



Istituto Nazionale di Fisica Nucleare

The African School of Physics and the African Light Source initiative are filling the gap of African continent in the global world of science



Dr. Sanae SAMSAM
on behalf of the ASP-IOC, IAC and LOC

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Outline



ASP Mission



ASP Organisation



ASP Editions



ASP Activities



ASP & INFN collaboration

The African School of Physics is much more than a school. It is a program of actions with directed ethos toward physics as an engine for development in Africa!

ASP Mission

ASP as a start-up

A non-profit organization created by a small group of worldwide scientists to stimulate and include more African-talented physics students in the world scientific community.

The aim of the school is not to set a strictly one-way effort to bring knowledge and experience to African colleagues and students, but rather to establish a genuinely integrating scientific network between Africa and the rest of the world.



Contribute to a world w/ equal access to knowledge



Support financially up to 85 African students for 3- week classes attendance



Establish a biennial educative program to be hosted across Africa



Provide high quality classes by international re-known Scientists

ASP Mission

Committees to build momentum

Build strategic partnership and collect financial support from Africa, Europe, USA and Asia via universities, laboratories, UN, and other organizations.



Prof. Bobby Acharya (ICTP & King's College London UK)



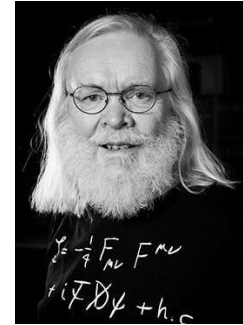
Dr. Kétévi A. Assamagan (BNL)



Dr. Anne E. Dabrowski (CERN)



Dr. Christine Darve (ESS)



Prof. John R. Ellis (CERN & King's College London UK)



Prof. Fernando Ferroni (INFN & GSSI)



Dr. Steve G. Muanza (CNRS-IN2P3)



Dr. Luca Serafini (INFN-Milan & LASA)

Preparation teams led by *K. A. Assamagan* and *C. Darve* (ASP2010).





ASP Organization

Objective: Increase capacity development in fundamental and applied physics in Africa



LOC -- Local logistics, Liaise with Education and Research branches of host country government



IAC -- Representatives of funding agencies. Advise on the program & Advise of the host country selection. (From INFN: **Dr. Luca Serafini**)



Board of Trustees -- Legal Responsibilities, Fundraising & Assess Management's

IOC

Program management

Fundraising

Coordination of activities

Activity reports to Funding agencies.

(From INFN:
Prof. F. Ferroni)



Assessment of Impact -- Survey of students, Survey of their Professors & Follow academic developments











International Lecturers (IL) -- Design the Scientific Program, Help in the student selections, Mentor and Coach students continuously.

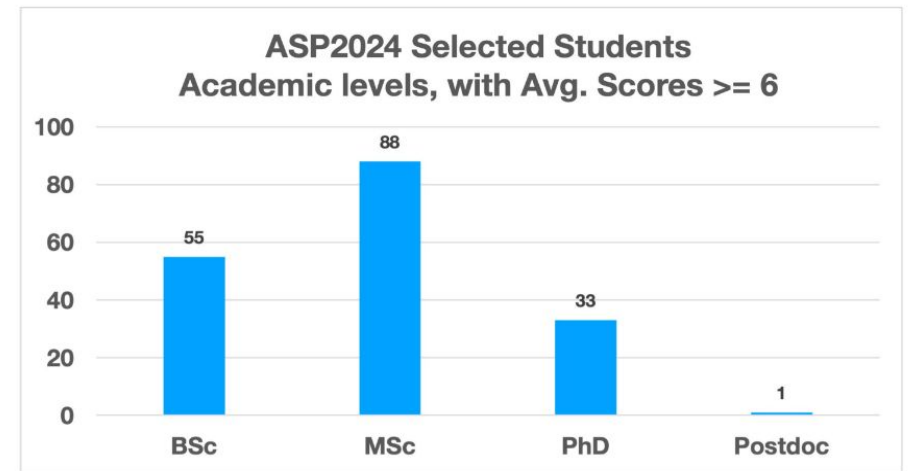
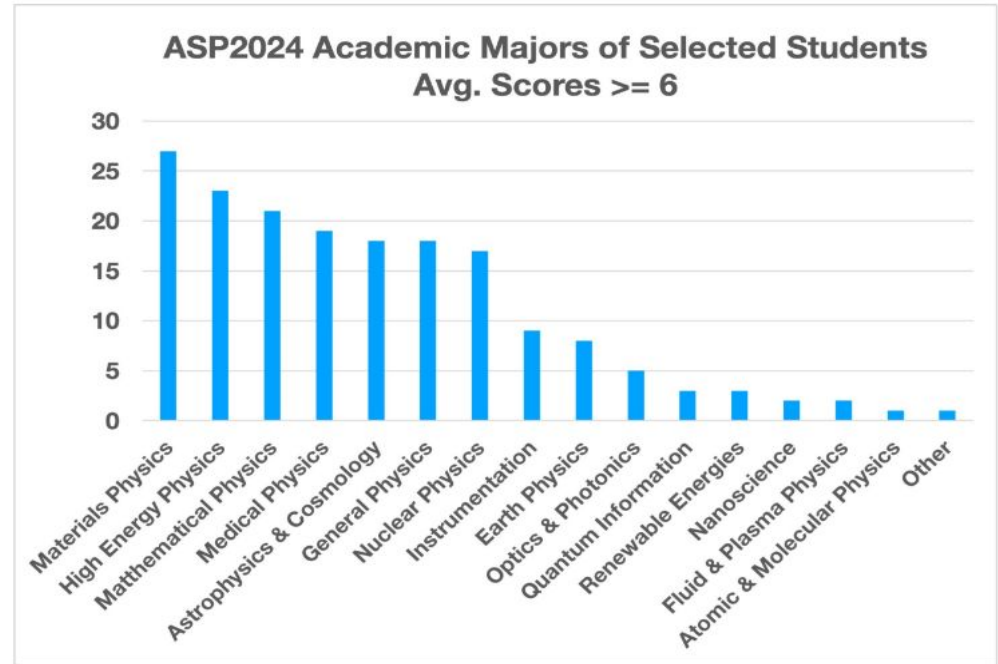
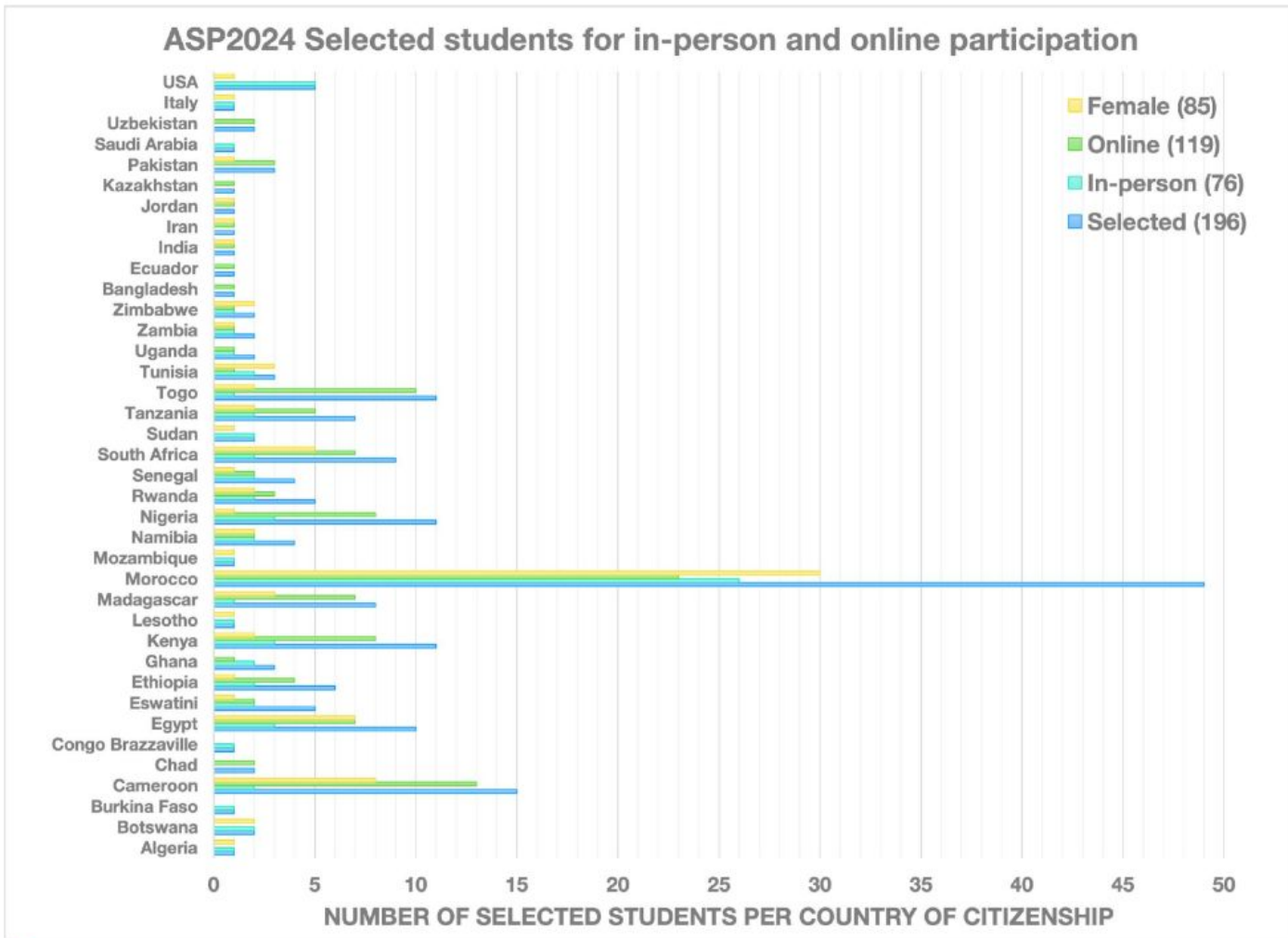


Spin-Offs -- ASP Mentorship Program, Networking and sharing of information. Align ASP with educational priorities, Improve future editions of ASP & Promote research collaborations.

ASP Editions

ASP	Host Country	Applicants	Students	African Countries	Mentorship	Teachers	Pupils	Conference
2010	South Africa 	125	65	17	Continuously, even when there is no formal school			
2012	Ghana 	138	50	15				
2014	Senegal 	330	70	21				
2016	Rwanda 	429	75	28			20	150
2018	Namibia 	523	85	26		63	> 1200	+60
2020/ 2021	Morocco  Online	N/A	94		Program formalized in 2016. Runs continuously			+649
2022	South Africa 	>416	~82: In person ~97: Online	40		~80	~230	ACP2023 September 23
2024	Morocco 	534	196 76 in person		Coming up in July			6

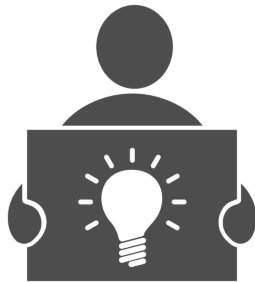
ASP2024 Selected Students Academic Majors



courtesy: Dr Mounia Laassiri (BNL), Dr. Ketevi Assamagan (BNL)

ASP Activities

ASP Program Expansion



Student Program

2-week intensive school

- 3rd year of University to Ph.D.
- Mostly African Students

High School Teachers Program

1-week intensive workshop

- Train High School Teachers for improved physics teaching

High School Learners Program

1-week learners Outreach

- 10 – 12th grade learners
- Encourage learners to develop and maintain interests in Physics and Applications



From 15-20 April
Marrakech, Morocco

ASP Forum

1-day

- Involve Regional policy makers
- Promote spin-off activities in Africa
- Introduce students to policy

Mentorship / Coaching Program

At all times

- Connect Students with Researchers
- Place students at Laboratories
- Help students to address their academic needs.

ASP Conference

Introduced since 2016
1-week International Conference

- Participation of ASP Alumni
- Participation of Research Faculties

ASP Activities

ASP– Conference (ACP)

Objectives

- *Attract ASP alumni*
- *Attract African research faculties*
- *Attract international participants not part of ASP*
- *Foster new research collaborations*

One week:

The physics topics taught at the school form the core of the ASP conference.



Peer-reviewed conference proceedings published by the African Review of Physics.

<http://aphysrev.ictp.it/index.php/aphysrev/issue/view/35>



ACP23: <https://indico.cern.ch/event/1229551/>

Summary



NELSON MANDELA UNIVERSITY



The 3rd African Conference on Fundamental and Applied Physics

25-29 September 2023

George, South Africa.

- Number of registrants: 601

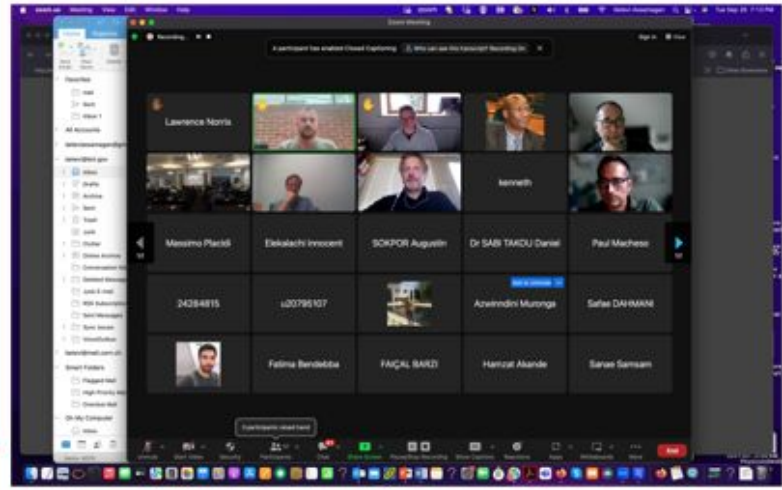
13. Community Engagement

Videoconference

Registration

- Peak Zoom connections: ~50

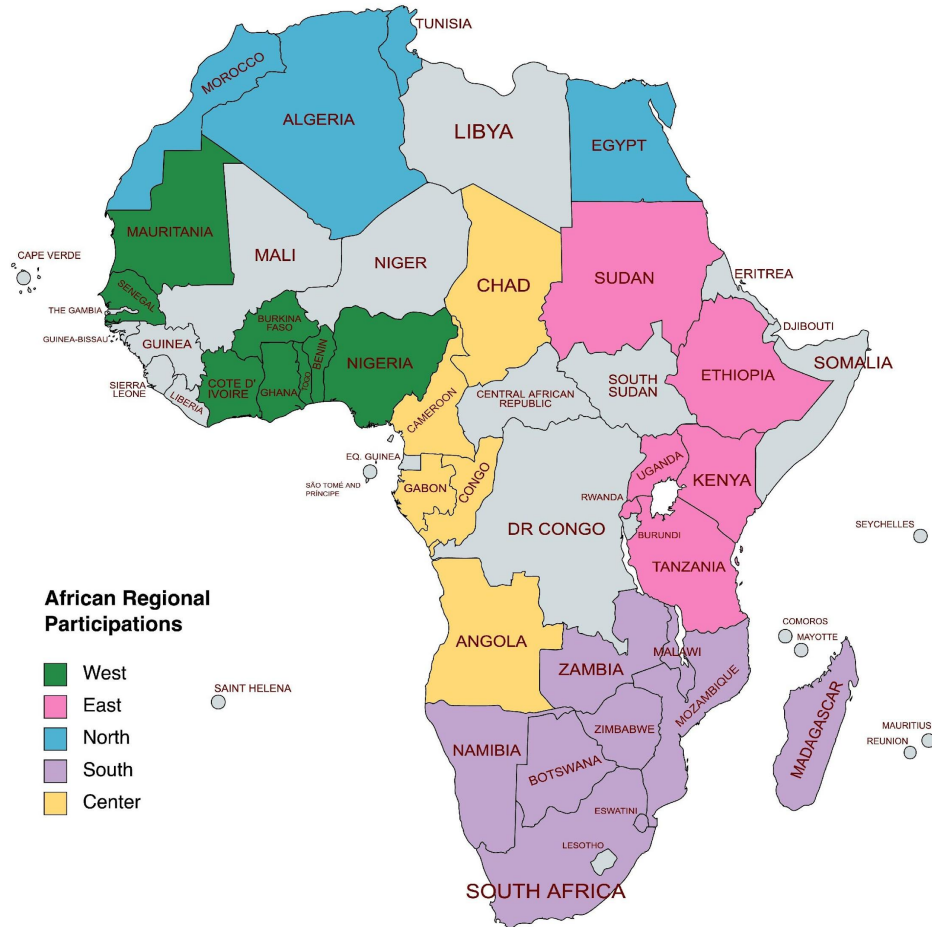
- Number of in-person participants: 60



Participation

- 30 African countries (**475**)

- 28 Non-African countries (**126**)



United States of America (36)

Italy (17)

India (16)

France (9)

Germany (6)

United Kingdom (4)

Pakistan (4)

Portugal (4)

Russia (4)

Sweden (3)

Saudi Arabia (2)

Switzerland (2)

Japan (2)

Yemen (1)

China (1)

The Netherlands (1)

Peru (1)

Hungary (1)

Bulgaria (1)

Spain (1)

Bahrain (1)

Poland (1)

Canada (1)

Finland (1)

Greece (1)

Austria (1)

Serbia (1)

Jordan (1)

Iran (1)

Mexico (1)

September 25

Challenges of 4th generation accelerator-based light sources



- Simone DiMitri (Elettra Sincrotrone)
- Luca Serafini (INFN-Milan & LASA)
- Simon Connell (University of Johannesburg)

Developing an African Inverse Compton Scattering source of advanced X-rays as an incubator on the path towards the African Light Source



The first African Light Source: lighting the future of Africa

Courtesy: Dr. Ketevi Assamagan

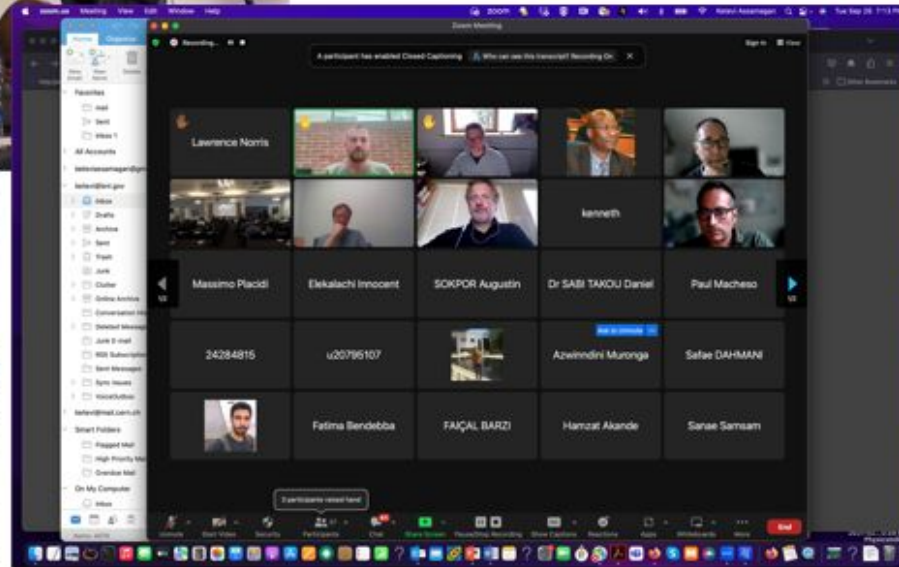


September 26



Discussion on light source infrastructures in Africa

Inverse Compton Scattering & Light Source Research Infrastructure



*Courtesy:
Dr. Ketevi Assamagan*



Article published in APS

<https://www.aps.org/programs/international/apn.cfm>

A very nice article referring to STAR about the African Light Source (AfLS) and its first phase based on ICS source.

Chairs:

Luca Serafini, INFN-Milan & LASA

Simon Connell, University of Johannesburg

Sanae Samsam, INFN-Milan & LASA

The First African Light Source Project Roundtable Discussion at the African Conference of Physics (ACP2023)

Led by accelerator physics experts, a collaborative roundtable unveiled the African Light Source Project (AfLS), attracting a global audience.



AfLS discussion at the ACP2023 in George, South Africa.

(Photo Credits: The Authors)

The 3rd biennial African Conference on Fundamental Physics and Applications (ACP)[1], covered a broad spectrum of topics, ranging from particle and nuclear physics to renewable energies, thereby fostering collaboration and innovation. The conference exemplified the spirit of innovation and collaboration. From delving into the depths of particle physics to venturing into the cosmic mysteries of astrophysics, this unique event offered a platform for experts to discuss subjects as diverse as artificial intelligence, quantum physics, earth science, and accelerator physics. Committed to inclusivity, ACP2023 also championed the voices of young physicists and women in physics, acknowledging the importance of diversity in scientific pursuits.

Within this rich scientific tapestry, the spotlight shone on the African Light Source Project (AfLS). This interactive platform provided an opportunity to gather and listen to diverse ideas and propositions, enriching the ACP experience with thoughtful insights and collaborative discussions.

AUTHOR

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University of Johannesburg, South Africa

CONTRIBUTING EDITOR

Mounia Laassiri

JANUARY 2024

Link:

<https://res.cloudinary.com/apsphysics/image/upload/v1705008223/5 - The First African Light Source Project Roundtable Discussion at the African Conference of Physics ACP2023 aor8f6.pdf>

ACP2025 in Togo

University of Lome
September/October 2025



A Local Organizing Committee is already formed; more discussions with the ASP IOC forthcoming

The exact date will be communicated later!

link: <https://africanschoolofphysics.org/>

Acknowledgements – Funding agencies



Istituto Nazionale di Fisica Nucleare



- INFN is supporting ASP since its 2012 edition in Ghana, with a funding contribution of 15k euros each ASP edition.
- Travel funds for 2 speakers each edition (about 4k euros).



ASP and INFN Collaboration

→ Strong collaboration between **INFN-Milan** Researchers (L. Serafini, V. Petrillo, S. Samsam, A. Bacci, M. Rossetti Conti, I. Drebot) and **AfLS** (first phase based on a Compact Source I.C.S. similar to STAR, to be developed in South-Africa as a first step towards the AfLS).

INFN lecturers

Ghana 2012	L. Serafini
Rwanda 2016	L. Serafini, A. Bacci
Namibia 2018	L. Serafini, F. Ferroni
South Africa 2022	L.Serafini, F. Ferroni
Morocco 2024 (July 2024)	L.Serafini, A. Bacci, S. Samsam & F. Ferroni

** E. Coccia (GSSI) and C. Biscari (ALBA-Cells, on leave from INFN-LNF) have been also lecturing during 2016 and 2018 editions.

Topics

- ★ Particle Accelerators.
- ★ Radiation Sources (FELs, ICS)
- ★ Advanced Accelerators (Plasma, Laser)
- ★ Underground Physics, Dark Matter and Dark Energy
- ★ Gravitational Waves.

References:

- ❑ African School of Physics <https://africanschoolofphysics.org/>
- ❑ 3rd African Conference of Physics <https://indico.cern.ch/event/1229551/>
- ❑ The First African Light Source Project Roundtable Discussion at the African Conference of Physics (ACP2023)
<https://res.cloudinary.com/apsphysics/image/upload/v1705008223/5 - The First African Light Source Project Roundtable Discussion at the African Conference of Physics ACP2023 aor8f6.pdf>
- ❑ The African light source <https://www.africanlightsource.org/>
- ❑ Newton, MC; Connell, SH; Mitchell, EP; Mtingwa, SK; Ngabonziza, P; Norris, L; Ntsoane, T; Traore, DAK, Nature Reviews Physics, Building a brighter future for Africa with the African Light Source, 5/2 (2023) 74-75.
- ❑ African Strategy, the accelerator working group.
<https://twiki.cern.ch/twiki/bin/view/AfricanStrategy/AfAccelerators>



Istituto Nazionale di Fisica Nucleare



Grazie

Backup slides

ASP Activities

Topics of interest

Theoretical Physics



- Nuclear and Particle Physics
- Beyond the Standard Model
- Astro-particle physics and Cosmology
- Theoretical Heavy-ion physics

Experimental Physics



- Particle Detectors
- Particle Identification and Data Analysis and statistics
- Exp. Particle physics, current status of the field
- Exp. Nuclear Physics
- Exp. Heavy Ion Physics
- Exp. Astro-particle Physics

Accelerator, Applications and GRID

- Accelerator Physics and Technology
- Physics of Particle Beams
- Medical Applications
- Neutron and Light Sources
- Energetics and solid state
- GRID and computing
- Digital Library

ASP Activities

High School learners Program

Objective

Motivate high school pupils to develop and maintain interest in Physics.



1-week learners Outreach:

- ASP2022: 10 high schools, 230 pupils
- ASP2018: 39 high schools, 1500 pupils

Program designed such that the lecturers that are not lecturing to students can help with the learners program.

Learners program runs in parallel to the students program!

Learners Program in Morocco – April 15-19, 2024

	April 15	April 16	April 17	April 18	April 19
08:00-09:00	Lecturers travel to school and set up				
09:00-11:00	Visit1, Marrakesh: 1) Particle physics 2) Accelerator physics 3) Astrophysics 4) Detectors & instrumentation	Visit3, Chichaoua (about 76 km from Marrakech) 1) Particle physics 2) Accelerator physics 3) Astrophysics 4) Detectors & instrumentation	Visit5: El Haouz (about 50 km from Marrakech) 1) Particle physics 2) Accelerator physics 3) Astrophysics 4) Detectors & instrumentation	Visit7: El Kelaa-Sraghna (about 87 km from Marrakech) 1) Particle physics 2) Accelerator physics 3) Astrophysics 4) Detectors & instrumentation	Visit9: Rehamna (about 81 km from Marrakech) 1) Particle physics 2) Accelerator physics 3) Astrophysics 4) Detectors & instrumentation
11:00-11:30	BREAK (cloud chamber and cosmic ray detector)				
11:30-13:00	Visit1: Marrakesh, same as above	Visit3: Chichaoua (about 76 km from Marrakech) same as above	Visit5: El Haouz (about 50 km from Marrakech), same as above	Visit7: El Kelaa-Sraghna (about 87 km from Marrakech) Same as above	Visit9: Rehamna (about 81 km from Marrakech) Same as above
13:00-14:00	Lecturers LUNCH at location				
14:00-15:30	Visit2 (with different group of learners: Marrakesh. Same program as above)	Visit4 (with a different group of learners). Same as above. Chichaoua (about 76 km from Marrakech)	Visit6 (with a different group of learners). Same as above. El Haouz (about 50 km from Marrakech)	Visit8 (with a different group of learners) Same as above El Kelaa-Sraghna (about 87 km from Marrakech)	
15:30-16:00	BREAK (cloud chamber and cosmic ray detector)				
16:00-18:00	Visit2, Marrakesh, same as above	Visit4, Same as above. Chichaoua (about 76 km from Marrakech)	Visit6, Same as above. El Haouz (about 50 km from Marrakech)	Visit8, Same as above El Kelaa-Sraghna (about 87 km from Marrakech)	
18:00					

Proposed activities

- April 15-19

150-200 student in each visit

- 1) particle physics
- 2) accelerators
- 3) astroparticle
- 4) detectors & instrumentation

1) Particle Physics Program details
<https://docs.google.com/presentation/d/1jYSnQ7KvZuEDTGRqkW2s648-VZb00Krn2sTZzAA4yDw/edit?usp=sharing>

1) Accelerators program details
https://indico.cern.ch/event/1392949/contributions/5854866/attachments/2817416/4920033/ASP_outreach_program_Accelerator.pdf

2) Astrophysics program details

3) Detectors & Instrumentation Program details
<https://indico.cern.ch/event/1389470/contributions/5841545/attachments/2810736/4905589/BNL%20Proposed%20Labs%20for%20ASP%20HS%20Event%202024.pdf>

ASP Activities

ASP Forum

One day. Objective:

Align ASP with the research and education priorities of African countries.

ASP2010

Stellenboth, South Africa



ASP2012

Kumasi, Ghana



AfLS and compact acc.

Prof. H. WINICK, Prof. Emeritus, SLAC and Prof. L. SERAFINI (INFN, IT)

ASP2014

Sakar, Senegal



UN support

Dr. H. TOURE, UN ITU Secretary General.
Prof. A. WAGUE and O. KA M. NGOM - US Embassy rep.

ASP2016

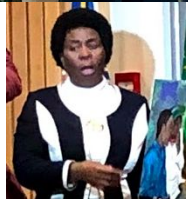
Kigali, Rwanda



East Afr. Science and New ICTP Center
Rwandan Ministry of Education

ASP2018

Windhoek, Namibia



Education and capacity building in Namibia and Africa in general

Dr T. TJIVIKUA, Vice-Chancellor, Namibia University of Science and Technology (Namibia),
Dr. ADAM (SKA, SA)

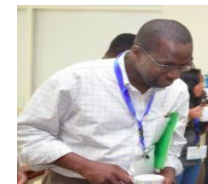
ASP2020

marrakech, Morocco



Physics education and research roadmap development and implementation in Africa

Prof. A. Muronga (Nelson Mandela University, SA)
Dr. Raissa Malu (Investing In People (IIP) ASBL)
Oumar Ka (Cheikh Anta Diop University, Senegal)



ASP2022

NMU, SA



Sustainability of ASP and capacity development & retention in Africa—with the participation of policymaker representatives from Morocco, Senegal, Ivory Coast, Burkina Faso, Benin and South Africa (DSI, NRF, SAIP, SANS, NMU), and international delegates from Africa, Europe and the U.S.



*"If each African country supports its participants or contributes 2500 Euros every year to the ASP budget, ASP will be entirely financed by African countries. And *2500 Euros* is marginal even for the least developed country"*

4/4/2024

ICTP Support major

- Student participation
- Management of application database
- Arrange student travels

Host Country Support Significant

- In-kind support
- Direct Financial contributions
- Human Resources toward ASP Organization



IOC

- Writes Proposals
- Requests for Supports
- Produces Final Reports of Activities
- Seeking permanent financial backing

African Contributions (ASP2022)

- SAIP
- Mandela University
- NRF

Fund Management

Funds centralized and managed by the South African Institute of Physics (SAIP)

Lecturers and Organizers Supported by External Sources - Significant

Support received is then used to maximize student participation