach[a], Martin Blackledge[c], Michael Haertlein[b], V. Trevor Forsyth[b,d], Edward P. Mitchell[e]

[a] WITS Medical School , NHLS, Johannesburg, Republic of South Africa.
[b] Life Sciences Group, Institut Laue-Langevin, 71 Avenue des Martyrs, 38000 Grenoble, France.
[c] IBS, 71 Avenue des Martyrs, 38000 Grenoble, France.
[d] Faculty of Natural Sciences, Keele University, Staffordshire, ST5 5BG, United Kingdom.
[e] ESRF, 71 Avenue des Martyrs, 38000 Grenoble, France.

PSB

NATIONAL HEALTH LABORATORY SERVICE

ibs

ESRF The European Synchrotron

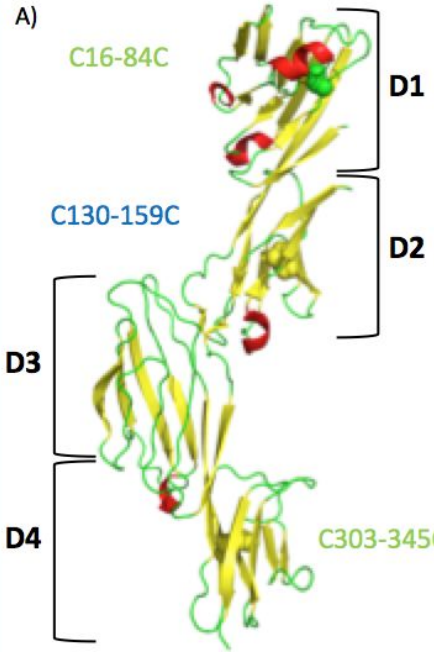
UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

Structural studies of dynamic CD4 changes relevant to HIV infection

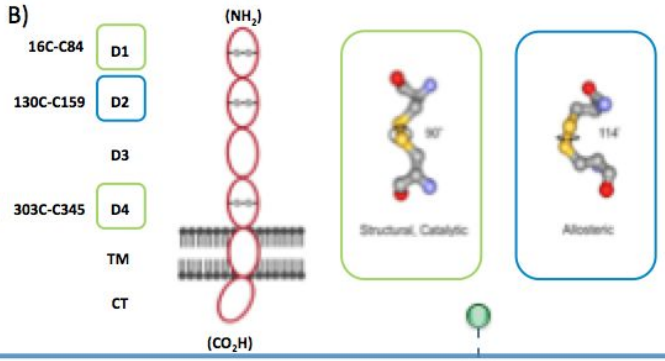
J.A. Channell[1,2,4,5], N. Cerutti[3], M. Moulin[1], T. Forsyth[1,4], M. Haertlein[1], E. Mitchell[2,4], A. Capovilla[3], M. Papathanasopoulos[3]
From the ILL Life Sciences Group[1] and the ESRF Business Development Office[2], Grenoble, France, the HIV Pathogenesis Research Unit in the Department of Molecular Medicine and Haematology at the University of the Witwatersrand, Johannesburg, South Africa[3],EPSAM, Keele University, UK[4] and the South African Medical Research Council[5].

CD4 is the primary receptor for HIV-1 surface glycoprotein, gp120. Preliminary data suggests that gp120 binds a specific redox isomer of CD4 in which its second domain, metastable allosteric disulphide bond is reduced. A collaboration exists between the ILL, ESRF and HPRU to use high and low-resolution X-ray and neutron scattering techniques to determine the structural implications of CD4 redox biology on gp120 binding and will thus aid in rational design of HIV-1 entry inhibitors.

Scientific Background



HIV is the causative agent of AIDS infecting CD4+ and CCR5/CXCR4+ cells of the innate and adaptive immune systems of more than 35million people, worldwide. CD4 is the primary receptor of trimeric HIV-1 surface antigen (env) and specifically binds gp120. CD4 has a transmembrane (TM), a cytosolic tail (CT) and 4 ecto-domains (D1-4) of which D1,2 & 4 contain disulphide bonds(fig. 1A,B)[2]. D2 contains a non canonical configuration of disulphide bond (-RHStaple) which is metastable and associated with an unusual class of disulphide bonds called the allosteric disulphides. Biochemical analyses show that CD4 can only bind gp120 when its D2 disulphide bond is reduced[3] (fig.1C). Physiologically, CD4's function is involved in the adaptive immune response and can be found on resting T-cells in fully oxidised monomers and on active T-cells in D2 swapped disulphide dimers. Therefore, the partially reduced CD4 redox isomer (2dCD4^{R1}) is a functionally and therefore a potentially structurally unique CD4 species able to bind gp120.



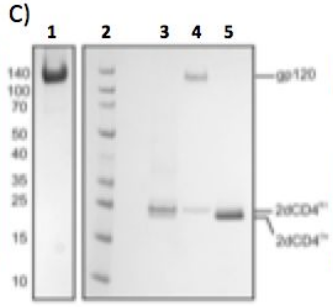


Figure 1: A) Ecto-domains of CD4 1-4. The disulphide bonds in D1, 2 and 4 are shown in space filling mode. (generated using PyMOL from PDB ID 1WIQ)[1]. B) Schematic depicting full-length, oxidised, monomeric CD4 as found on the resting T-cell. The D1 and 4 disulphides are structural whereas the D2 disulphide bond belongs to the allosteric family of disulphide bonds. C) 1=gp120 control, 2=molecular weight marker, 3=pre-bound CD4 redox isomers, 4=gp120-CD4 bound fraction, 5=unbound CD4 fraction. SDS-PAGE showing that only the partially reduced 2dCD4^{R1} species is capable of binding CD4[3].

MAPPING THE EPITOPE:
DEFINING THE STRUCTURE OF THE HIGHLY IMMUNOGENIC ENV-CD4 COMPLEX

Gavin Owen, Nichole Cerutti, Mark Killick, Edward Mitchell,
Michael Haertlein, Trevor Forsyth, Maria Papathanasopoulos

INTRODUCTION

Despite recent advances in the design of HIV-1 Env-based vaccine immunogens, such immunogens have not yet elicited broadly cross-reactive neutralizing antibodies against circulating primary HIV (Fig. 1). A major research aim of the HIV Pathogenesis Research Unit (HPRU) at the University of the Witwatersrand in South Africa is the evaluation of vaccine design strategies to identify Envelope(HIV)-CD4(human host) (Fig. 2) vaccine immunogens capable of inducing potent, durable, and broadly protective neutralizing antibodies responses against clinically relevant HIV-1 subtype C.

The HPRU has focused on the development of an effective prophylactic HIV vaccine which utilizes a novel immunogen called Env-2dCD4^{S60C} that consists of a human two domain CD4 with an S60C mutation (2dCD4^{S60C}) covalently bound to monomeric gp120 (Fig. 3). We have designed, expressed, and purified sufficient quantities of the recombinant gp120 monomers, the 2dCD4^{S60C} capable of forming a covalent interaction with Env, and have subsequently generated, isolated, and performed functional analyses on the novel covalent complex (reported in [1]).

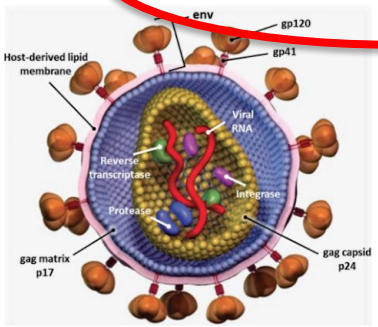


Fig. 1: A model representation of the structural organization of the HIV-1 virion and its associated proteins [2].

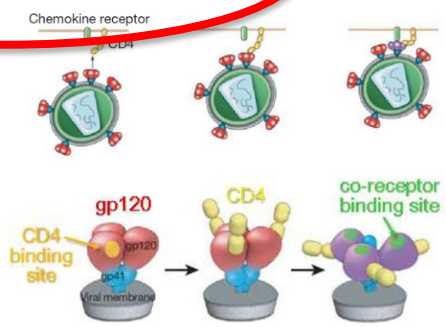
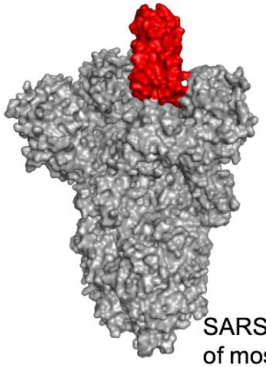


Fig. 2: Conformational changes in the gp120 trimeric spike induced by CD4 binding and the associated consequences for viral attachment to the target cell [3].

Contribution of Light Sources to Biological and Medical Sciences

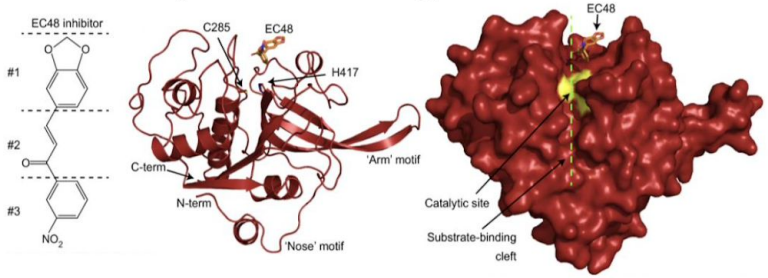
Structural biology helps us understand the **structure and function of macromolecules** including proteins, DNA and RNA

Aids in vaccine design



SARS-CoV-2 spike protein – basis of most vaccine candidates

Provides information on protein-inhibitor interactions for drug, herbicide and pesticide design

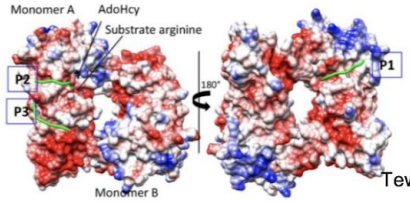


Malaria protein bound by inhibitor

Machin et al 2019, *Malaria Journal*

Dr Thandeka Moyo

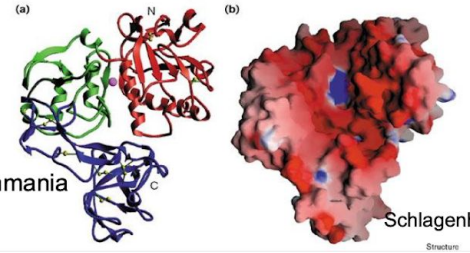
Provides insight into the mechanism of enzymes and is an enabler for industrial enzymology



Active site binding of protein arginine methyltransferases

Tewaryy et al., 2019, *Cell Mol Life Sci.*

Reveal the structure and therefore vulnerable regions of proteins from pathogens



Structure of the main leishmania surface antigen

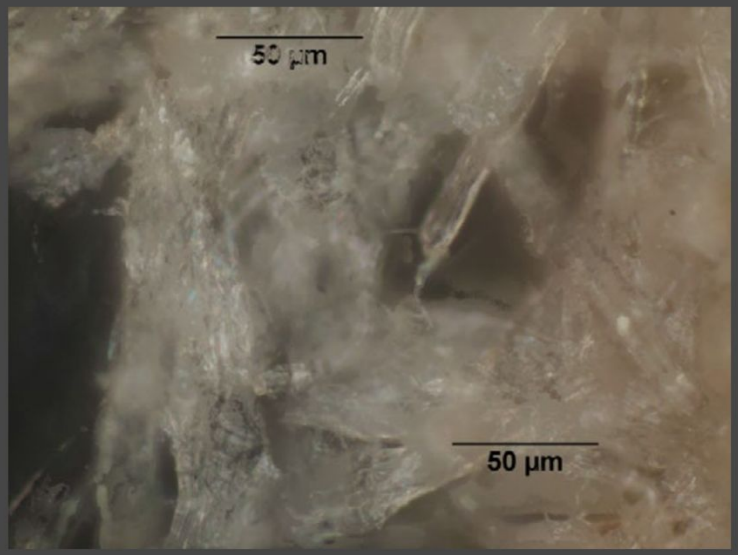
Schlagenhauf et al, 1998, *Structure*

Investigation of the **manufacturing technologies** used to produce historical documents in the southern African region

Chemical composition and degradation pathways of African historical documents

Ink, fibre and sizing analysis of African historical documents

Collaboration with institutions that deal with archaeological objects for resource sharing



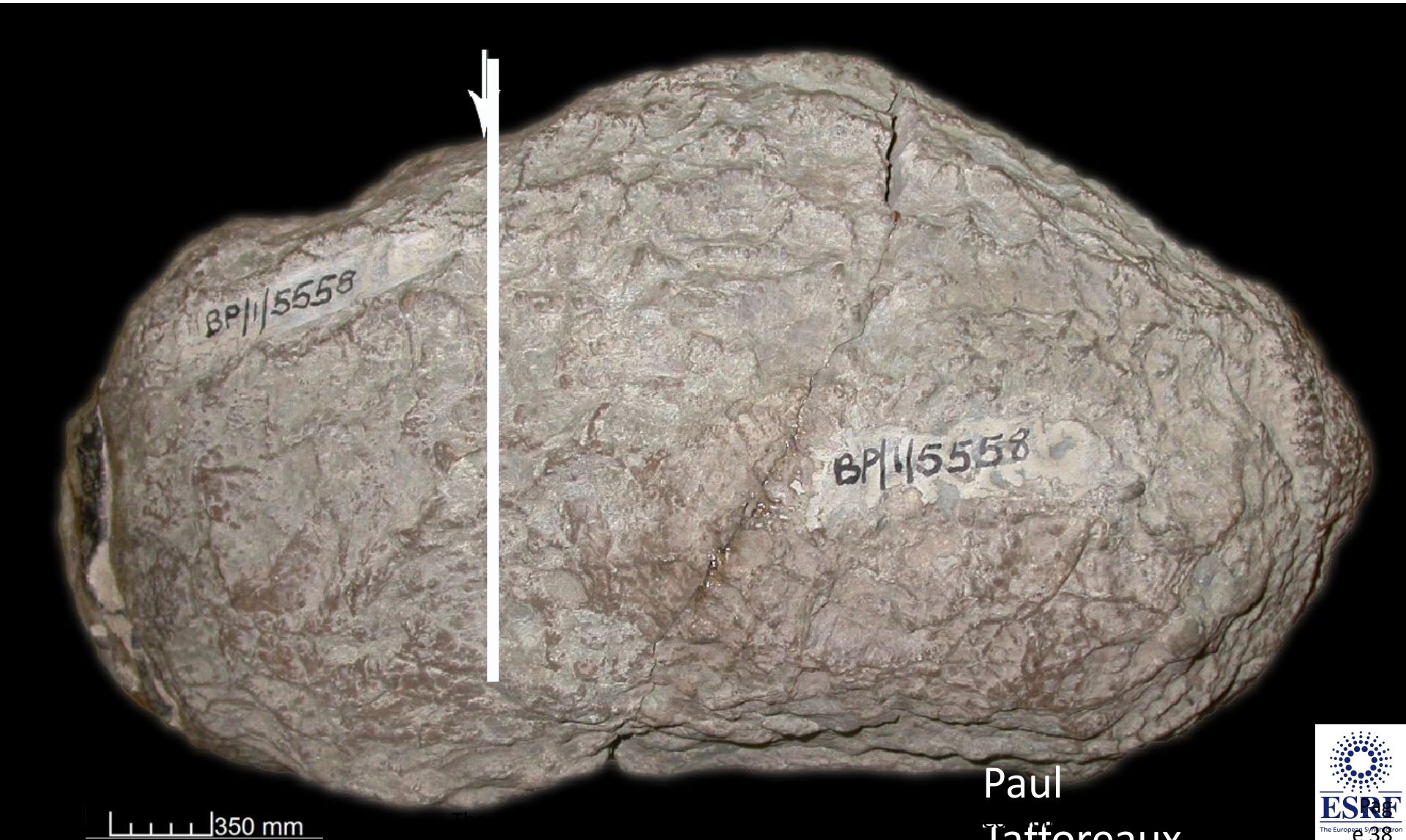
Historical documents : Timbuktu

Research stay of Kaitano Dzinavatonga to work on proposals, start preparing samples and perform preliminary tests


South African rock art
St. Hoerlé, S. Mguni, D. Pearce, C. Sandt, L. Jacobson, L. Bertrand…
SOLEIL SYNCHROTRON
UNIVERSITE DE TOULOUSE LE MIRAIL
UNIVERSITE DE VERSAILLES SAINT-QUENTIN-EN-YVELINES
UNIVERSITE CHAMBERY SAVOIE
UNIVERSITÉ LUMIÈRE LYON 2
McGregor museum
NATIONAL • NASIONALE MUSEUM BLOEMFONTEIN
origins centre
AHRI
African Light Source Conference
Loïc Bertrand 17 November 2015
IPANEMA
ARCHAEOLOGY CONSERVATION SCIENCES PALAEONTOLOGY PALAEO-ENVIRONMENTS
ANCIENT MATERIALS RESEARCH PLATFORM

The Africa Light Source Foundation

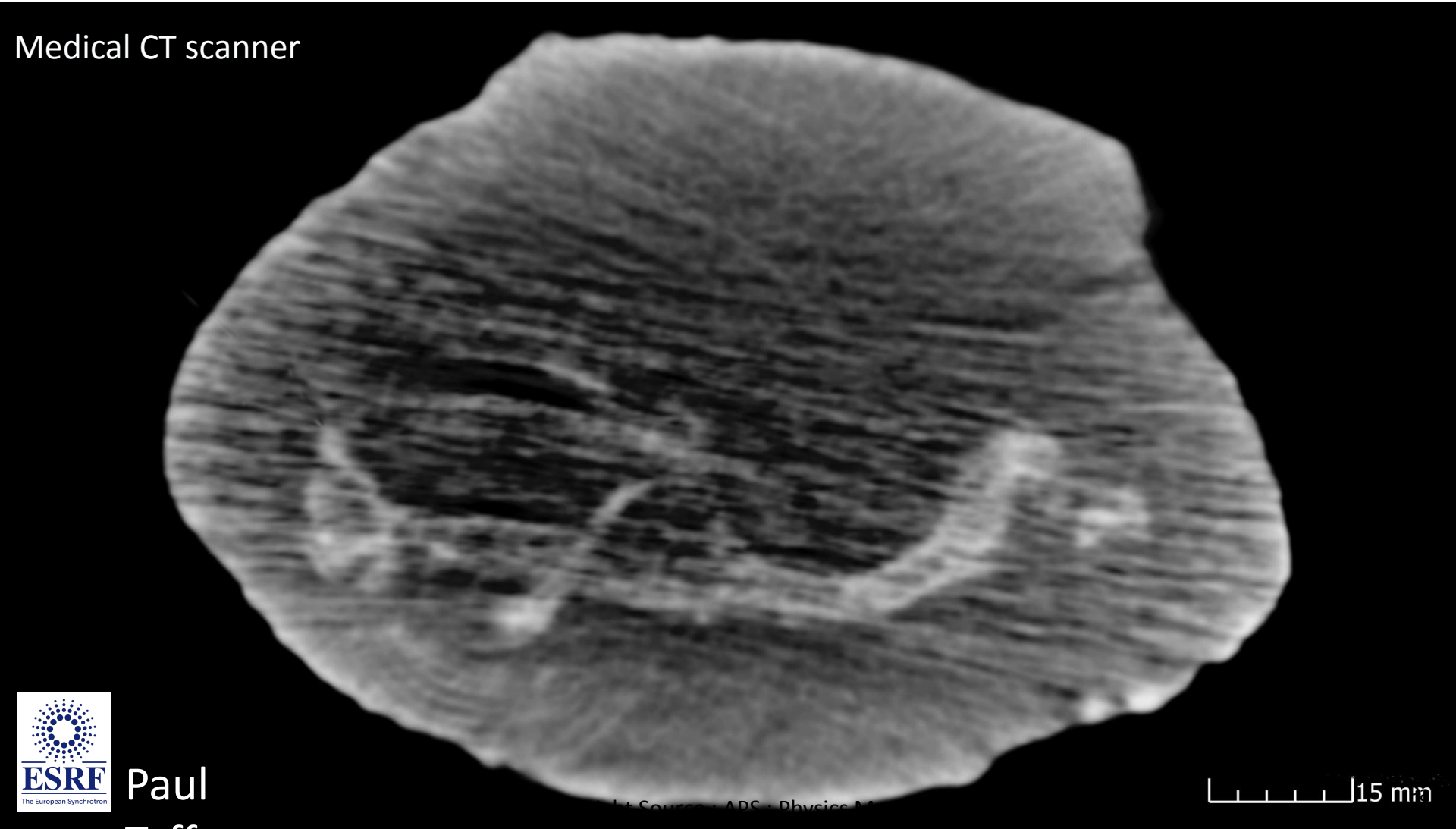
Towards a Lightsource for the African Continent



Paul Tafforeaux

The Africa Light Source Foundation

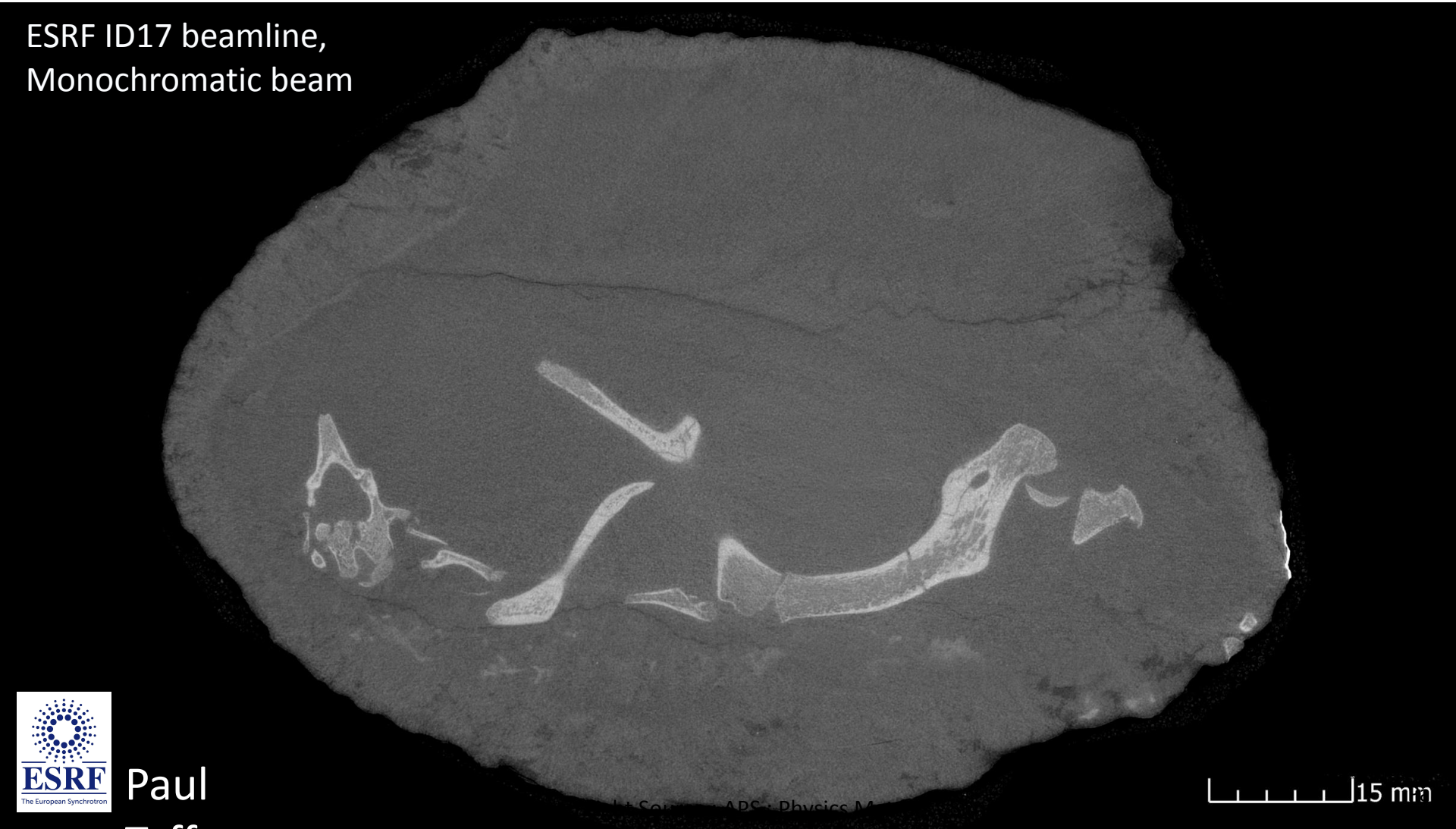
Towards a Lightsource for the African Continent



Paul

The Africa Light Source Foundation

Towards a Lightsource for the African Continent



Paul

Broomistega : Temnospondyl amphibian, aquatic predator, the best skeleton ever discovered

Thrinaxodon : Mammalian reptile, close to the origin of mammals

350 mm

Paul Tafforeaux

ESRF
The European Synchrotron

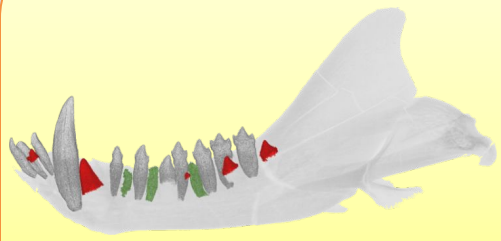
The Africa Light Source Foundation

Towards a Lightsource for the African Continent

© Vincent Fernandez

The Africa Light Source Foundation

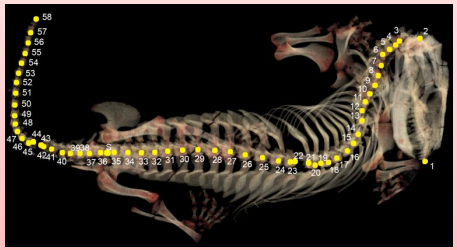
Towards a Lightsource for the African Continent



Dental replacement

Abdala *et al.* 2013

J. Vert. Paleontol.



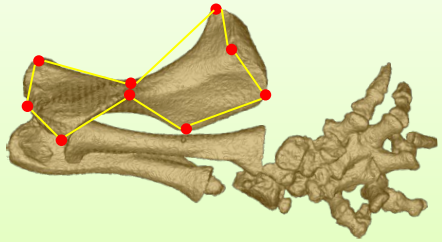
Vertebral biomechanics

S. Pierce; K. Angielczyk

Paul Tafforeaux

Cranial ontogeny

Jasinoski *et al.* 2015



Functional morphology

Iqbal *et al.* en prep

ESRF

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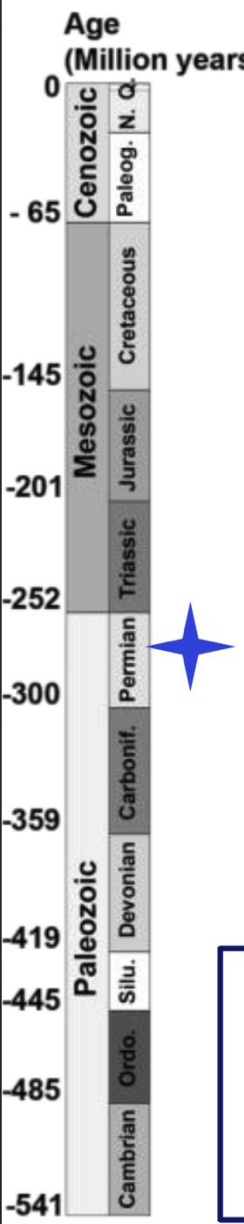
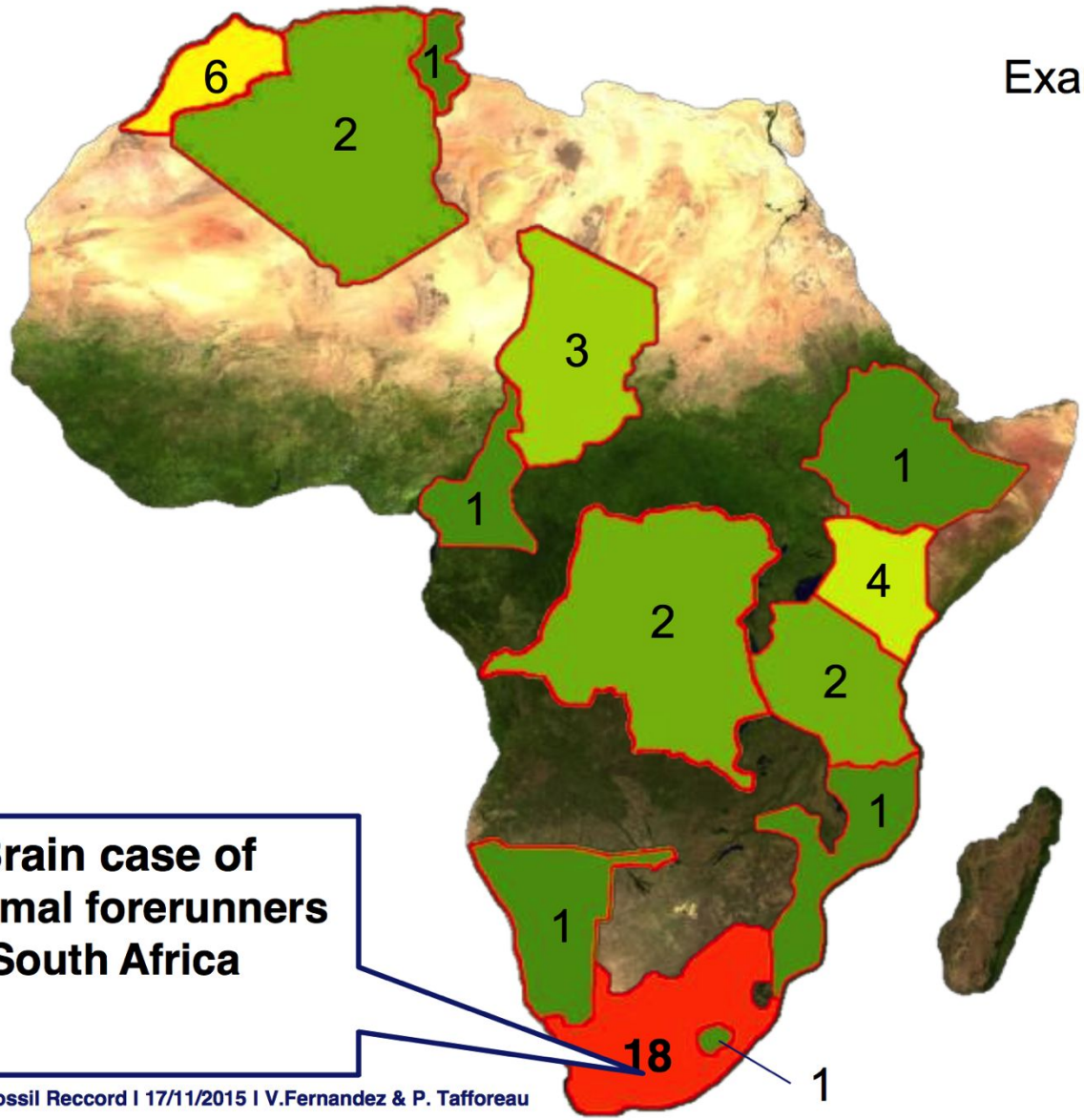
Towards a Lightsource for the African Continent



Number of articles or (ongoing) projects per country



Example of ongoing projects

Brain case of mammal forerunners South Africa

The Africa Light Source Foundation

Towards a Lightsource for the African Continent

22 PARTNER COUNTRIES

13 Member states:

France	27.5 %
Germany	24.0 %
Italy	13.2 %
United Kingdom	10.5 %
Russia	6.0 %
Benesync (Belgium, The Netherlands)	5.8 %
Nordsync (Denmark, Finland, Norway, Sweden)	5.0 %
Spain	4.0 %
Switzerland	4.0 %

10 Associate countries:

Austria	1.75 %
Israel	1.75 %
Centralsync (Czech Republic, Hungary, Slovakia)	1.05 %
Poland	1.00 %
Portugal	1.00 %
India	0.66 %
South Africa	0.30 %

Contact SRRIC Chair
Tshepo Ntsoane

- Staff: ~ 650
- Partner countries' contributions: ~ 85 M€/year
- Annual Operation Budget: ~100 M€

- Access based on scientific excellence
- Travel and local costs refunded to users

Top Down

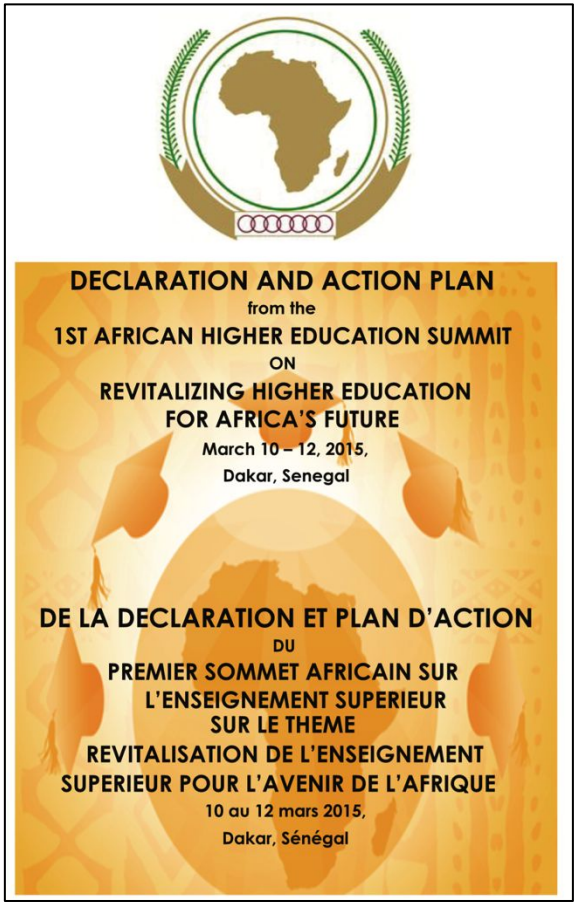
Declaration and Action Plan

1st African Higher Education Summit on Revitalizing Higher Education for Africa's Future,

10-12 March 2015, Dakar, Senegal.

Article 5.3.2 p 22 : Recommends establishing a Synchrotron as a centralized African scientific facility.

Co written by
Dr Nkem Khumbah,
STEM-Africa Initiative



Top Down

Specialized Technical Committee on Education, Science and Technology

Africa Union : STC-EST

20 October 2017 Egypt

H.E. Prof. Sarah Anyang Agbor

AU Commissioner for Human Resources, Science and Technology.

African Academy of Science

President **Prof. Felix Dapare Dakora**

Presentation on African Light Source

Top Down

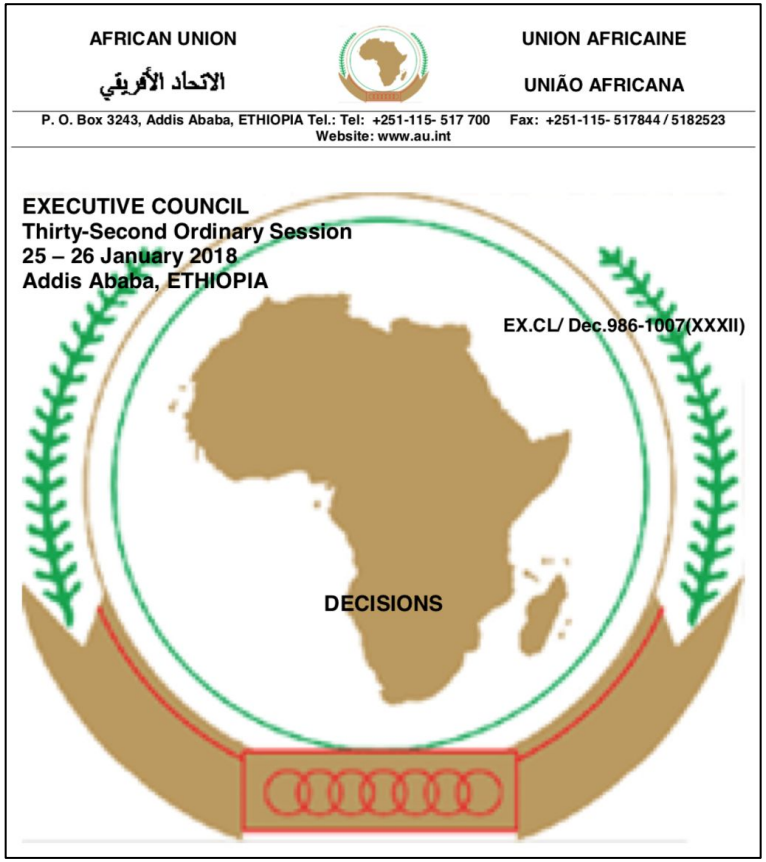
AfLS at the AU : Jan 2018

DECISION ON THE REPORTS OF THE SPECIALISED TECHNICAL COMMITTEES (STCs)

The Executive Council,

C. STC ON EDUCATION, SCIENCE AND TECHNOLOGY

21. CALLS UPON Member States to support the Pan-African Synchrotron Initiative;



Countries Expressing Commitment

Ghana

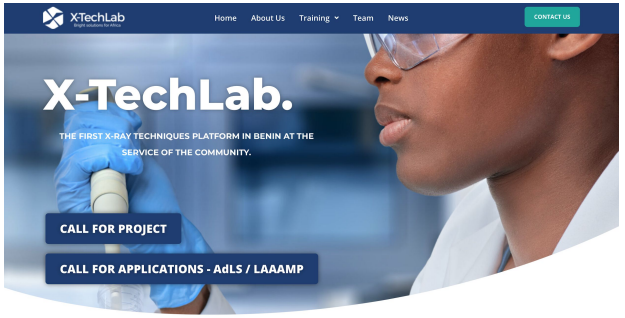
2019, the President Akufo-Addo of Ghana
pledged to champion the project in the African Union.
2020, the science minister, Dr. Kwabena Frimpong-Boateng,
reaffirmed Ghana's support for the African light source

Benin

2019, X-TechLab, as a government priority project,
expresses itself as part of the Roadmap to the AfLS.

Contribute to the establishment of the first African Synchrotron

X-TechLab aims to contribute to the emergence of a community of experts of x-rays experts who will, not only be active users of the future African synchrotron, but also be instrumental in defining its strategy and scientific priorities.



SA

2021, SA Dept Science and Innovation and the NRF invite
a proposal towards the AfLS as a "Flagship Project"

Draft Roadmap: The African Light Source Foundation and South Africa's Department of Science and Innovation (DSI) and National Research Foundation

Noting:

1. An advanced light source (AdLS) is one of the most transformative large-scale infrastructures for knowledge and innovation based sustainable socioeconomic development for the African continent.
2. An AdLS has a broad footprint in many disciplines that include physics, chemistry, bioscience, materials science, nanoscience, geoscience, heritage science, environmental science, medical science, all fields of engineering and industrial manufacturing. A few examples are highlighted:

2021, Nigeria

Office of the Science Ministry

2021, Cote d'Ivoire

Office of the Science Ministry

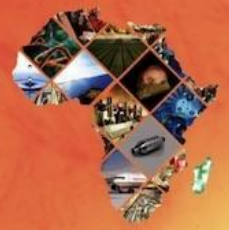
2021, AUC-HRST

Developing Process and Actions

Some Government, Pan African organization and AU level events

The Africa Light Source Foundation

Towards a Lightsource for the African Continent



Pan African scholarly associations, supporting the AfLS co-convening / co-organizer AfLs Conferences,

Art, Cultural Heritage, and Forensics	LNLS, Center for Scientific Studies in the Arts
Biochemistry	Federation of African Societies of Biochemistry and Molecular Biology (FASBMB)
Bioimaging	African Bioimaging Consortium (ABIC)
Chemistry	Federation of African Societies of Chemistry (FASC)
Crystallography	African Crystallographic Association (AfCA)
Earth Sciences	African Institute for Planetary and Space Sciences (AIPSS)
Geophysics	African Geophysical Society (AGS)
Electrical Engineering	IEEE-Africa, IEEE Region 8
Engineering	Federation of African Engineering Organizations (FAEO)
Food Science	South African Association for Food Science and Technology (SAAFoST)
Immunology	Federation of African Immunological Societies (FAIS)
Materials Science	African Materials Research Society (AMRS)
Medical Physics	Federation of African Medical Physics Organizations (FAMPO)
Nanoscience and Nanotechnology	African Society for Nanoscience and Nanotechnology (AfNN)
Optics/Photonics	African Optics and Photonics Society (AfOPS)
Paleontology	Eastern African Association for Palaeoanthropology and Palaeontology (EAAPP)
Physics	African Physical Society
Structural Biology	Biostruct Africa
Water Science	African Water Association

Also …. Support from AAU and ARUA, and other members of NASAC

The Africa Light Source Foundation

Towards a Lightsource for the African Continent

The joint virtual event of the
African Light Source AfLS2020
and the
African Physical Society AfPS2020

AfPS

- **Lightsources for Africa, the Americas, Asia and Middle E**
  Dr Michele Zema
- **The X-TechLab x-ray techniques platform in Bénin**
  Dr Thierry d'Almeida
- **Towards an African Crystallographic Association**
  Prof. Delia Haynes
- **BioStruct-Africa: empowering Africa-based scientists thr**
  Prof. Emmanuel Nji et al.
- **African Neutron and Synchrotron Data Analysis Compet.**
  Prof. Fischer Nico
- **African Synchrotron Network for Advanced Energy Mate**
  Dr Marcus Newton
- **GCRF START – Synchrotron Techniques for African Res.**
  Prof. Bryan Trevor Sewell
- **Crystallography in Africa: the IUCR-UNESCO Africa Initia**
  Prof. Claude Lecomte
- **The African Materials Research Society**
  Prof. Sam Chigome

AfLS 2020

Participation by
community, PBs, VAs, AdLS

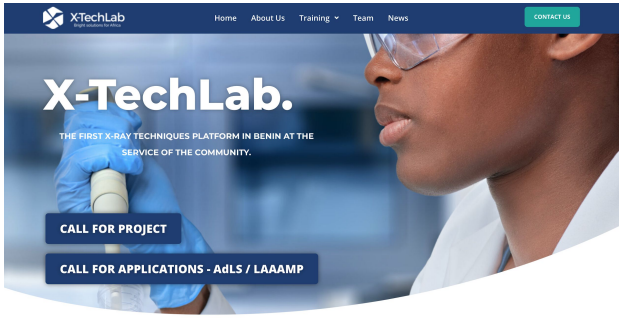
- **Letters of Support and Light Sources Roundtable**
  Kenenth Evans-Lutterodt
- **ESRF - The Light Sources Round Table**
  Dr Francesco Sette
- **Elettra - The Light Sources Round Table**
  Prof. Giorgio Paolucci
- **ALBA and LEAPS - The Light Sources Round Table**
  Caterina Biscari
- **Diamond - The Light Sources Round Table**
  Prof. Harrison Andrew
- **SESAME - Light Sources Round Table**
  Dr Khaled Toukan

Zoom Screen shot of delegates and Presentation Videos stored on on YouTube

Some Existing Regional Facilities

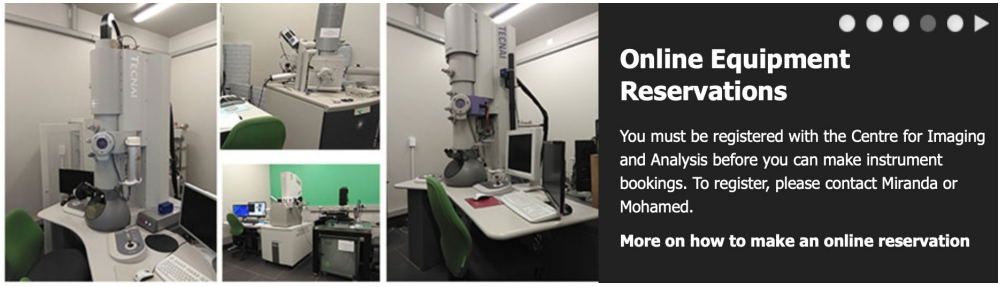
X-TechLab - Benin

Materials analysis, spectroscopy for many disciplines.
Energy, health, environment, agriculture, materials



Sir Aaron Klug Centre - SA

Structural biology resource widely used in SADEC region



African Laser Centre

Pan-African NEPAD flagship initiative

ICTP-EAIFR - Rwanda

Condensed matter, Geology, Particle Physics,
Cosmology, Astroparticle physics

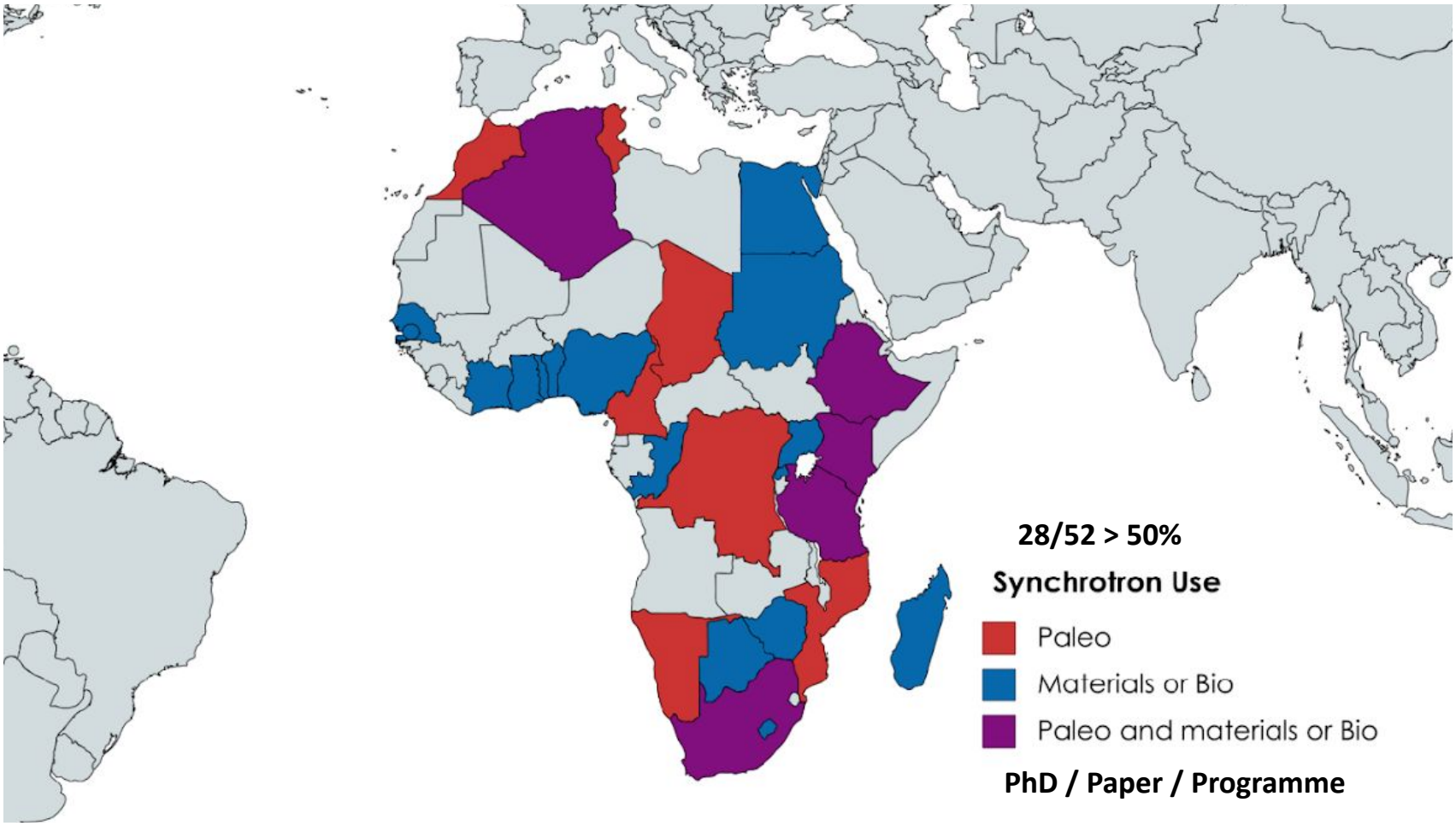
Others ….

Top Down

AfLS : Plenary Session at COREVIP 2019

The AfLS was endorsed in a Conference Resolution
Proceeding to develop MoU for Formal Collaboration

Bottom Up

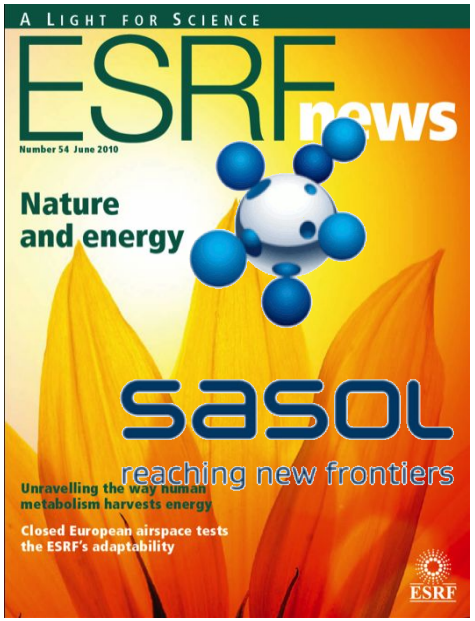

28/52 > 50%
Synchrotron Use
Paleo
Materials or Bio
Paleo and materials or Bio
PhD / Paper / Programme

Bottom Up

Example of African Industry :

SASOL investment in R&D and HC

SASOL capacity, achievements in catalysis studies – local and at light sources



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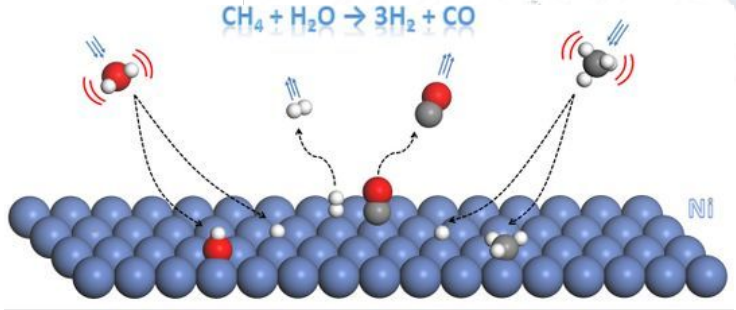
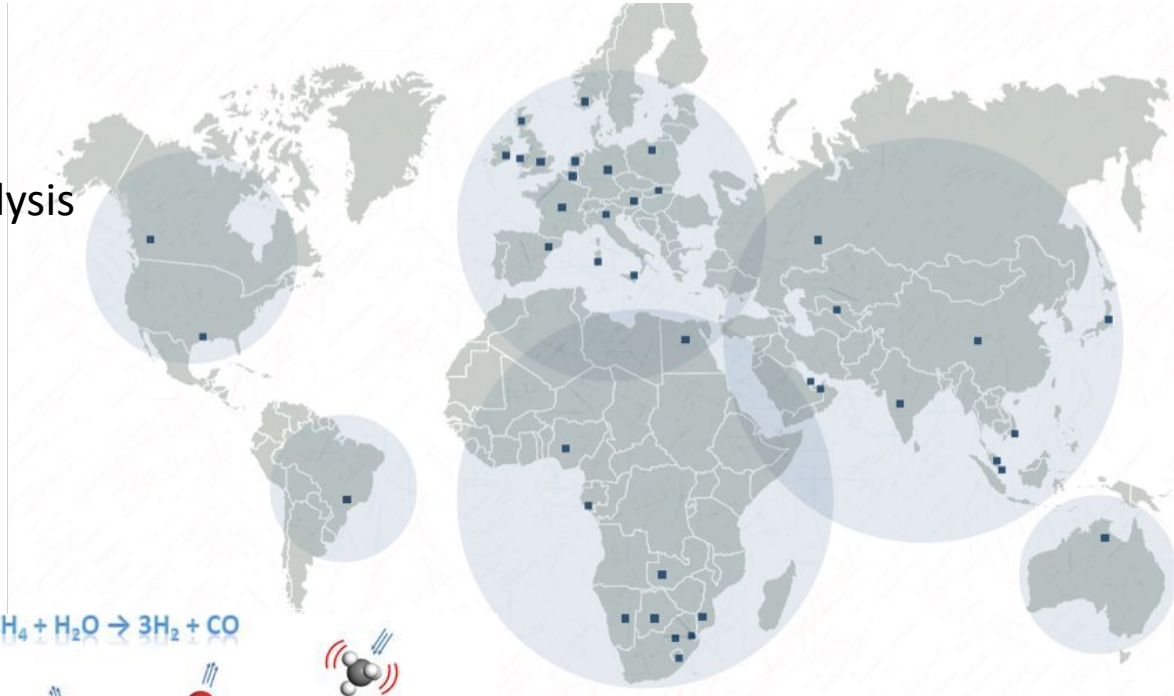




from Dr E du Plessis at AfLS2015

Bottom Up

Bio-Science Capacity in Africa

Ghana
University of Ghana
Zambia
The University of Zambia
Algeria
Ecole Nationale Polytechnique de Constantine
Nigeria
Federal University of Technology, Akure
University Ile-Ife
Burkina Faso
Institute of Research in Health Sciences, Burkina Faso
Morocco
University Sidi Mohamed Ben Abdellah
Ivory Coast
Universite Felix Houphouet Boigny
Egypt
Helwan University, Ain Shams University
Lesotho
National University of Lesotho
Ethiopia
Addis Ababa University

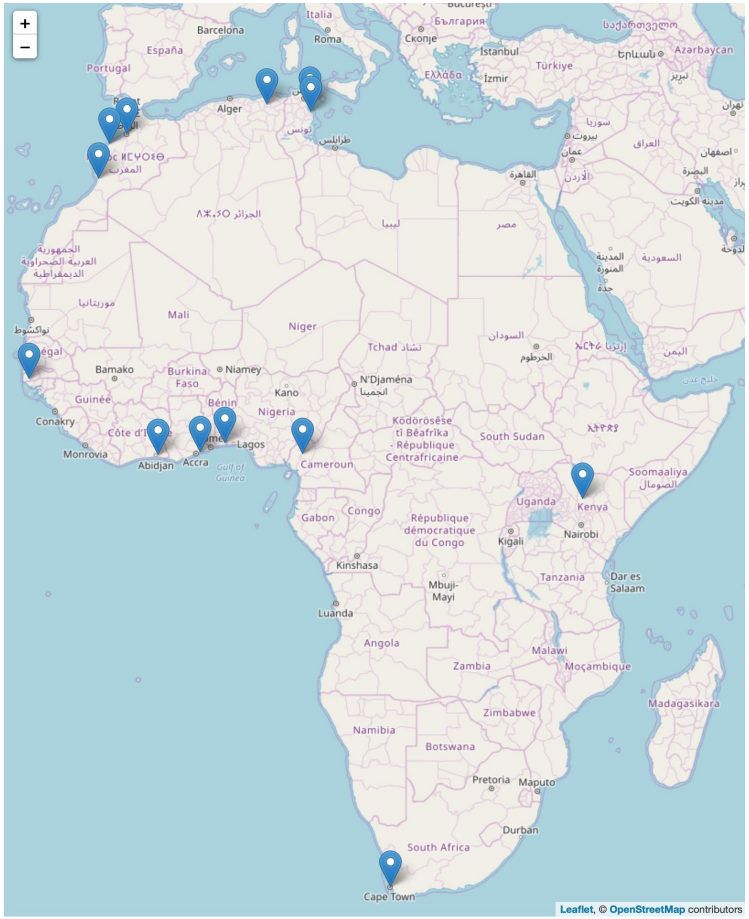
Bottom Up

Feeder Facilities

1. **South Africa**
   - Aaron Klug Centre, UCT, link, U Witwatersrand, U Free State, U Stellenbosch, iThemba
2. **Benin**, X-TechLab, Benin, link
3. **Ghana**, U Ghana, link
4. **Côte d'Ivoire**, LaCPM, Universite Felix Houphouet Boigny, **Abidjan**, link
5. **Senegal**, Ziguinchor, link
6. **Cameroon**, Dschang, link
7. **Kenya**, Kenyatta University, link
8. **Tunisia**
   - Monastir, link, Nabuel, Tunisia, link
9. **Algeria**, Constantine 1, link
10. **Morocco**
    - U Rabat,, link, El Jadida, Morocco, link , Agidir, Morocco, link

Significant facilities

IUCr OpenLab venues with facilities



Bottom Up

X-TechLab AT SÈMÈ CITY, BENIN

X-Ray Techniques for Sustainable Development

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

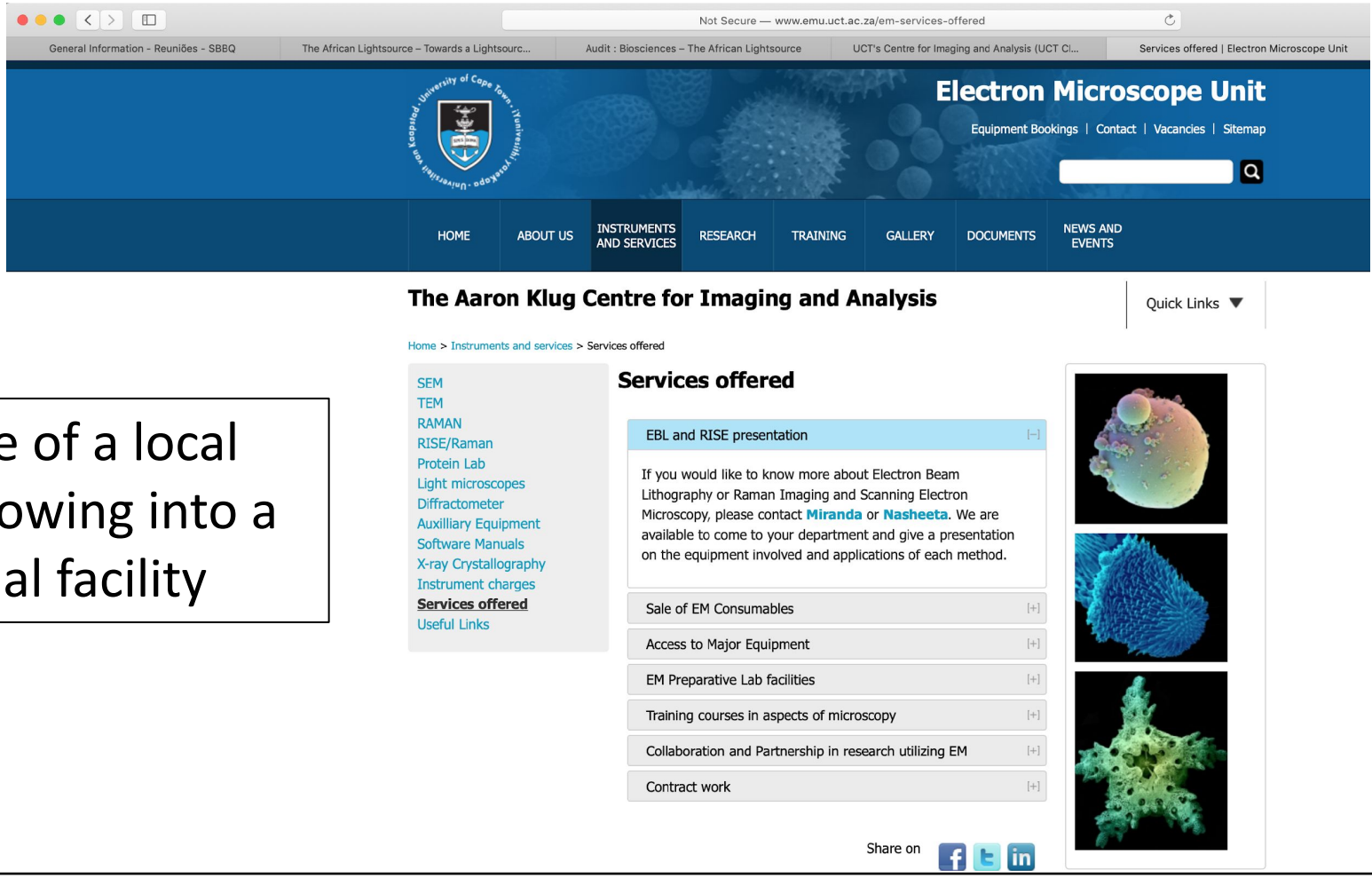
REVEALINGBENIN

SÈMÈ CITY

X-TechLab is aimed at **training** over a hundred Master and Ph.D. students from Benin and neighbouring countriesevery year, and at **establishing a permanent user research facility** with experienced, permanent staff to act as a hub for the region.

Bottom Up

Example of a local facility growing into a regional facility



Bottom Up

Several significant training interventions

Bottom Up

- Training
- Mobility
- Networking
- Local Facilities
- Conferences

IUPAP IUCr INTERNATIONAL COUNCIL FOR SCIENCE

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

LAAAMP

Lightsources for Africa, the Americas, Asia and Middle East Project

Sekazi Mtingwa
TriSEED Consultants, USA
Chair, *LAAAMP* Exec. Comm.
Chair, IUPAP C13 Commission

Sandro Scandolo
ICTP Trieste, Italy

Michele Zema
University of Pavia, Italy
Dir. of Outreach, IUCr

http://laaamp.iucr.org/

The Abdus Salam International Centre for Theoretical Physics

IAEA

DONATE

Research | Scientific Calendar | Programmes

Europe/Rome | Administration

Search

Search in Conferences:

Overview
Programme
Speakers

Secretariat:

smr3611@ictp.it

School on Synchrotron Light Sources and their Applications | (smr 3611)

Starts 6 Dec 2021
Ends 17 Dec 2021
Central European Time

Online -
Online

An ICTP Virtual 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) the physical aspects concerning the design and function of the main components: accelerators, insertion devices and beamline optics (2) an overview of the arguments that can be made in order to fund and build a synchrotron light source, including socioeconomic benefit, stakeholder engagement, communication (3) Overview of common synchrotron light techniques including synchrotron infrared techniques and XANES/EXAFS.

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

Organizers

Simon Connell (University of Johannesburg, AfLS), Andrea Lausi (SESAME), Kirsi Lorentz (Cyprus Institute), Alessandro Migliori (IAEA), Ed Mitchell (ESRF, AfLS), Sekazi Mtingwa (LAAAMP, AfLS, TriSEED Consultants LLC), Ian Swainson (IAEA), Local Organiser: Nadia Binggeli

Co-sponsors

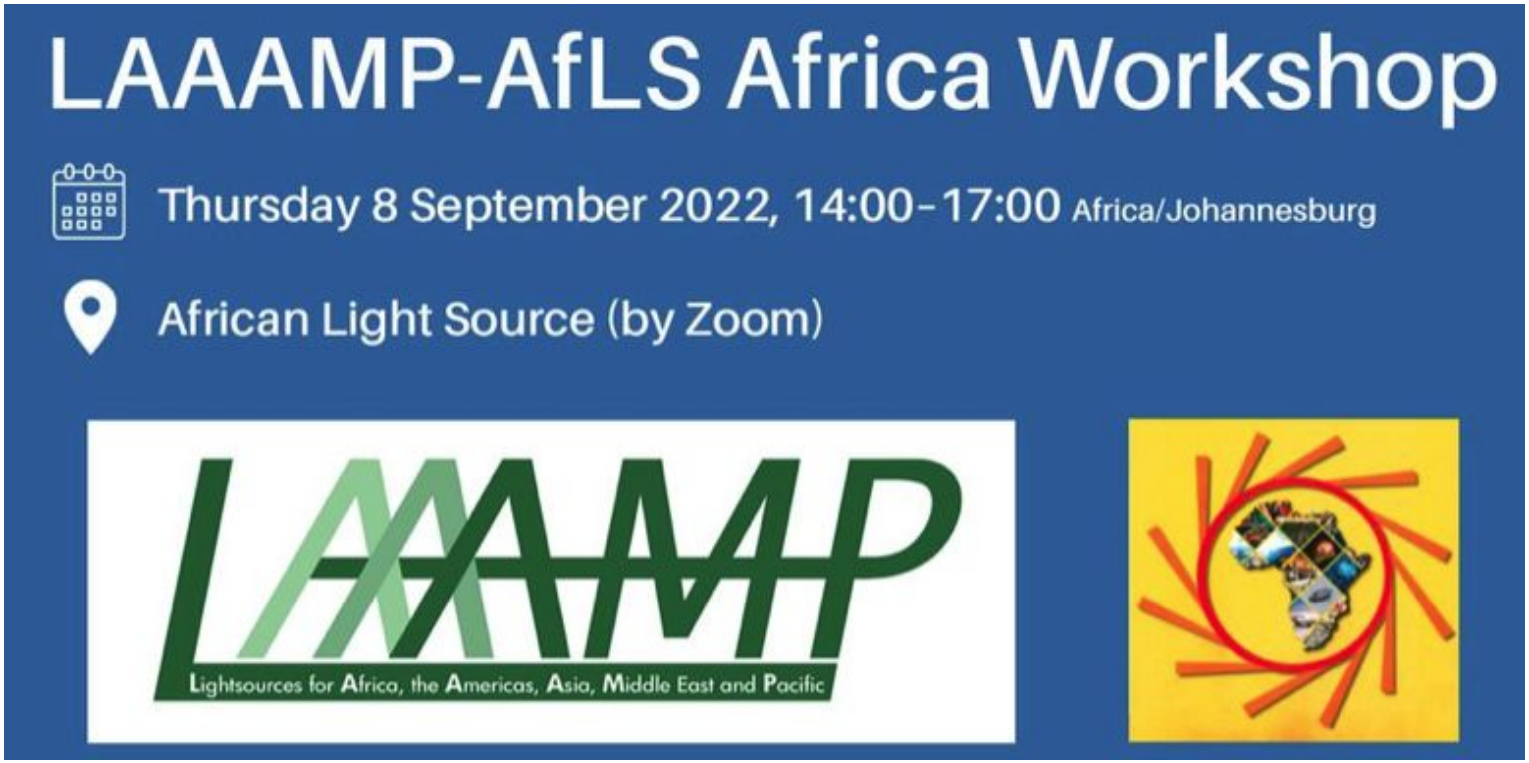
IAEA International Atomic Energy Agency

SESAME

LAAAMP

2023 FAST Team call (deadline 30 Sept 2022)

https://events.saip.org.za/e/LAAAMP2023

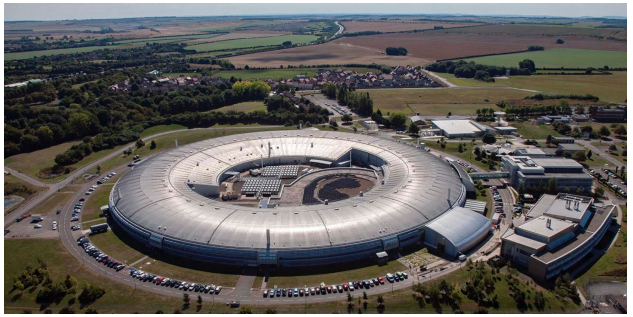


https://laaamp.iucr.org/

Bottom Up

Capacity in Africa

START is a collaborative project that seeks to foster the development of Synchrotron Techniques for African Research and Technology.



Two lines of scientific investigation:

1. New energy materials (eg solar cells, novel catalysts)
2. Structural biology studying diseases and develop drug targets.

Jump-start Africa's entry into synchrotron based bioscience.

SA, Lesotho, Ethiopia participation so far ……

diamond

The Africa Light Source Foundation

Towards a Lightsource for the African Continent

Memoranda of Understanding

Advanced Light Source Facilities

- Synchrotron-Light for Experimental Science and Applications in the Middle East (SESAME)

International Institutions / Organisations

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

Letters of Support

African Institutions / Organisations

- African Crystallography Association Steering Committee (AfCA-SC), Africa
- Ghana Academy of Arts and Sciences, Ghana
- African Seismological Commission (AfSC), Africa
- International Union of Geodesy and Geophysics (IUGG), Africa
- Network of African Science Academies (NASAC), Africa
- South African Institute of Physics (SAIP), South Africa
- Ministry of Environment, Science, Technology & Innovation (MESTI), Ghana
- Federation of African Medical Physics Organizations, FAMPO, Africa
- Mbarara University of Science and Technology, Faculty of Science, Uganda
- African Physical Society (AfPS)
- BioStruct Africa, Africa
- African Materials Research Society (AMRS), Africa

Advanced Light Source Facilities

- Diamond Light Source, UK
- Centre for Advanced Microstructures and Devices (CAMD) Louisiana State University, USA
- European XFEL,Europe
- Paul Scherrer Institute (PSI), Switzerland
- Elettra Sincrotrone Trieste, Italy
- European Organization for Nuclear Research (CERN)
- The European Synchrotron Radiation Facility (ESRF)
- MAX IV laboratory, Sweden
- Synchrotron SOLEIL, France
- National Synchrotron Light Source II (NSLS II), USA
- Australian Synchrotron (ANSTO), Australia
- Singapore Synchrotron Light Source NUS
- National Synchrotron Radiation Research Center (NSRRC),Taiwan

International Institutions / Organisations

- International Center for Theoretical Physics (ICTP)
- International Union of Pure and Applied Chemistry (IUPAC)
- International Union of Pure an Applied Physics, (IUPAP)
- International Union of Crystallography (IUCr)

External National Institutions / Organisations

- The Cockroft Institute of Accelerator Science and Technology, UK)
- US Particle Accelerator School (USPAS), USA
- National Society of Black Physicists (NSBP), USA

Bottom Up

Capacity in Africa

WORKING WITH AFRICAN RESEARCHERS

1. HIV infection mechanisms – integrase subtype C mutants, CD4 action…
2. Malaria - drug targets…
3. Cell-free protein synthesis for integrated structural biology
   - ESRF and ILL (International Large-Scale Research Facilities)
   - Synthelis (biotech company)
   - Wits University, Keele University and Universite Grenoble-Alpes

PhD students and undergraduate trainees, experiencing cross-border and cross-discipline research.

Exchange/mobility programme with the Fr-SA "PROTEA" scheme and Grenoble International Internship Programme

PIs: Trevor Forsyth (ILL), Theresa Coetzer and Maria Papathansopoulis (Wits), Ed Mitchell (ESRF), Sandra Cortes and Bruno Tillier (Synthelis)

Just submitted his thesis, PhD student: Vinesh Jugnarain (Mauritius)

Page 1

The European Synchrotron | ESRF

Bottom Up

Recent AfLS Events

63rd IAEA General Conference

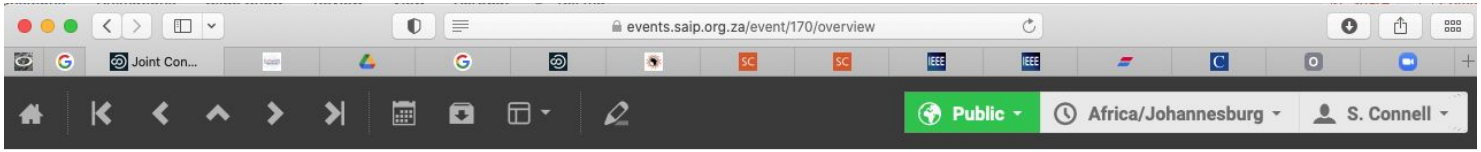
AfLS, Thais, SESAME and Elettra, African govt reps.

September 16-21 2019

90-min slot dedicated to synchrotron applications, showing usefulness to both developed and developing countries, “side event”, of Sep 17.

The Africa Light Source Foundation

Towards a Lightsource for the African Continent



The joint virtual event of the
AfLS3-2021 : African Light Source
ePCCr : Pan-African Conference on Crystallography Online
AfPS-2021 : African Physical Society

https://events.saip.org.za/e/AFLS3

15-19 November 2021
Hosted by X-TechLab
Africa/Johannesburg timezone

Big Science and Big Goals for Africa

Overview

T1 : AfLS Topics

T2 : ePCCr / AfCA Topics

T3 : AfPS Topics

T4 : Co-convenor Topics

Conference Posters

The time zone is controlled by you as an Indi Setting (top right). The session times will therefo
shifted if you are not set to Central Africa Ti CAT) = GMT+2.

Welcome to the 2021 joint virtual meeting frican Light Source (AfLS), the
Society (AfPS), and Pan Africa (ePCCr), co-convene
other Pan African professional sc by X-TechLab. We hope that
us as we communicate and celebrate Big Goals for Africa!

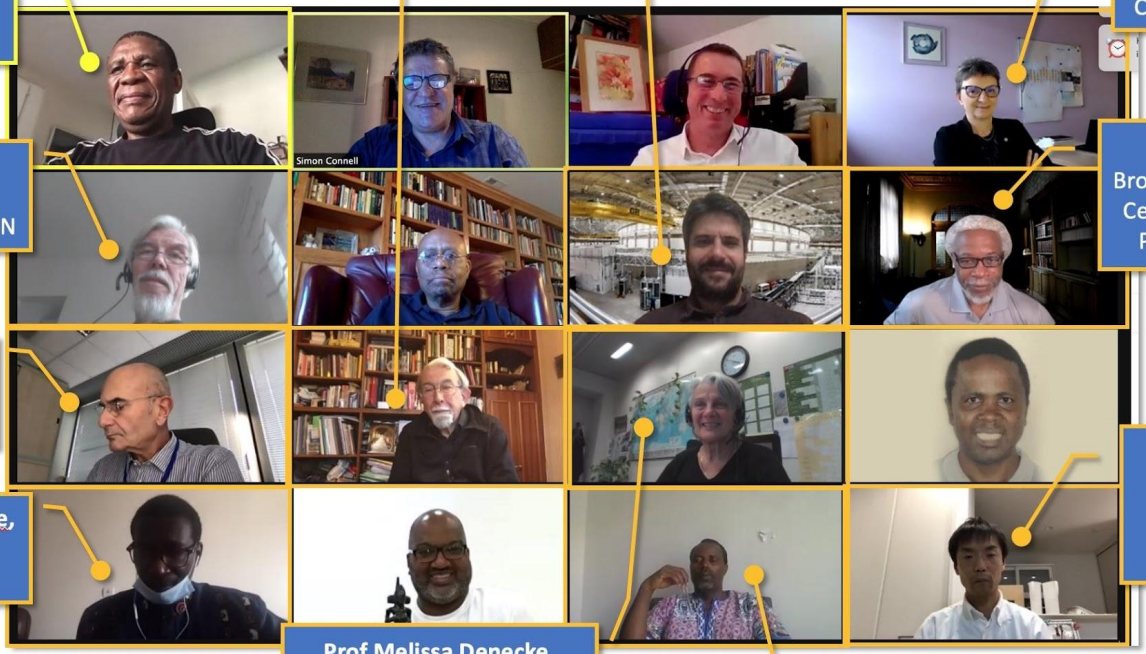
Participating Organisations

As advanced light sources support r ple discipl he AfLS conference formally i

>500 registrations

Now 5 African Governments involved
Many co-conveners
Prof bodies
Academies

International Advisory Committee



Prof Tom Blundell, Cambridge University (UK)

Dr Harry Westfahl Jr, Director of the Brazilian Light Source

Prof Caterina Biscari, Director ALBA Synchrotron (Spain) and Chair of LEAPS (Europe)

Dr Khotso Mokhele, INTERIM CHAIR Chancellor, University of the Free State (SA)

Prof Rolf Heuer, President of SESAME Council, former DG CERN

Prof Jim Gates, Brown Theoretical Physics Center Director and APS President Elect (USA)

Prof Francesco Sette, Director General ESRF (France)

Prof Hitoshi Abe, Synchrotron Radiation Science Divn, KEK Light Source (Japan)

Prof Mary Teuw Niane, former Minister of Science (Senegal)

Prof Melissa Denecke, Director of the IAEA Division of Physical and Chemical Sciences

Dr Daniel Nyanganyura, Regional Director, ISC Regional Office for Africa

AfLS and Biophysics

African health is a special case for Structural Biology on the continent and the AfLS

1. **Training Programmes, building the User Base**
   a) START – continuation, SA-ESRF continuation
   b) Others
2. **Local and regional equipment infrastructure**
3. **African Governments positions creating African excellence in Bio Sciences**
   a) Build activities at University Departments
   b) AKC as a regional Centre, support as a CoE
   c) BioStruct Africa
   d) Other National, Regional and African initiatives
4. **Regional African Partnerships**
   a) African Beamline at a International facility
   b) Multi-state membership of an international facility

2022 and 2021 events

- **Hands- on training in Structural Biology, a tool for sustainable development in Africa** Malaria Research and Training Centre (MRTC) in Bamako, Mali 25-28 April 2022
- SESAME-Africa online workshop 6 July 2022
- UNGA Science Summit Events 18-27 September 2022
- Africa-US Symposium on Synchrotron Science 12-14 October 2022
- International Conference on Research Infrastructures (ICRI) 17-18 October 2022
- **Training Workshop on Synchrotron Technologies and Techniques and their Applications** 25-29 July 202
- **AfLS4-2022 Virtual Conference** from 14-18 November 2022 hosted virtually by BIUST, Botswana.

- **ICTP School on Synchrotron Light Sources and their Applications** 6-17 Dec 2021
- **AfLS 3 Virtual Conference** hosted by **X-TechLab**, Semi City, Benin 15-20 November 2021
- **AfLS CDR Town Hall** – Reviewing the CDR Process 11 Oct 2021
- **Biophysics in Africa** – 22 -26 March 2021

AfLS engaging from grassroots science and scientists level, up to the policy/politician level

Pan African Virtual University in Light Source Based Science

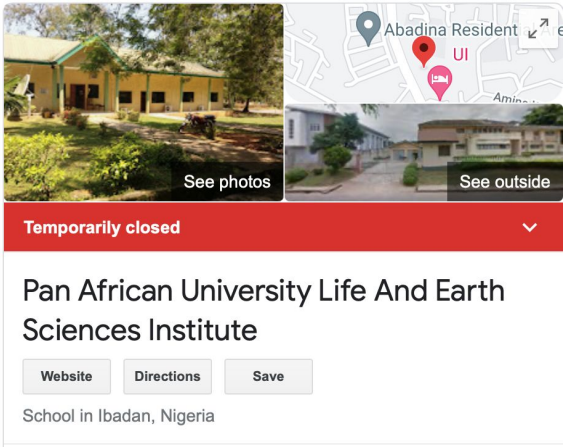
Pan African University PAU

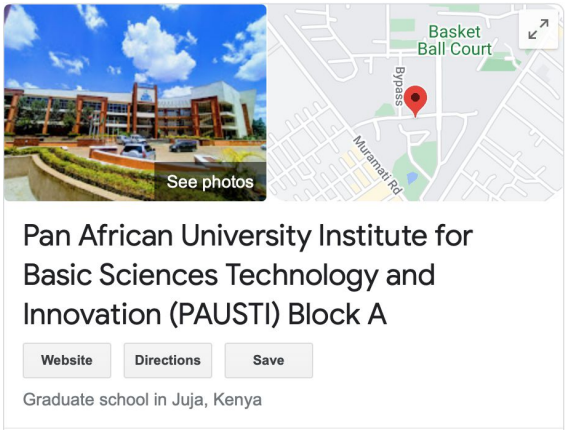
Hosted within existing Universities

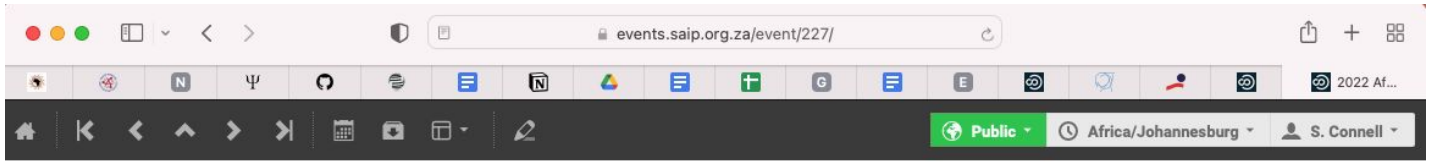
1. PAU Statutes, Governance Structure, Council and Senate
2. Each Institute has other institutions operating under it.

Proposal

1. Desktop study of Statutes, see how the PAVULBS can be set up within PAU structures
2. Integrate into existing Institute or set up a new one
3. How the institutes are funded, and evaluation of proposals compatible with the funding.
4. Make list of clear options







AfLS4 2022 https://events.saip.org.za/e/AfLS2022

14-18 November 2022

Africa/Johannesburg timezone

Big Science and Big Goals for Africa

- Overview
- T1 : AfLS Topics
- T2 : AfPS Topics
- T3 : Co-convenor Topics
- Registration
- Call for Abstracts
- Author Instructions
- Connection Details
- Important Dates
- Funding Requests
- Organising Committees
- Paper Peer Reviewing
  - Reviewing Area
  - Judging Area
- Editing
  - Papers

The time zone is controlled by you as an Indico Setting (top right). The session times will therefore be shifted if you are not set to Central Africa Time (CAT) = GMT+2.

Welcome to the 2022 joint virtual meeting of the African Light Source (AfLS), the African Physical Society (AfPS), and co-convened with several other Pan African professional science societies, all hosted by . We hope that you will join us as we communicate and celebrate **Big Science and Big Goals for Africa**!

Participating Organisations

As advanced light sources support multiple disciplines, the AfLS conference formally includes participation by the following Pan African scientific societies, which we are proud to count as supporters and partners in our vision to establish an advanced light source on the African continent.

African Astronomical Society
African Inst of Planetary and Space Sciences
African Optics and Photonics Society
African Society for Nanosciences and Nanotechnologies
Federation of African Societies of Chemistry
Federation of African Societies of Biochemistry and Molecular Biology

African Geophysical Society
African Materials Research Society
Biostruct Africa
Federation of African Immunological Societies
Federation of African Medical Physics Organizations

African Scientists and International Light Sources

1. **African scientists / projects at Light Sources**
   a) See large footprint slide 14 (50%)
   b) African Science Diaspora
2. **Africa long since over-threshold** (>300 Users) for own LS
3. **International light sources involved in training**
   a) ESRF, SOLEIL, DIAMOND, Elettra, DESY, Bessy, Alba APS, LNLS, Spring8, ALS, CLS, DELTA, MAC IV, Phton Factory, Pohang AL, SESAME, Siam PS, SLAC, Taiwan PS, others
   b) Now via **LAAAMP.** https://laaamp.iucr.org
4. **African Regional Membership** of EU Light Source
   a) Expand SA – ESRF Scientific Associateship ?
5. **African (Regional) Beamline**
   a) (MX, Paleo Tomography, materials …)

Towards and African Membership of a International AdLS

1. Academic Output
2. Capacity Building, Deep training
3. User base, Community building, Interdisciplinarity
   a) Example: towards African Vaccine development capacity
   b) Coherence in Local Community
4. Win-win : AdLS access to SA premier research projects and colleagues
5. Policy maker involvement
6. International networks
7. Technology transfer
   a) Techniques, sample prep, instrumentation, big data ….
8. African (beyond SA) participation
9. AfLS Project

The Africa Light Source Foundation

Towards a Lightsource for the African Continent

Young scientists ….. Can you see yourself here….

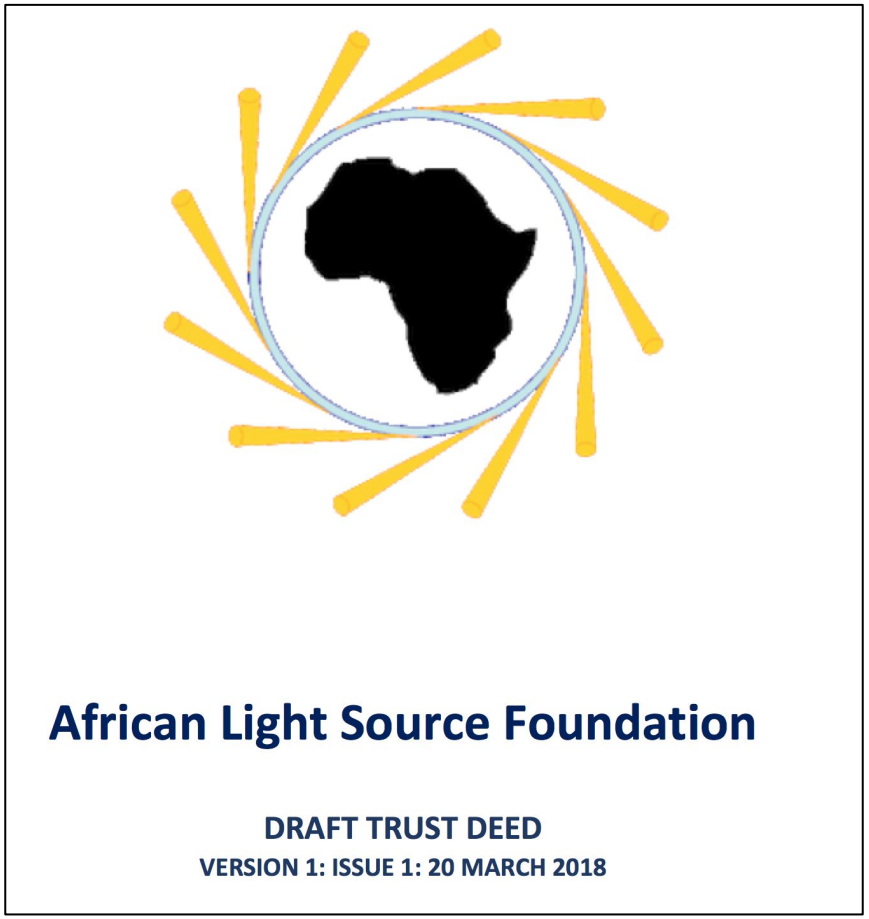
Backup

AfLS
Legal Entity

Supported by SAIP Council and assisted by SAIP Exec Office

Registered as a Trust
With a Constitution
Bank Account established
Receiving funds
Appointed Auditor
Access to staff

Registration as a Public Benefit Organization (PBO)



AfLS meeting : **2016 Conference -** Concrete outcomes.

1. Grenoble Resolutions.
   - See http://events.saip.org.za/conferenceDisplay.py/getPic?picId=70&confId=61
2. Terms of Reference.
   - See http://events.saip.org.za/conferenceDisplay.py/getPic?picId=67&confId=61
3. Roadmap summary.
   - See http://events.saip.org.za/conferenceDisplay.py/getPic?picId=66&confId=61
4. Steering Committee to drive this roadmap forward.
   - fully mandated
   - globally elected
   - See https://docs.google.com/spreadsheets/d/1NlULgrE7Bu9t2aeiKIYd3zgFALoLbksfEFTqNC8p0q0/edit#gid=0

AfLS and LS world wide

Long history of association of many synchrotrons with AfLS

ESRF, SESAME, Elettra, Alba, SOLEIL, Diamond, Sirius and UVX, DESY, LNLS, CHESS, SLAC, SPRING8, Taiwan, ALS, CANDLE, APS, …. (others too, and no particular order)

AfLS encourages connections that enhance its vision to all.

Driven by :
Bottom up (scientists, collaborations, training, history ….)
Top Down (strategy and policy

International Advisory Committee