10th Edition of the Large Hadron Collider Physics Conference

May 16 - 20, 2022

Outreach, Diversity & Education session 2

The African School of Fundamental Physics and its Applications
From the point of view of education

Oumar KA

Cheikh Anta Diop University, Dakar, Senegal
ASP IAC

OUTLINE

- ASP
- Life after ASP
- More

ASP

12 years ago…

1st edition of the African School of Fundamental Physics and its Applications

Stellenbosch, South Africa

Full bursary 3-week School

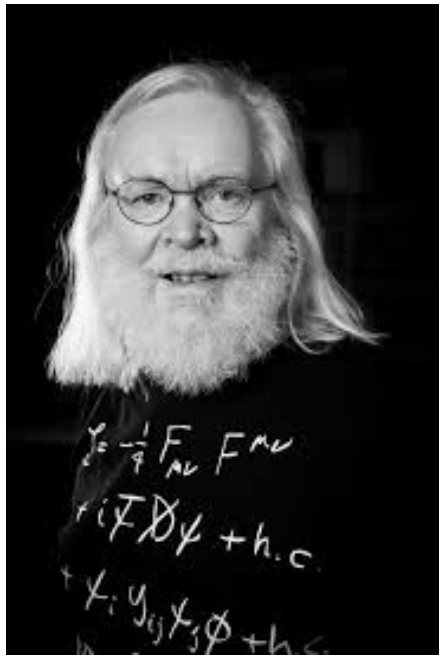
African School of Fundamental Physics and Applications

- Also known as “The African School of Physics”
- Acronym: ASP
- https://www.africanschoolofphysics.org
- Organized biennially in different African countries since 2010 by an International Organizing Committee (IOC)
- ASP-IOC@CERN.CH

Current Members of the IOC

Dr. Anne E. Dabrowski
CERN

Dr. Steve G. Muanza
CNRS-IN2P3
France



Prof. John R. Ellis
CERN and
University of London

Dr. Christine Darve
ESS

Prof. Bobby Acharya
ICTP and
King's College London

Prof. Fernando Ferroni
GSSI-INFN

Dr. Kétévi A. Assamagan
BNL

Objective:
Increase capacity development in fundamental physics and related applications in Africa

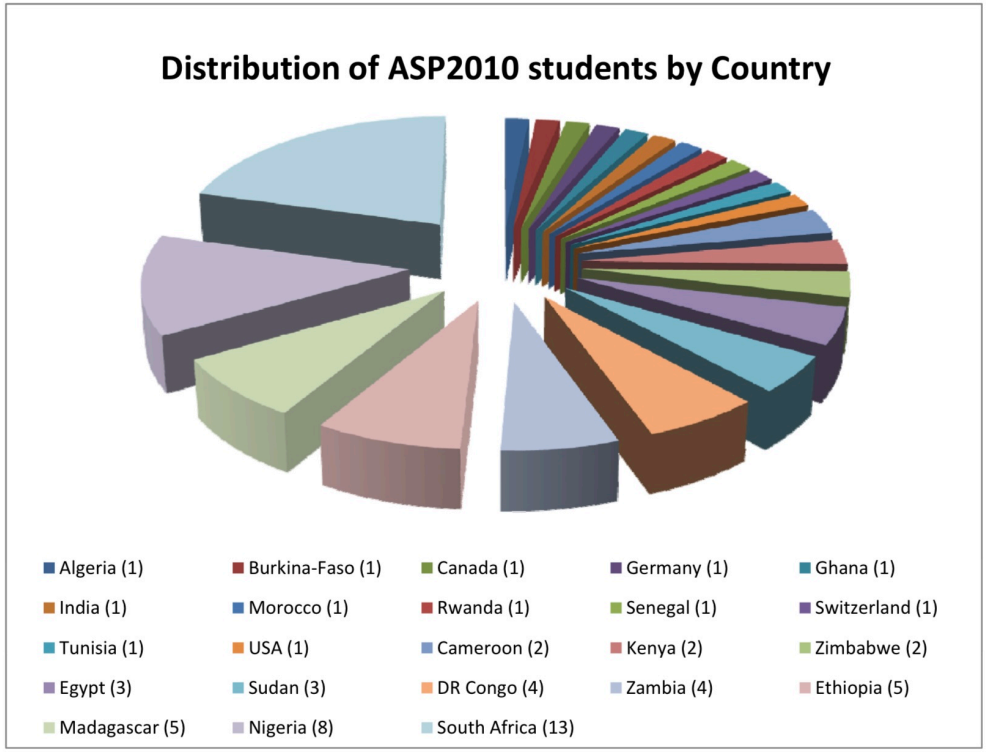
Local Organizing Committee (LOC) – in the host country
Local logistics
Liaise with Education and Research branches of host country government

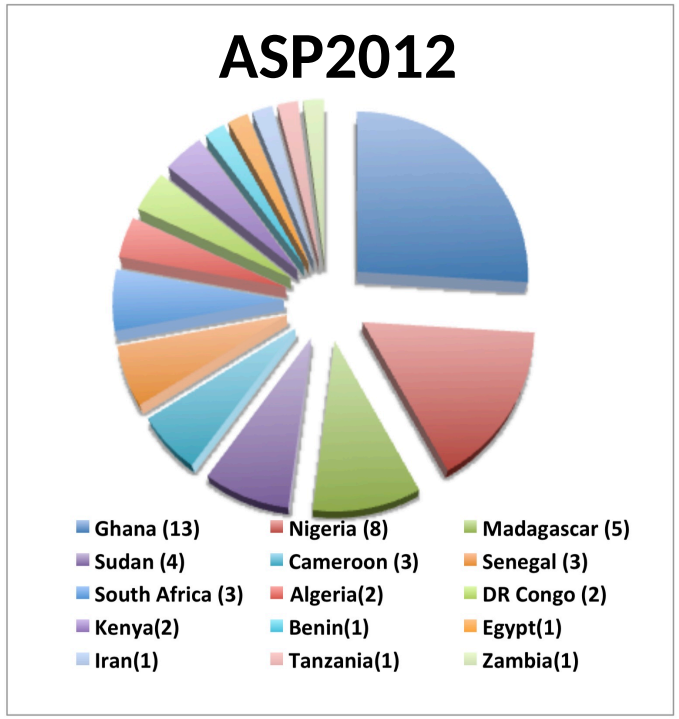
International Advisory Committee (IAC)
Representatives of funding agencies
Advise on the program
Advise of the host country selection

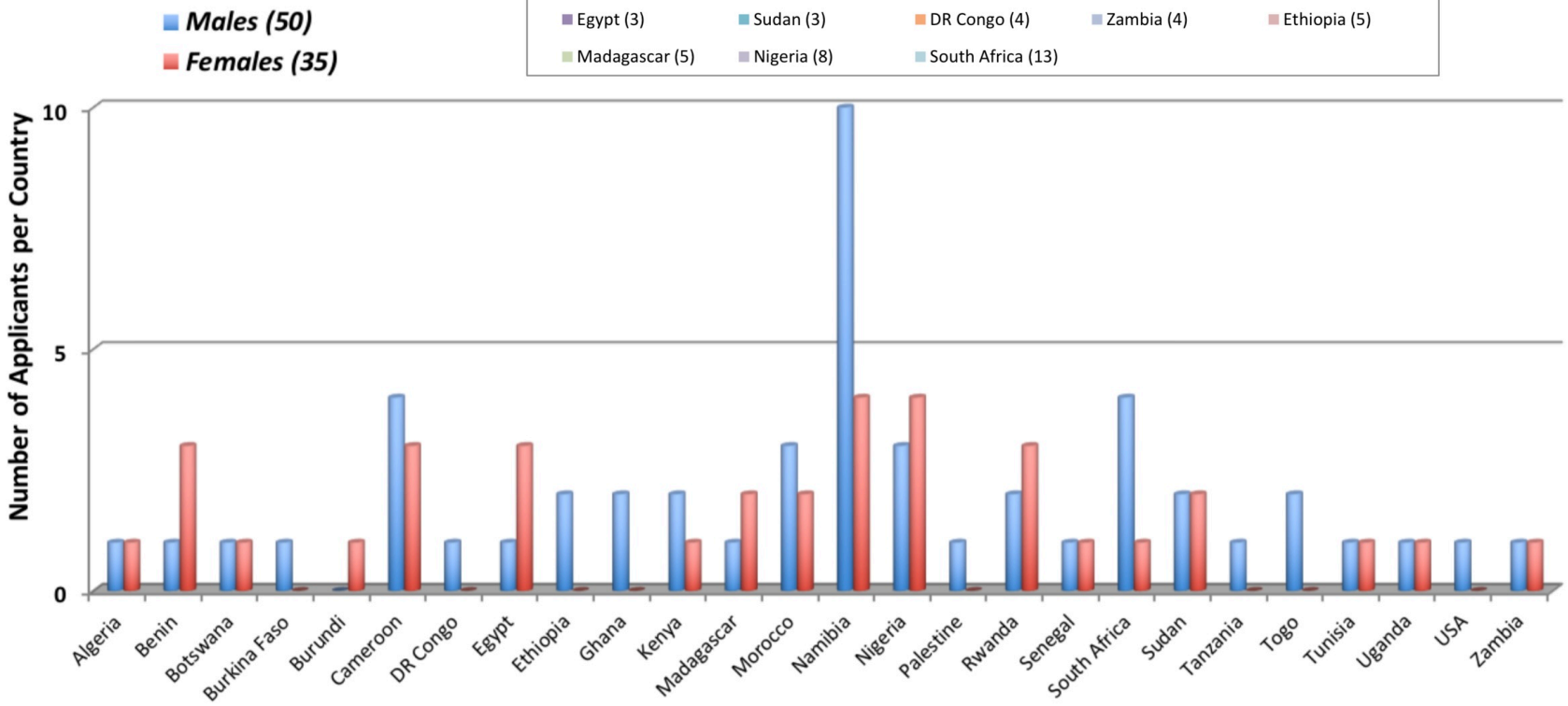
International Lecturers (IL)
Design the scientific Program
Help with the student selections
Mentor and Coach students continuously

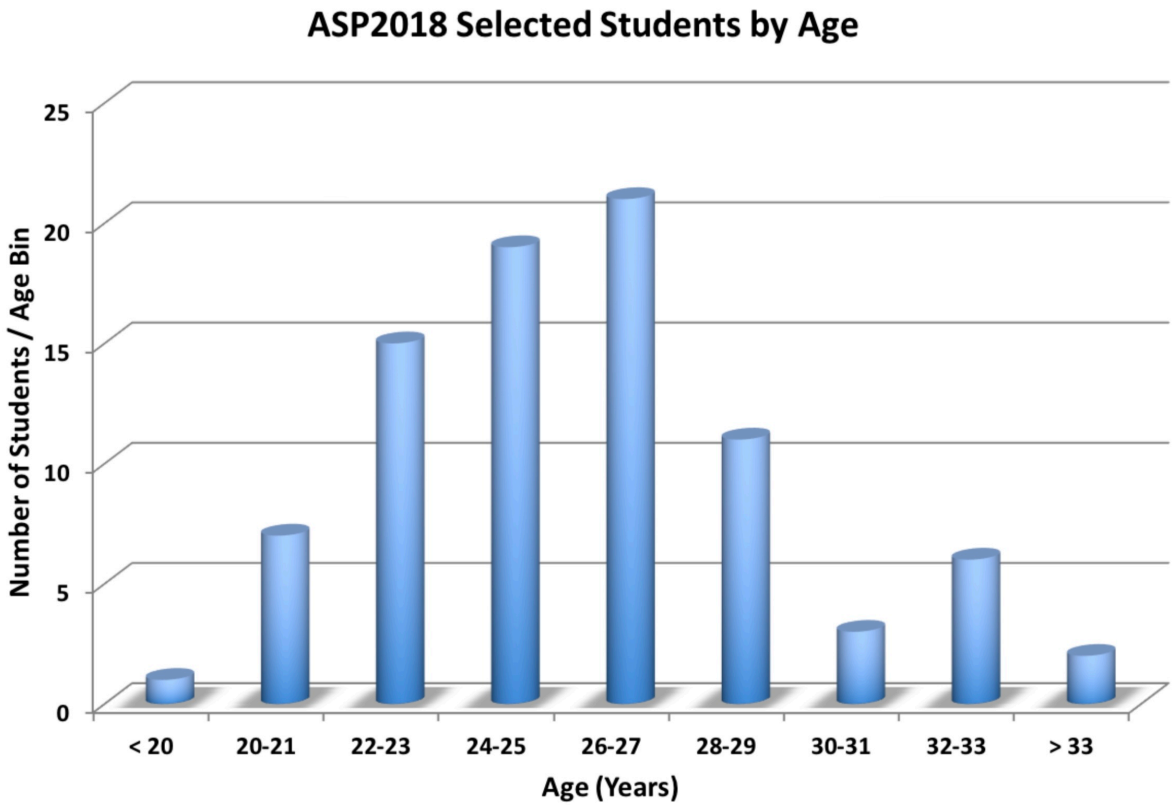
Spin-Offs
ASP Mentorship/Coaching Program
Online lectures
Networking and sharing of information

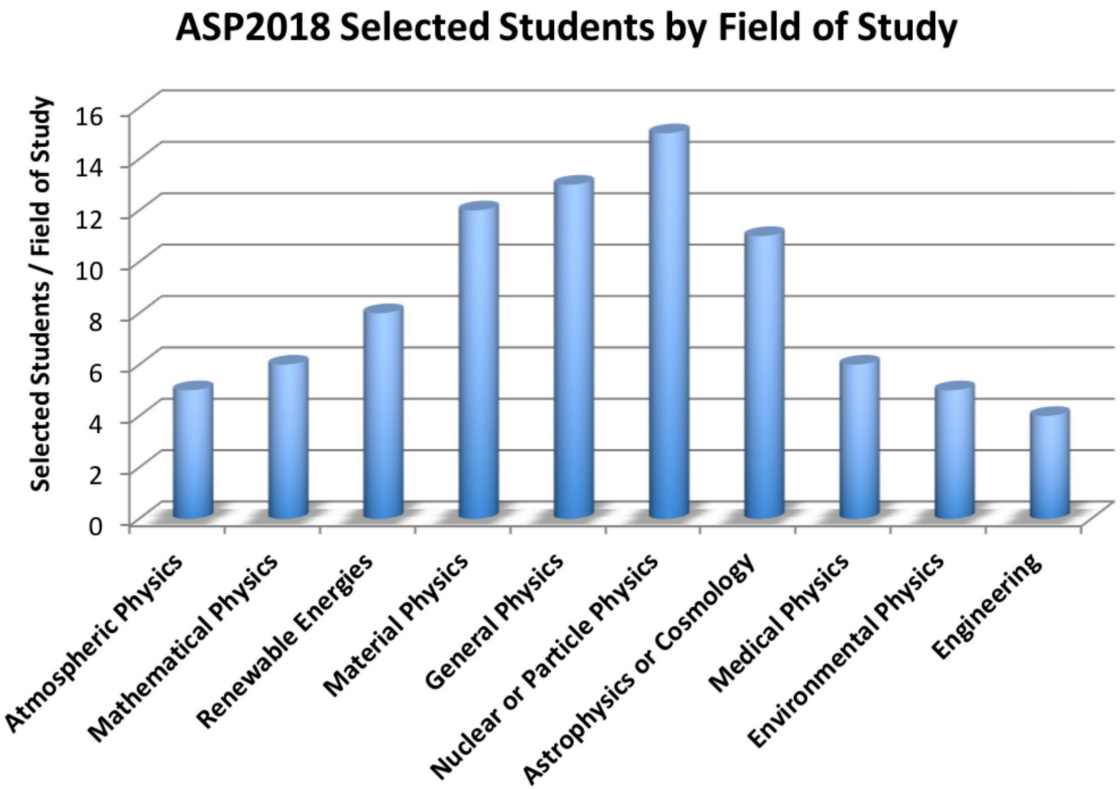
ASP	Host Country	Applicants	Students	Countries
2010	South Africa	125	65	23
2012	Ghana	138	50	15
2014	Senegal	330	70	23
2016	Rwanda	429	75	27
2018	Namibia	523	85	26








ASP2018 Selected Students by Age
Number of Students / Age Bin
25
20
15
10
5
0
< 20
20-21
22-23
24-25
26-27
28-29
30-31
32-33
> 33
Age (Years)


ASP2018 Selected Students by Field of Study
Selected Students / Field of Study
16
14
12
10
8
6
4
2
0
Atmospheric Physics
Mathematical Physics
Renewable Energies
Material Physics
General Physics
Nuclear or Particle Physics
Astrophysics or Cosmology
Medical Physics
Environmental Physics
Engineering

Second Biennial African School on Fundamental Physics and its Applications

July 15, 2012 to August 8, 2012
Kumasi, Ghana
Europe/London timezone

Enter your search

Scientific Program

FIRST WEEK (16-20th july 2012)
Lectures and Discussion Sessions on the Theoretical aspects of:
. Particle Physics
. Nuclear Physics
. Hot and Condensed Nuclear Matter
. Astrophysics & Cosmology
. Monte Carlo Generators
. Computer labs on MC Generators

SECOND WEEK (23-27th july 2012)
Lectures and Discussion Sessions on the Experimental aspects of:
. Particle Physics
. Nuclear Physics
. Hot and Condensed Nuclear Matter
. Astrophysics & Cosmology
. Computing in HEP
. Computer labs on intros to ROOT and the GRID

THIRD WEEK (30th july-3rd august 2012)
Lectures and Discussion Sessions on:
. Beam Optics
. Accelerator Physics
. Instrumentation
. Laser Driven Plasma Accelerators
. Medical Applications of Particle Beams
. Practice labs on: Particle Detectors, Laser Physics, Computer lab on GEANT4

The Scientific Program of ASP2021

Jul 19, 2021, 9:00 AM → Jul 30, 2021, 8:00 PM Africa/Johannesburg

Anne Dabrowski (CERN), Bobby Samir Acharya (Abdus Salam Int. Cent. Theor. Phys. (IT)), Christine Darve (European Spallation Source), Farida Fassi (Mohammed V University in Rabat), Fernando Ferroni, Jonathan R. Ellis (University of London (GB)), Ketevi Adikle Assamagan (Brookhaven National Laboratory (US)), Mohamed Chabab (Cadi Ayyad University), Steve Guy Muanza (CPPM, Aix-Marseille Université, CNRS/IN2P3 (FR))

Description The Activities of the 6th edition of the biennial African School of Fundamental Physics and Applications. This is a virtual event:

- Online lectures, tutorials and workshops for selected students, July 19-30, 2021;

Main topics:

1. Nuclear and Particle Physics;
2. Astrophysics and Cosmology;
3. Accelerators, Radiation and Medical Physics;
4. Materials Physics, Nanosicence;
5. Biophysics, Fluid and Plasma Physics, Atomic & Molecular Physics;
6. Light Sources and Neutron Sources;
7. Earth Science, Optics & Photonics;
8. Physics Education, the Internet of things, Quantum Information;
9. Renewable Energies and Energy Efficiency;
10. Statistical Analysis, Heavy Ion Physics.

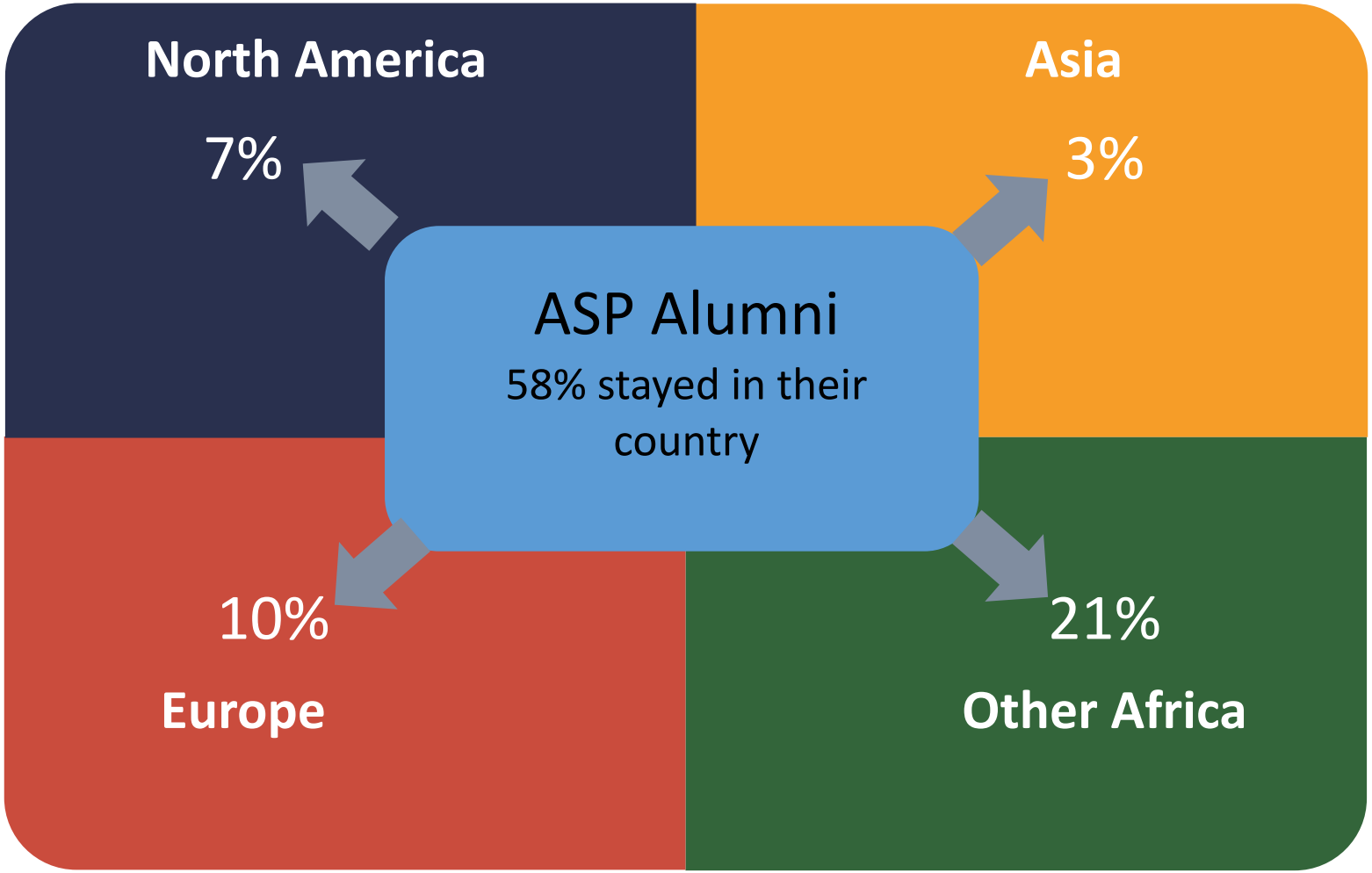
- **ASP2020-Morocco**
  - A 2-week online version organized as ASP2021
  - Online school because of COVID-19
  - July 19 - 30, 2021

- **South Africa to host ASP2022**

  At Nelson Mandela University

Life after ASP

Where do ASP alumni go?



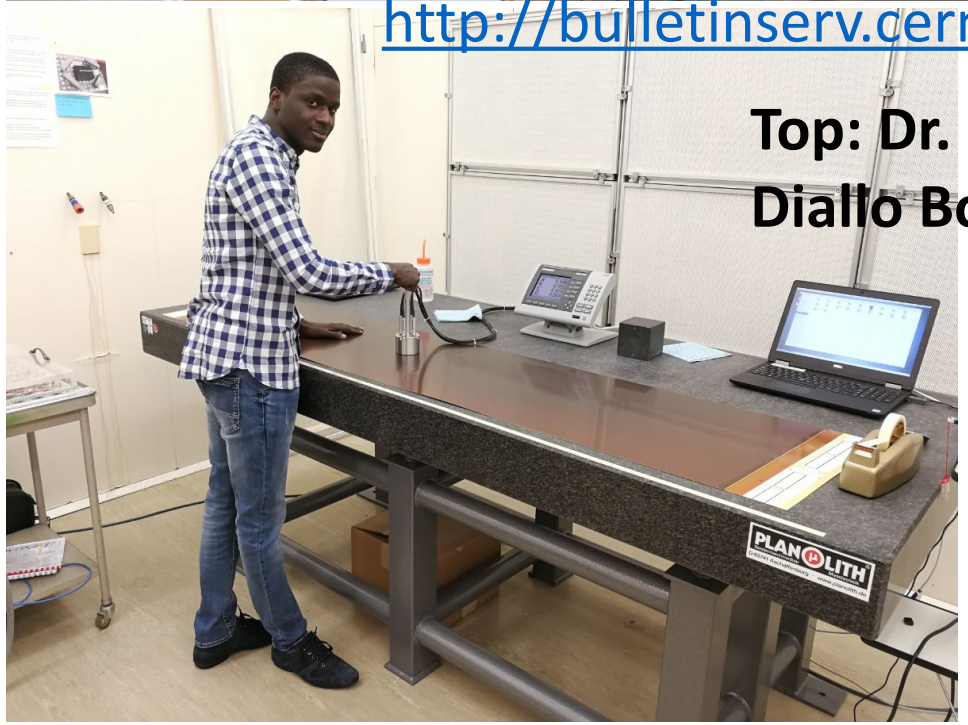
THE AFRICAN SCHOOL OF PHYSICS: A SPRINGBOARD FOR THE FUTURE

A biennial African School of Physics (ASP) on fundamental physics and its applications was established in 2010 in order to promote international cooperation in the field of fundamental physics among African countries and between them and western countries.

An ASP has taken place every second year from 2010 to 2016 ...

more >

http://bulletinserv.cern.ch/emails/archive/353/



Top: Dr. Chilufya Mwewa, (Zambia, ASP2010), PhD (2020)
Diallo Boye (Senegal, ASP2012), PhD (2020)

Both Chilufya and Diallo are post-docs at BNL to work on the ATLAS Experiment

Many other cases of active engagement to help alumni

ASP Structured Mentorship Program

- **Informal networking between ASP alumni and lecturers**

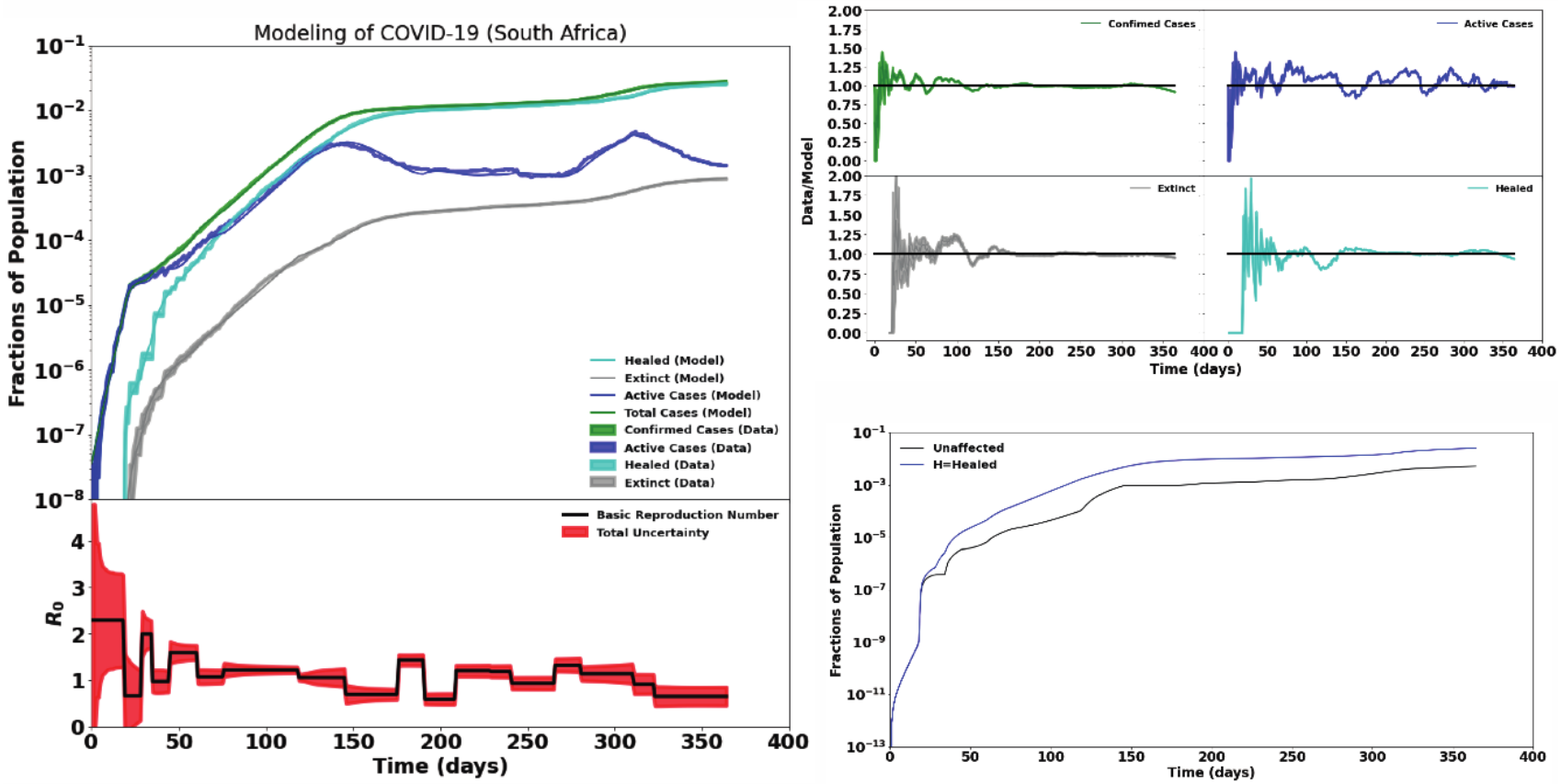
- **Structure mentorship formalized and integrated in 2016**
  - **Open to ASP alumni at PhD level**
  - **Runs on 2-year cycle**
  - **Pair alumni with ASP lecturers**
  - **Work with alumni academic advisors**
    - **Does not replace them**
    - **Extra assistance / support if needed**

ASP alumni of 2018, some of whom has benefitted from the ASP Mentorship Program

ASP Mentorship during COVID-19 Pandemic

ASP alumni learned about

- Analysis tools in C++ and Python
- Understanding their data
- Modeling, goodness of fit
- Statistical analysis
- Uncertainties (statistical, systematic)
- Estimation of basic reproduction number R_0
- Giving scientific talks
- Writing a paper and responding referees comments

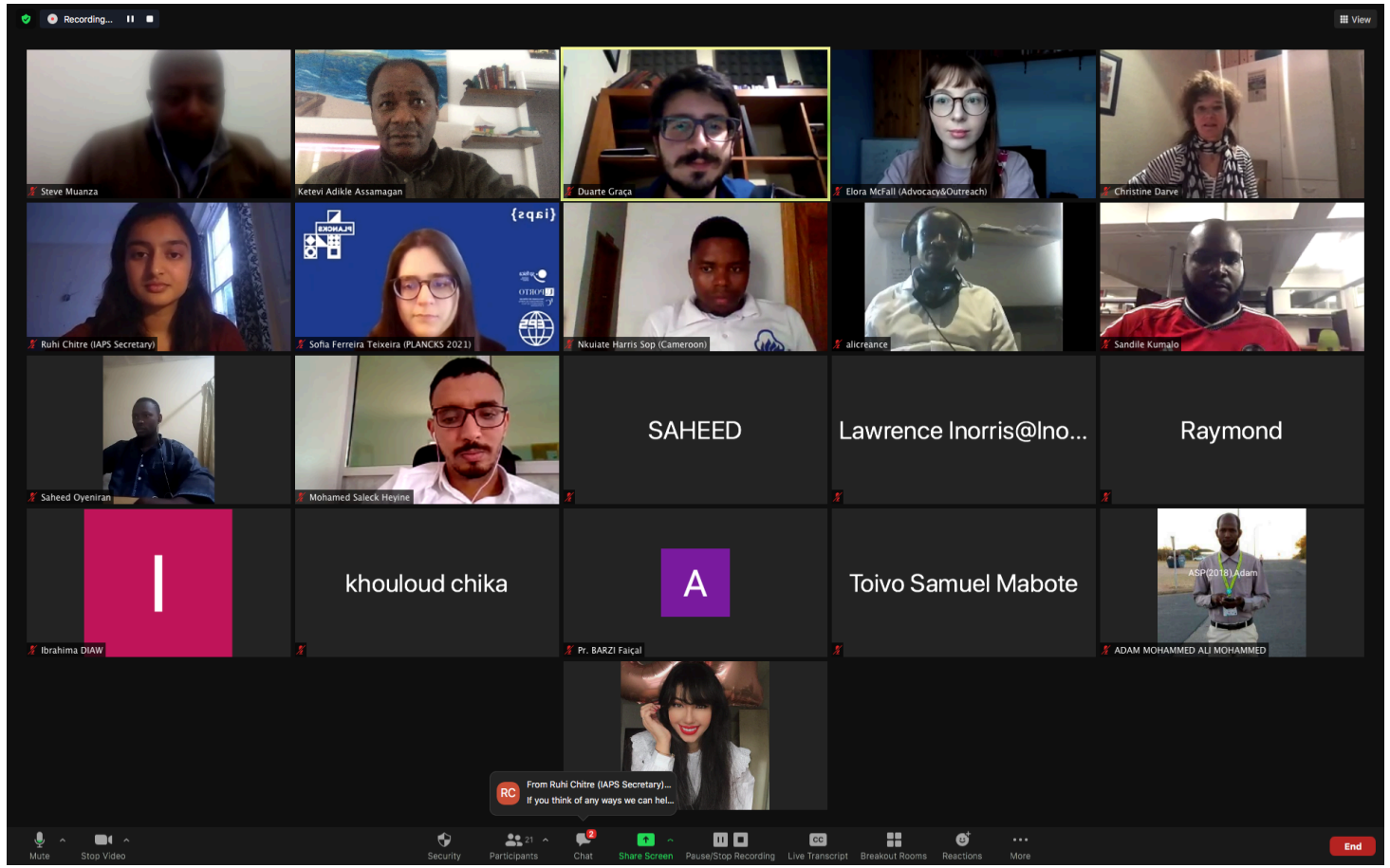


First 12 months of COVID-19 data of 10 countries analyzed
> 50% of all COVID-19 cases in Africa were analyzed by 13 African students

Study published in the Scientific African
https://doi.org/10.1016/j.sciaf.2021.e00987

ASP Online Weekly or Bi-weekly Seminars / Colloquia

- **Introduced during COVID-19 in April 2020**
- **It is now a part of ASP activities**
- **On Tuesdays at 13:00 UTC**
- **Open to anyone**
- **International guest speakers**



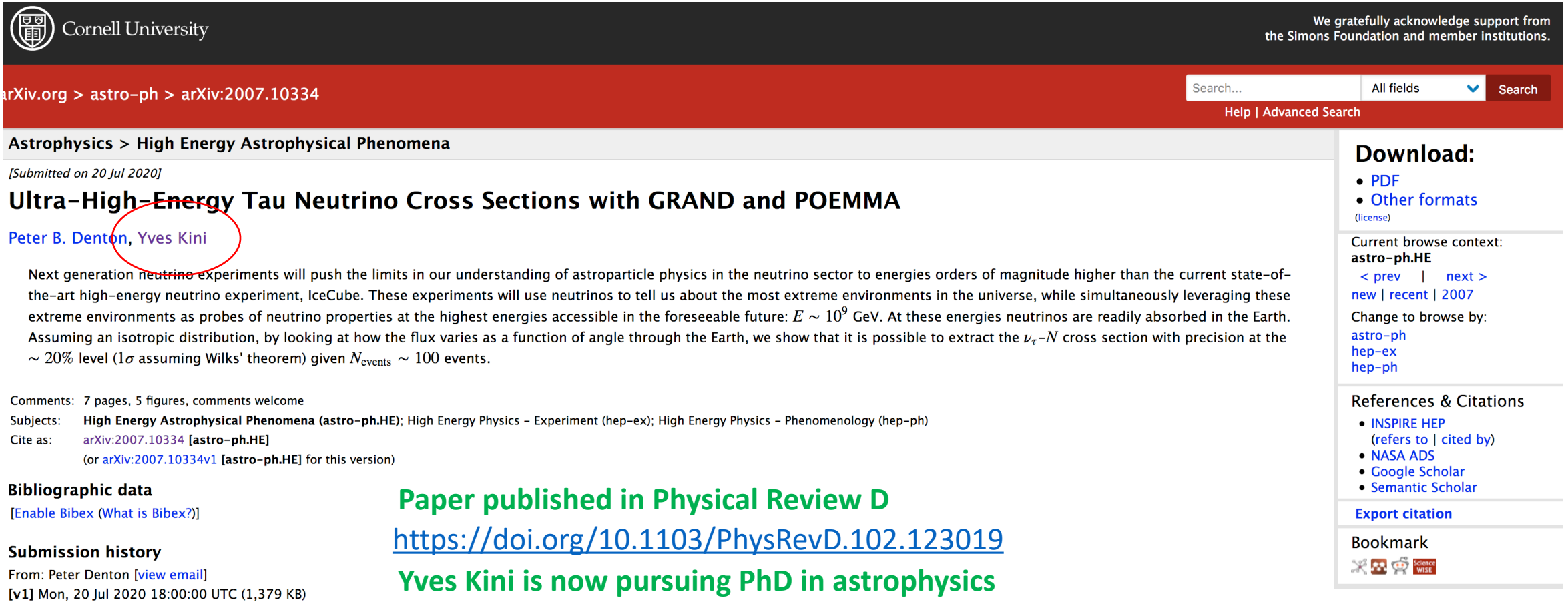
September 2, 2021 — joint session with the International Association of Physics Students (IAPS)

ASP Short-term visits for Research

- **Selected ASP alumni to spend 3-6 month at U.S. laboratories for research**
  - **Assigned to work in research groups according to majors**
- **Program formalized in 2019**
- **9 ASP alumni came to Brookhaven National Laboratory, June-December 2019**
- **Program will resume after COVID-19**

ASP alumni at BNL
With BNL / DOE research advisors and staff

ASP Alumnus Yves Kini (Burkina Faso) Publication Based on Study Done during Short-Term Visit at BNL



Cornell University

We gratefully acknowledge support from the Simons Foundation and member institutions.

arXiv.org > astro-ph > arXiv:2007.10334

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Astrophysics > High Energy Astrophysical Phenomena

[Submitted on 20 Jul 2020]

Ultra-High-Energy Tau Neutrino Cross Sections with GRAND and POEMMA

Peter B. Denton, Yves Kini

Next generation neutrino experiments will push the limits in our understanding of astroparticle physics in the neutrino sector to energies orders of magnitude higher than the current state-of-the-art high-energy neutrino experiment, IceCube. These experiments will use neutrinos to tell us about the most extreme environments in the universe, while simultaneously leveraging these extreme environments as probes of neutrino properties at the highest energies accessible in the foreseeable future: $E \sim 10^9$ GeV. At these energies neutrinos are readily absorbed in the Earth. Assuming an isotropic distribution, by looking at how the flux varies as a function of angle through the Earth, we show that it is possible to extract the ν_τ-N cross section with precision at the $\sim 20\%$ level (1σ assuming Wilks' theorem) given $N_{\text{events}} \sim 100$ events.

Comments: 7 pages, 5 figures, comments welcome

Subjects: **High Energy Astrophysical Phenomena (astro-ph.HE)**; High Energy Physics - Experiment (hep-ex); High Energy Physics - Phenomenology (hep-ph)

Cite as: arXiv:2007.10334 **[astro-ph.HE]**

(or arXiv:2007.10334v1 **[astro-ph.HE]** for this version)

Bibliographic data

[Enable Bibex (What is Bibex?)]

Submission history

From: Peter Denton [view email]

[v1] Mon, 20 Jul 2020 18:00:00 UTC (1,379 KB)

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References & Citations

- INSPIRE HEP (refers to | cited by)
- NASA ADS
- Google Scholar
- Semantic Scholar

Export citation

Bookmark

Paper published in Physical Review D

https://doi.org/10.1103/PhysRevD.102.123019

Yves Kini is now pursuing PhD in astrophysics

BNL Advisor during short-term visit: Dr. Peter Denton (theorist, neutrino physics)

ASP Alumna Dr. Mounia Laassiri gave an invited talk at DPF 2019-Boston

Physics > Physics Education

[Submitted on 13 Sep 2019 (v1), last revised 18 Nov 2019 (this version, v2)]

The African School of Fundamental Physics and Applications (ASP)

Kétévi Adiklè Assamagan, Mounia Laassiri

The African School of Fundamental Physics and Applications is a biennial school in Africa. It is based on the observation that fundamental physics provides excellent motivation for students of science. The aim of the school is to build capacity to harvest, interpret, and exploit the results of current and future physics experiments and to increase proficiency in related applications. The participating students are selected from all over Africa. The school also offers a workshop to train high school teachers, an outreach to motivate high school pupils and a physics conference to support a broader participation of African research faculties. Support for the school comes from institutes in Africa, Europe, USA and Asia. In this paper, we will present the school and discuss strategies to make the school sustainable.

Comments: 8 pages, 7 figures, Talk presented at the 2019 Meeting of the Division of Particles and Fields of the American Physical Society (DPF2019), July 29 – August 2, 2019, Northeastern University, Boston, C1907293

Subjects: **Physics Education (physics.ed-ph)**

Cite as: arXiv:1909.06309 **[physics.ed-ph]**

(or arXiv:1909.06309v2 **[physics.ed-ph]** for this version)

Contribution to the American Physical Society Division of Particles and Fields (DPF)-2019 Proceedings

More

ASP workshop for high school teachers

- **Formalized and started in 2016**
  - during ASP2016 in Rwanda
- **In ASP2016**
  - 2016, 20 teachers for 2-day workshop
- **In ASP2018, 70 teachers from 14 regions of Namibia**
- **Teachers selected by the Ministry of Education of host country**

Windhoek, Namibia, July, 2018 ASP2018
Dr. Milind Diwan with high school teachers

ASP Outreach Program for learners

- **Formalized and started in 2016**
  - During ASP2016 in Rwanda
- **During ASP2018**
  - 39 high schools around Windhoek
  - About 2000 learners
  - In one week
- **High schools selected by LOC, Ministry of Education of host country; pupils selected by the high schools**

Windhoek, Namibia, July, 2018 ASP2018
Dr. Kenneth Cecire with learners

The African Conference on Fundamental and Applied Physics (ACP)

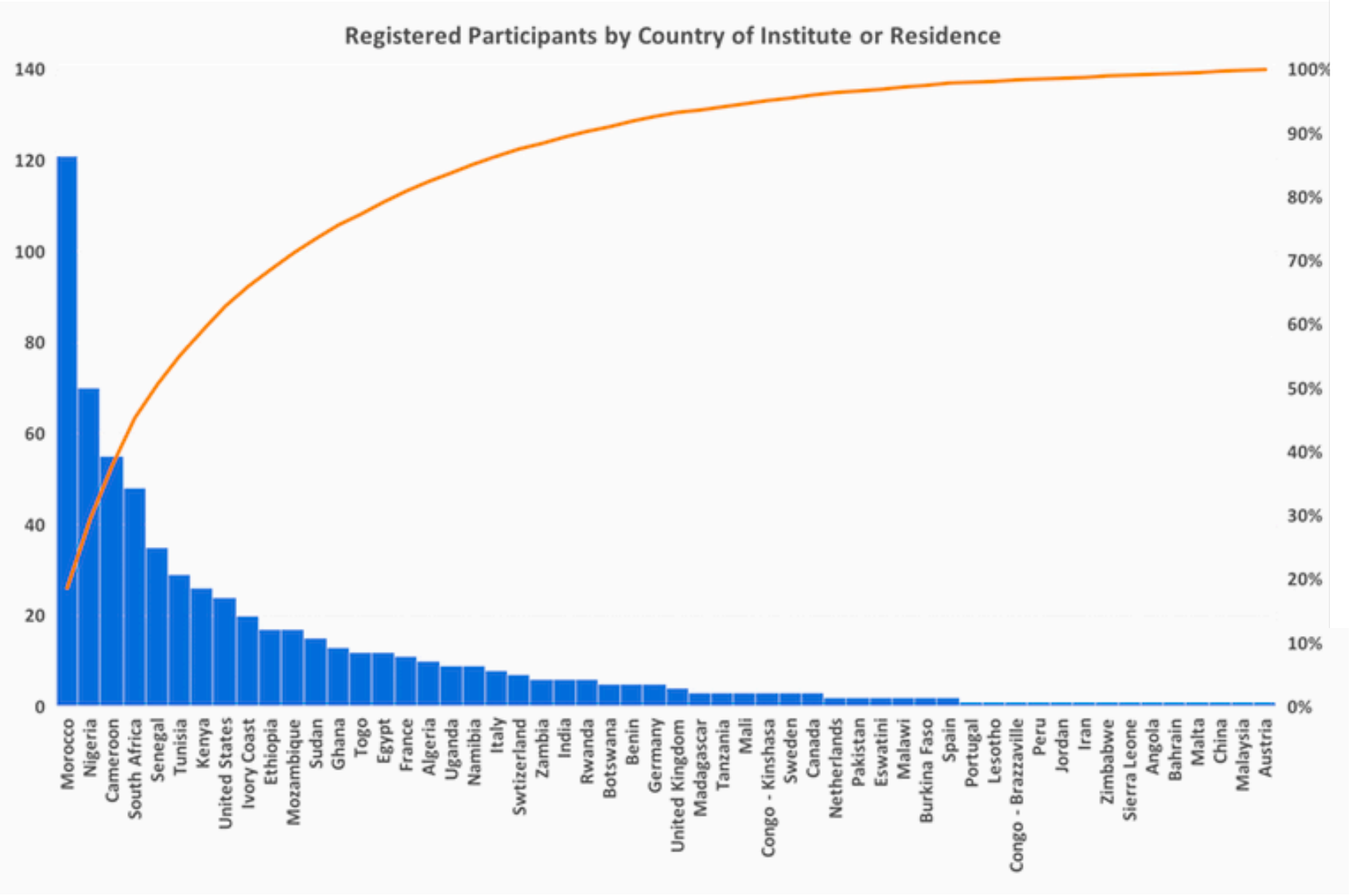
- **One week, integrated in ASP since 2018**
- **The first ACP tool place in Namibia in July 2018**
- **Formalized to promote**
  - Participation of African research faculties
  - Encourage participation of African students not selected for ASP due to budget constraints
  - International conference open to anyone

Second African Conference on Fundamental and Applied Physics ACP2021

- **ACP2021 should have been the 3rd week of ASP2021**
  - Postponed to March 7-11, 2022
  - Changed to virtual because of Omicron

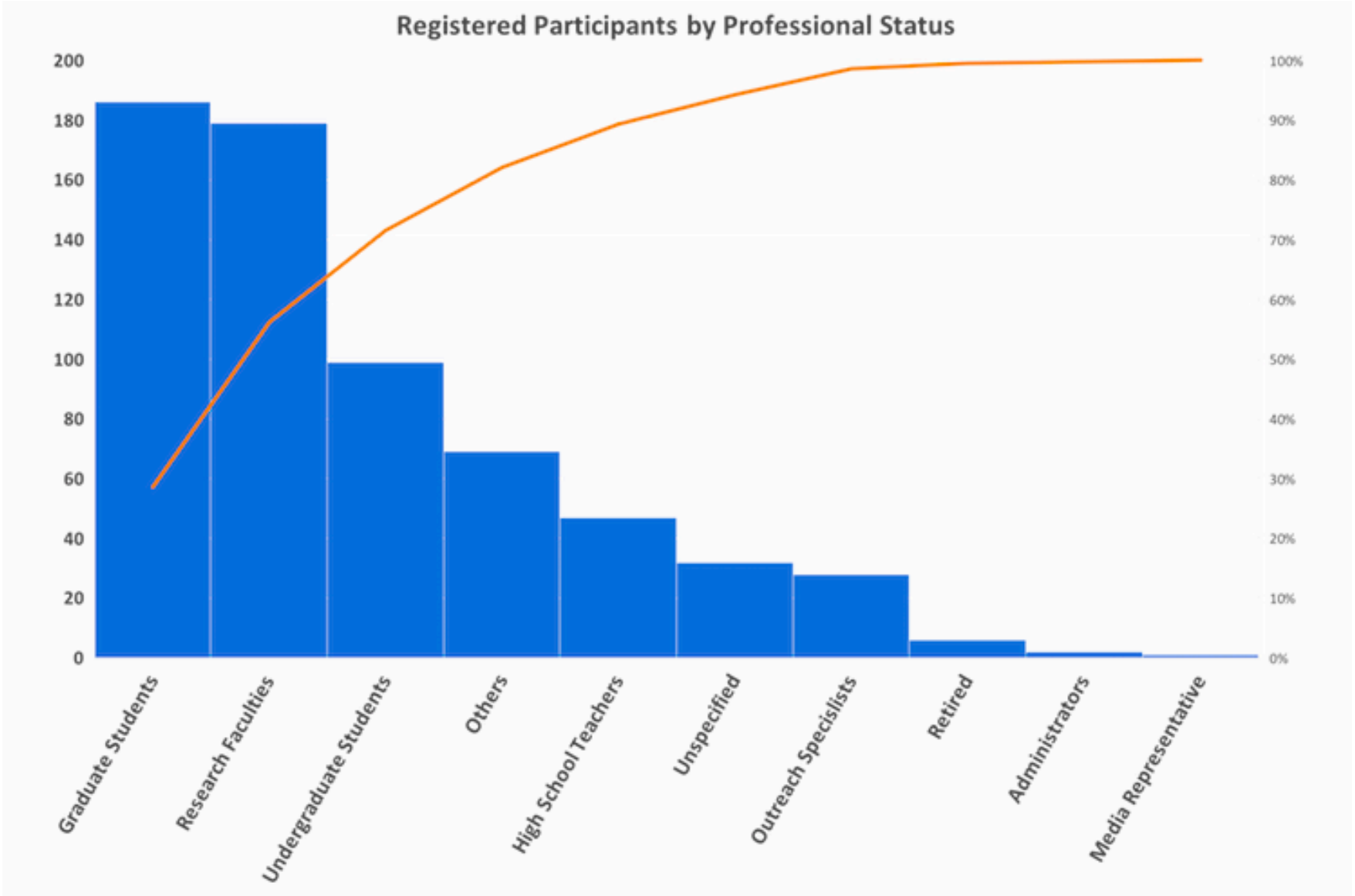
TOTAL: 649

ACP2021, March 7-11, 2022



33 African countries
563 participants from within Africa

ACP2021, March 7-11, 2022; TOTAL: 649



African School of Fundamental Physics and Applications

ASP	Host Country	Mentorship	Teachers	Pupils	ACP
2010	South Africa	Continuously, even when there is no formal school			
2012	Ghana				
2014	Senegal				
2016	Rwanda	Program formalized in 2016	20	150	
2018	Namibia		63	> 1200	+60

- **ACP2021 : 649 registrations**

Conclusion

- **ASP started in 2010**
  - as a 3-week biennial event in high energy physics (and applications) for university students
- **Extended since and now include**
  - Other fields of physics, of interest to Africa
  - Structured mentorship program continually for selected graduate students
  - A one-week workshop to train African high school teachers in the planning and delivery of physics instructions
  - A one-week physics outreach event to motivate African high school learners to develop and maintain interest in physics
  - ASP Forum — to liaise with policymakers
  - The African Conference on Fundamental and Applied Physics
  - A weekly or bi-weekly online seminars or colloquia
  - 3- to 6-month short-term visits to U.S. laboratories for physics research

ASP has grown to become a program of continuous activities Aimed at establishing physics as an engine for development in Africa through education

10th Edition of the Large Hadron Collider Physics Conference

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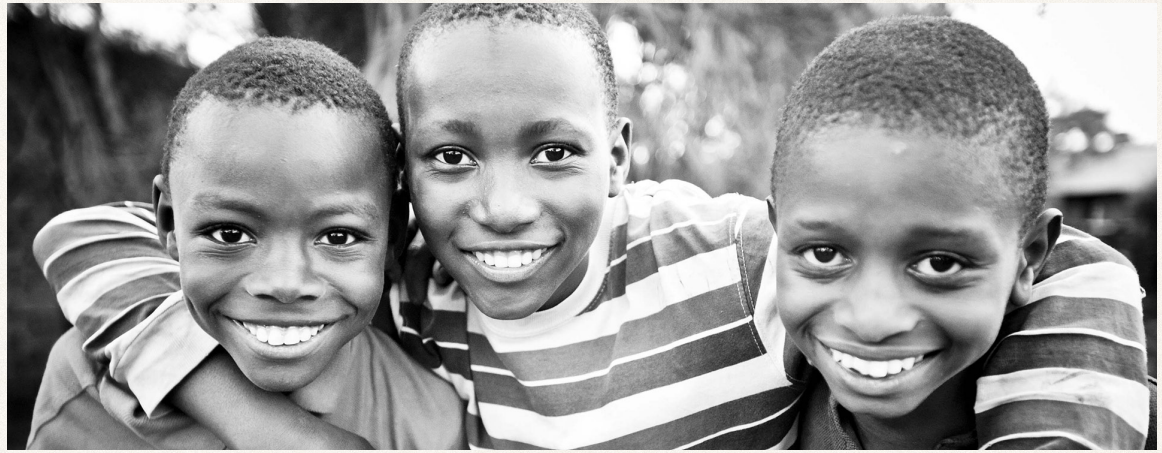

Thank you all !

Thanks to the ASP IOC

Special mention to Ketevi Assamagan