



# The African School of Fundamental Physics and Applications a.k.a. the African School of Physics (ASP)

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

**Dr. Kétévi A. Assamagan**

**Physicist at**

**Brookhaven National Laboratory (USA)**



# Outline

- **Brief overview of ASP in structure and activities**
  - Students
  - High school Teachers
  - High school Pupils
  - ASP Forum
  - Mentorship
  - Short-term visits for research
  - Online lecture
  - Conference
  - Assistance
  - More
- **Conclusions**



# African School of Fundamental Physics and Applications

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

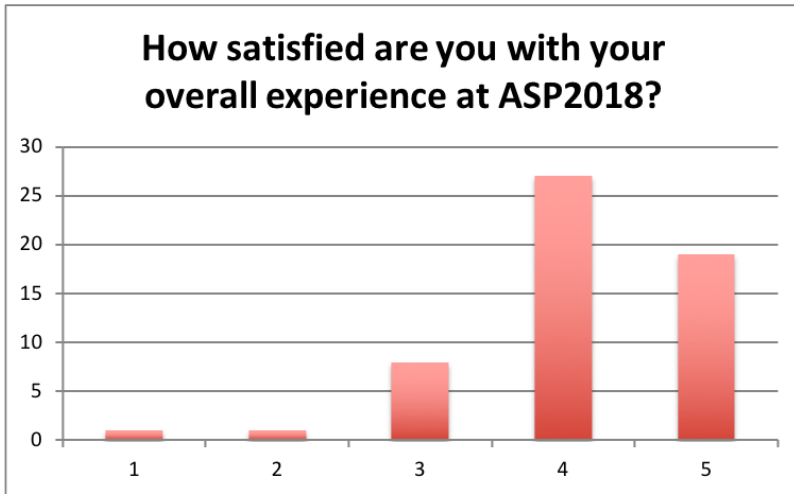
ASP	Host Country	Applicants	Students	Mentorship	Teachers	Pupils	Conference
2010	South Africa	125	65	Continuously, even when there is no formal school			
2012	Ghana	138	50				
2014	Senegal	330	70				
2016	Rwanda	429	75	Program formalized in 2016	20	150	
2018	Namibia	523	85		63	> 1200	+60

# ASP Impact

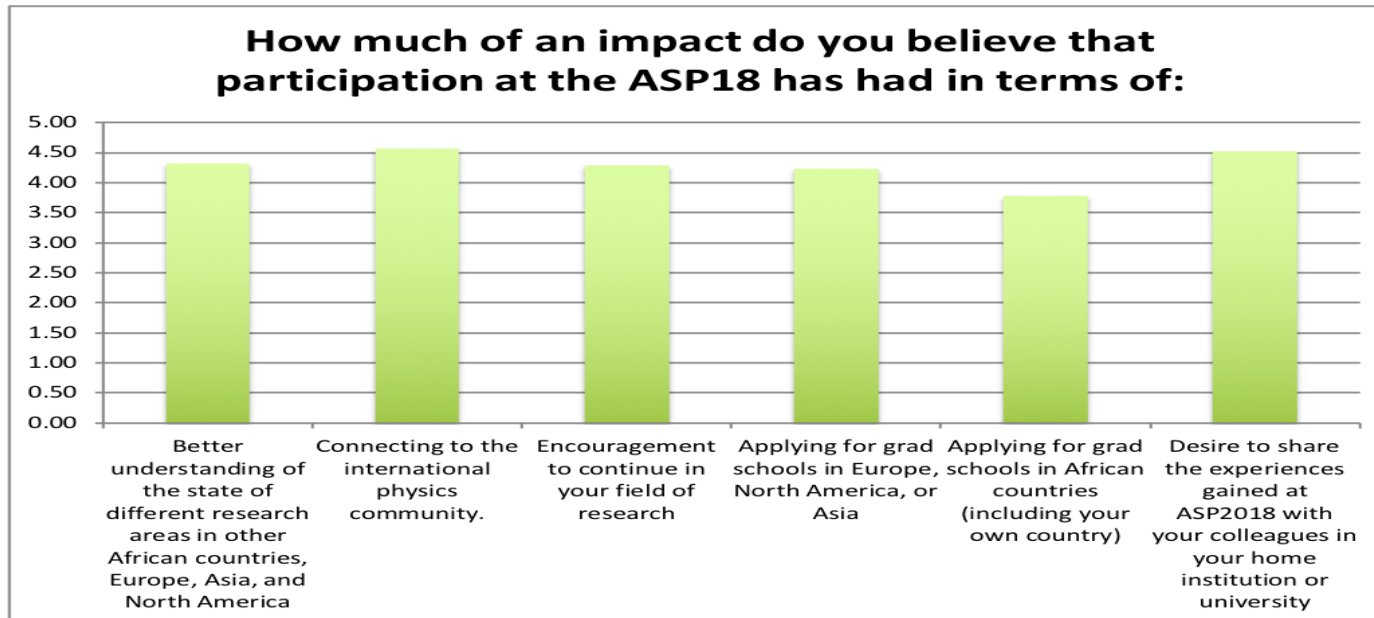
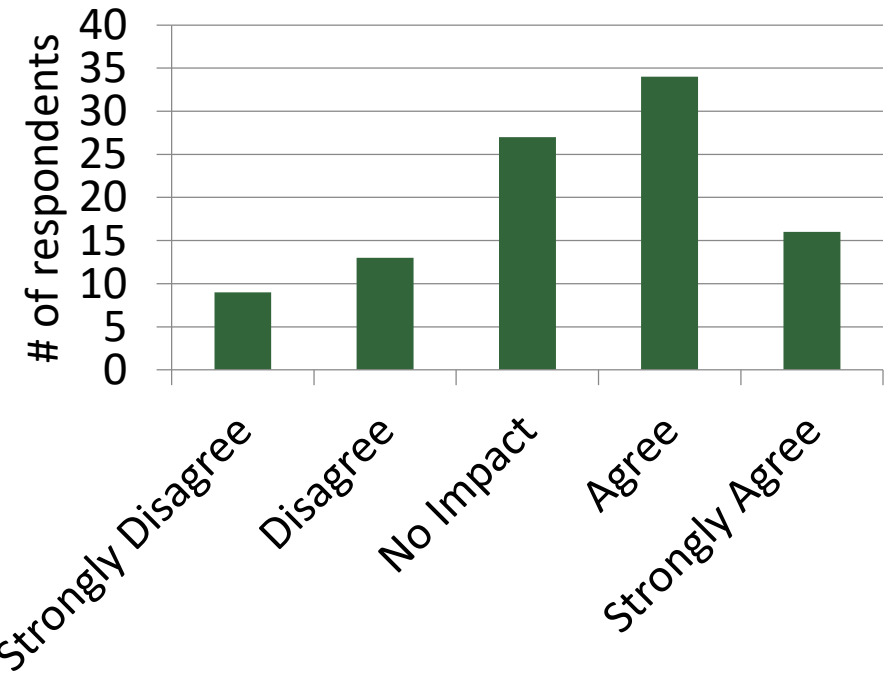
- **Two types of surveys done**

- One toward the end of each edition (current participants)
- One every 4 years (all alumni)

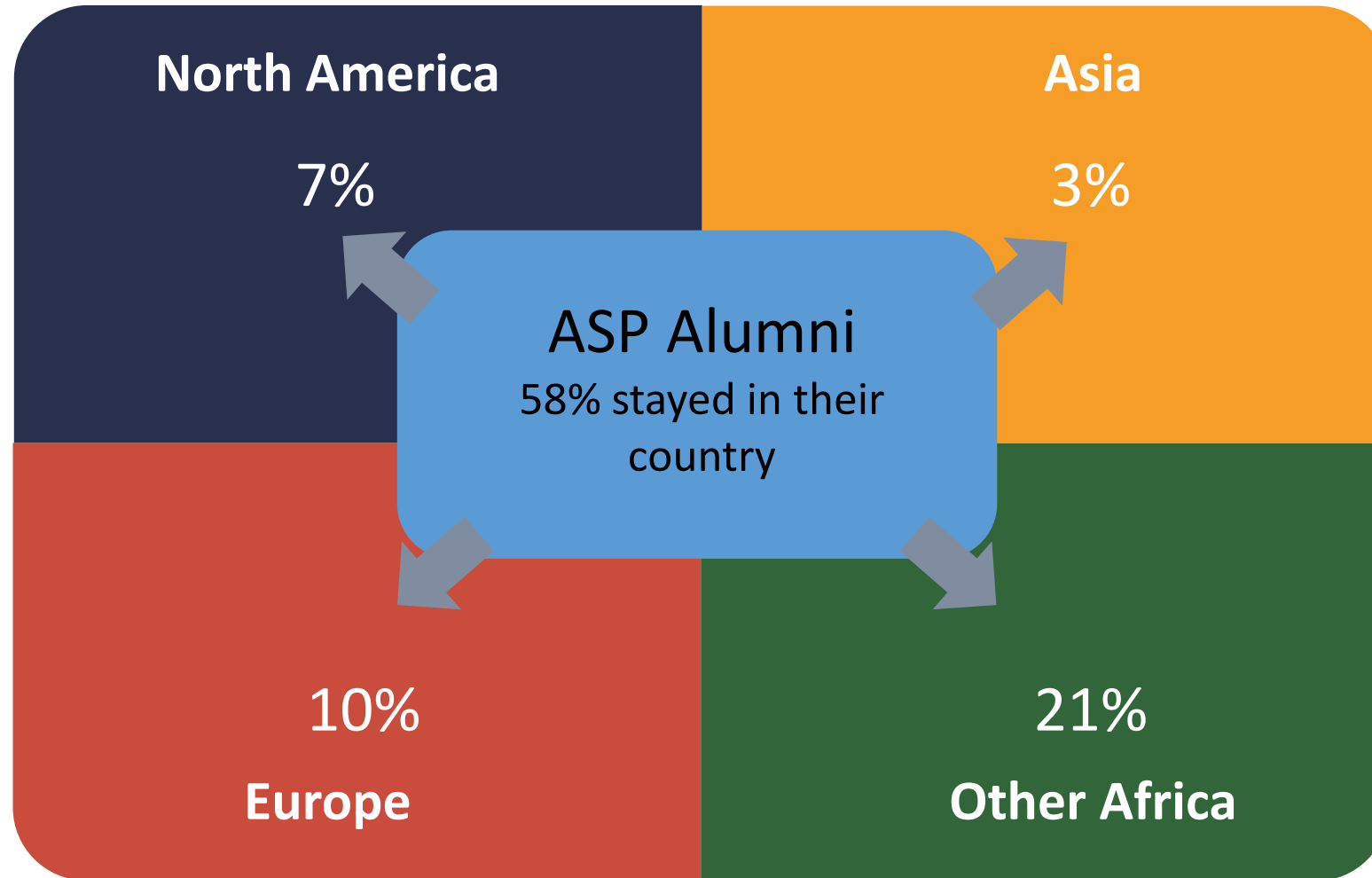
**My research has benefited through professional contacts made at ASP**



**5 = very satisfied; highest impact**



# Retention. Where do ASP alumni go?



# ASP Organization

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

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

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

**Assessment of Impact**  
Survey of students  
Survey of their Professors  
Follow academic developments

**International Organizing Committee (IOC)**  
Overall management  
Fund raising  
Coordination of activities  
Activity reports to Funding agencies

**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  
Align ASP with educational priorities  
Improve future editions of ASP  
Promote research collaborations  
Promote research consortia

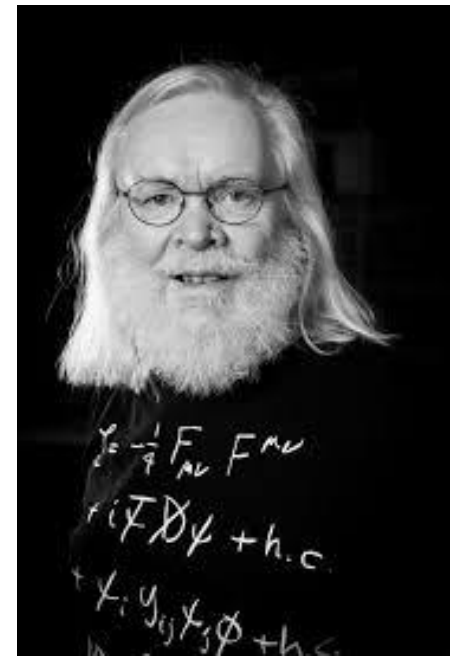
# Current Members of the IOC



Dr. Anne E. Dabrowski  
CERN



Dr. Steve G. Muanza  
CNRS-IN2P3  
France



Prof. John R. Ellis  
CERN and  
University of London



Prof. Bobby Acharya  
ICTP and  
King's College London



Dr. Christine Darve  
ESS

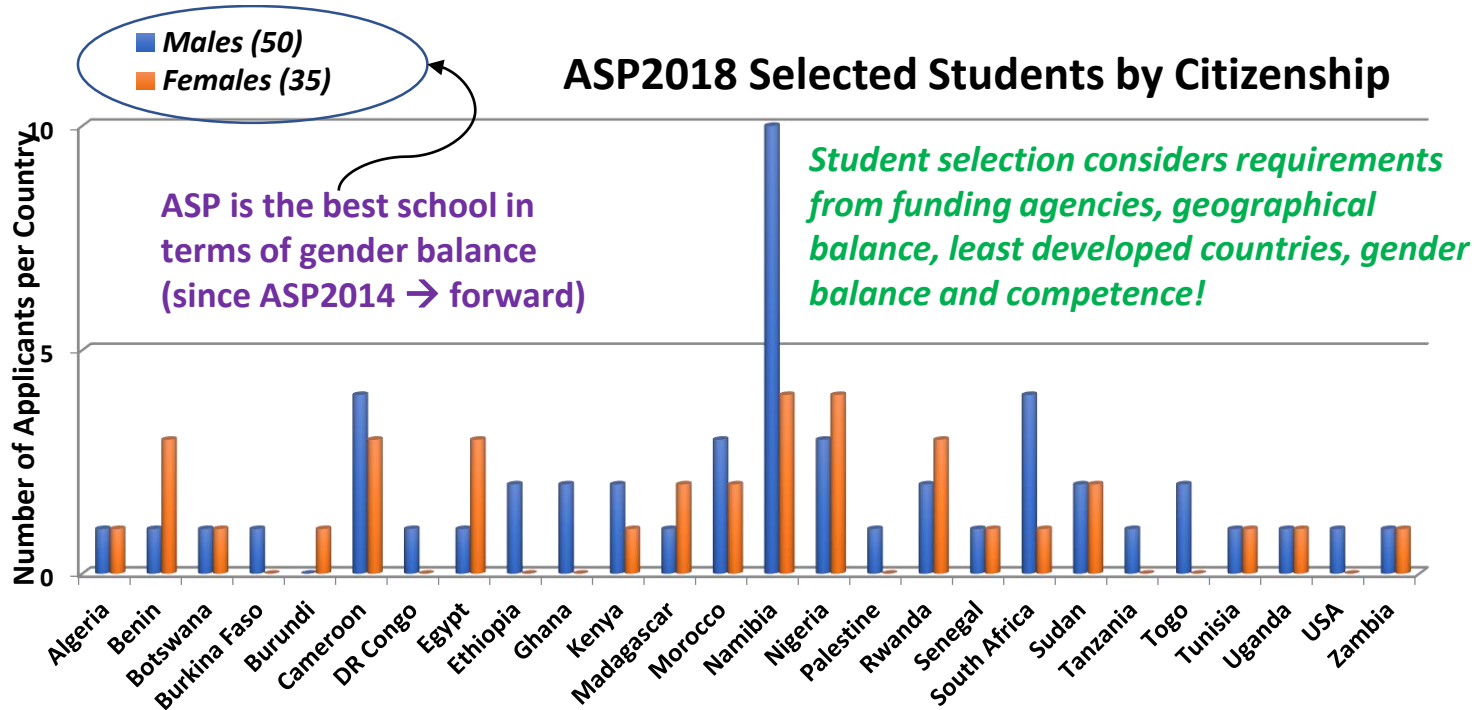


Prof. Fernando Ferroni  
GSSI-INFN

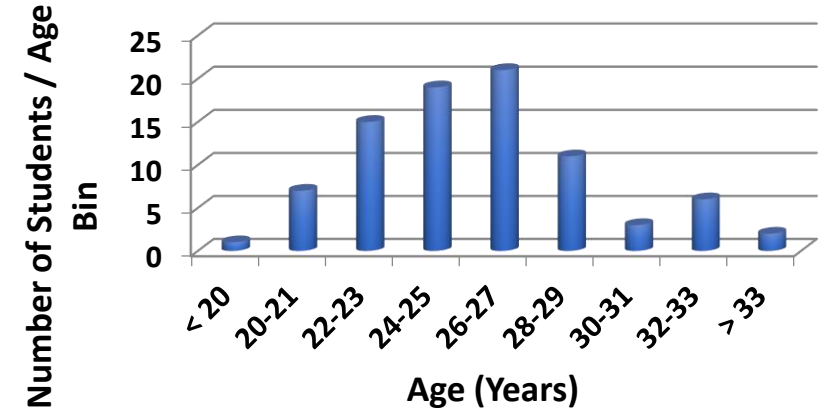


Dr. Kétévi A. Assamagan  
BNL

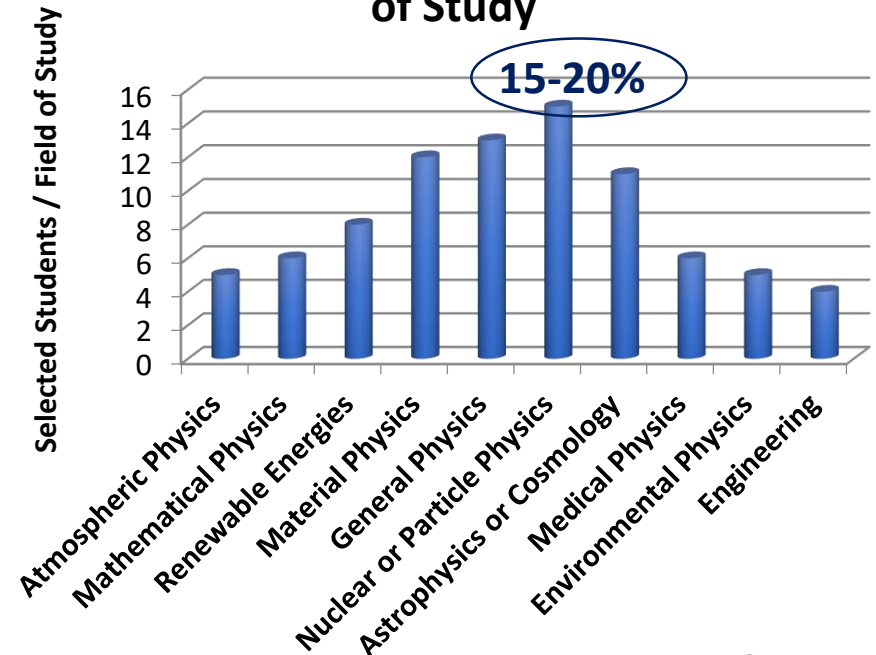
# ASP2018 Students Profile



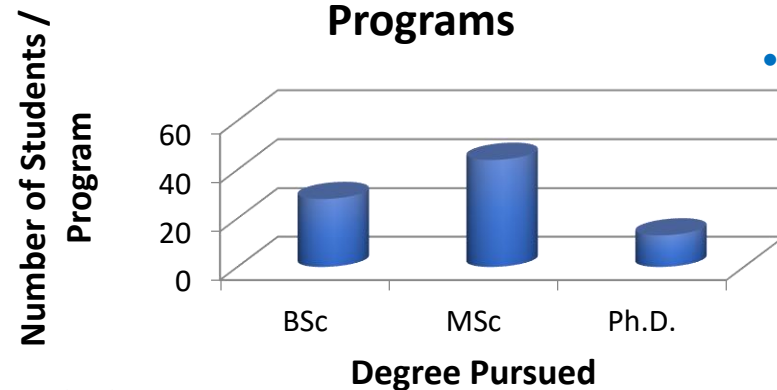
ASP2018 Selected Students by Age



ASP2018 Selected Students by Field of Study



ASP2018 Selected Student Degree Programs



- **523 Applications**
- **Total Selected: 85**
- **There were 30 good students on the waiting list**
- **Selections constrained by budget and logistics**
- **Replace early declinations**



# 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
- **In ASP2018, we covered**
  - 39 high school 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**

# ASP Structured Mentorship Program

- **Informal networking between ASP alumni and lecturers**
  - Always present and encouraged
- **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**
  - Light, information engagements
    - **Between mentor / mentee**
    - **For extra assistance / support if needed**



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

# The African Conference on Fundamental and Applied Physics (ACP)

- **One week, integrated in ASP since 2018**
- **The first ACP took 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



**Prof. Lerothodi Leeuw at ACP2018**

# ASP Forum

## Objective:

Align ASP with the research and education priorities of African countries



**0.5-1.0 day during ASP:** Local and international policy makers in matters of education and research, lecturers, ASP conference participants, students, teachers, industries, research and education institutes, and the media participate in this event.

**ASFAP emerged from the need to go beyond the ASP Forum and ACP**

**ASP2018 Forum, Windhoek July 2018**

# ASP Forum

**One day. Objective:**

Align ASP with the research and education priorities of African countries

**UN support**

Dr. H. TOURE, UN ITU Secretary General.

Prof. A. WAGUE and O. KA  
M. NGOM - US Embassy rep.



**AfLS and compact acc.**  
Prof. H. WINICK, Prof. Emeritus, SLAC and Prof. L. SERAFINI (INFN, IT)



**Dedicated to Knowledge and Transfer of Technology**  
Dr. D. ADAMS, chief director: Emerging Research areas & Infrastructure, Human Capital and Knowledge Systems.

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



Dr. Ketevi A. Assamagan (BNL)



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



# Social events during in-person ASP



# 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



3/11/22

Summer 2019 BNL

Dr. Kétévi A. Assamagan (BNL)



# 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

Search... All fields Search

Help | Advanced Search

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  $\nu_\tau$ - $N$  cross section with precision at the  $\sim 20\%$  level ( $1\sigma$  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)

*Which authors of this preprint are endorsers? / Dislike / Mark as?*

**Paper published in Physical Review D**  
<https://doi.org/10.1103/PhysRevD.102.123019>  
**Yves Kini is now pursuing PhD in astrophysics**

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Current browse context: astro-ph.HE  
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new | recent | 2007

Change to browse by: astro-ph, hep-ex, hep-ph

**References & Citations**

- INSPIRE HEP (refers to | cited by)
- NASA ADS
- Google Scholar
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**Export citation**

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**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

arXiv.org > physics > arXiv:1909.06309

Search...

Help | Advanced

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](https://arxiv.org/abs/1909.06309) [physics.ed-ph]

(or [arXiv:1909.06309v2](https://arxiv.org/abs/1909.06309v2) [physics.ed-ph] for this version)

### Bibliographic data

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### Submission history

From: Mounia Laassiri [[view email](#)]

[v1] Fri, 13 Sep 2019 15:59:36 UTC (719 KB)

[v2] Mon, 18 Nov 2019 19:16:04 UTC (719 KB)

[Which authors of this paper are endorsers?](#) | [Disable MathJax](#) (What is MathJax?)

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

# Assisting Alumni in higher education opportunities



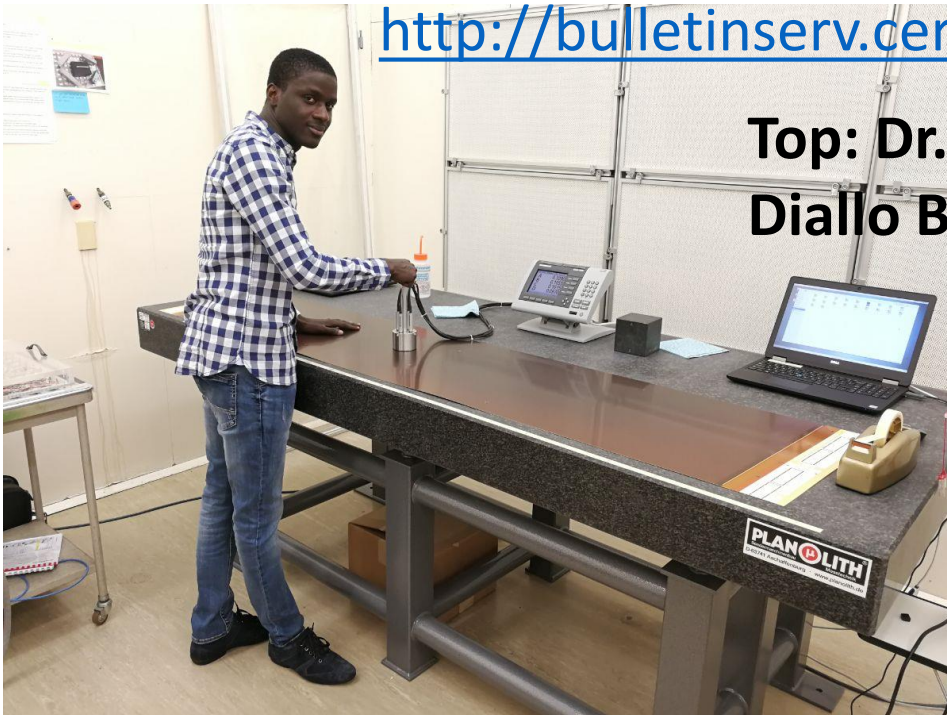
## THE AFRICAN SCHOOL OF PHYSICS: A SPRINGBOARD FOR THE FUTURE

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)**

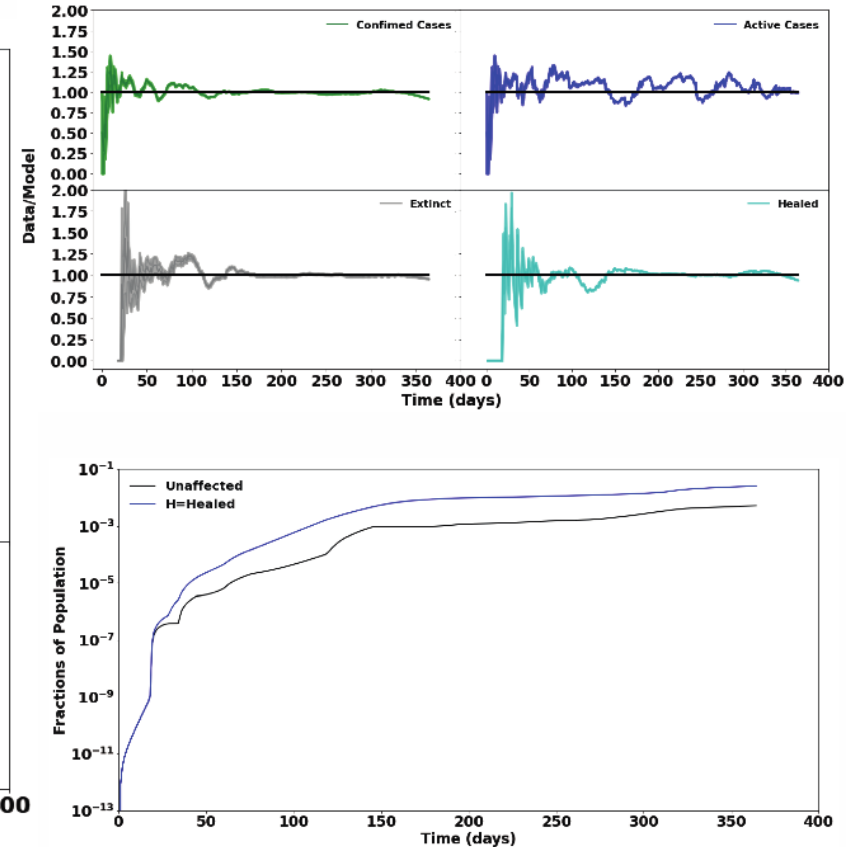
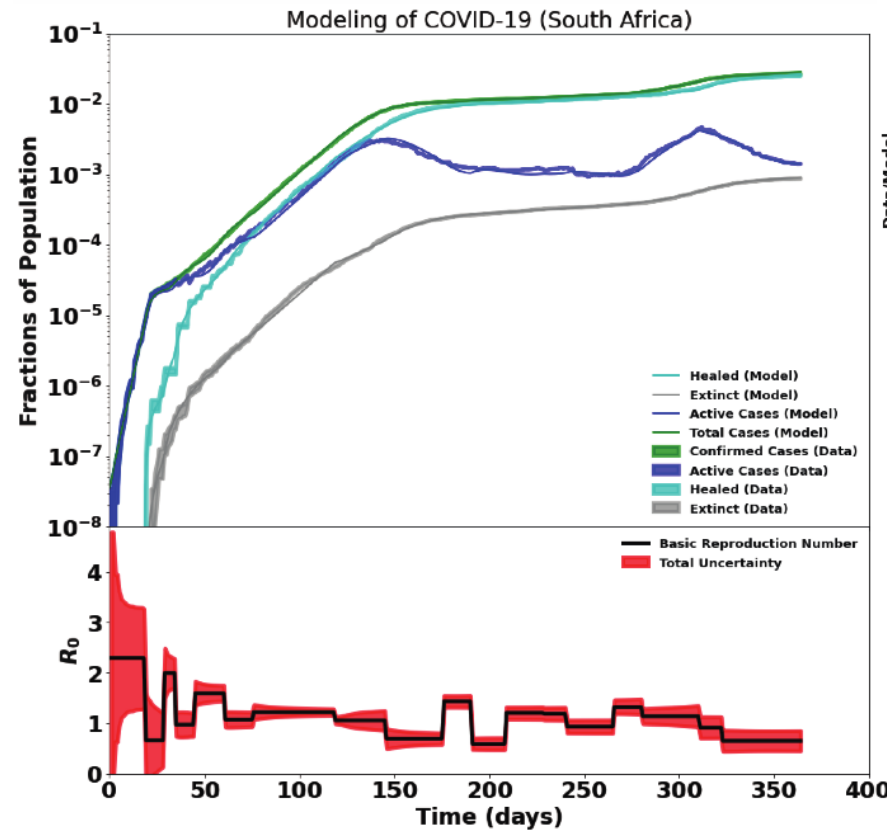
**Both Chilufya and Diallo are post-docs  
at BNL to work on the ATLAS Experiment**

**Many other cases of active  
engagement to help alumni**

# ASP Mentorship during COVID-19 Pandemic

APS 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>

3/11/22

See the talk by Toivo S. Mabote (Mozambique, ASP2020 alumnus)  
On Friday, March 11, 2022

Dr. Kétévi A. Assamagan (BNL)

# Serving on Thesis Committees / External Examiners / External Reviewers

- Many of us, organizers or lecturers at ASP, do this

## Files status determination in a Large Scale Data Center

Aulan Lucrèce ZAHOUNDO (aulan@aims.ac.za)  
African Institute for Mathematical Sciences (AIMS)

Supervised by: Dr Kétévi Adiklè ASSAMAGAN  
Brookhaven National Laboratory, USA

02 May 2020

*Submitted in partial fulfillment of a structured masters degree at AIMS South Africa*



## Abstract

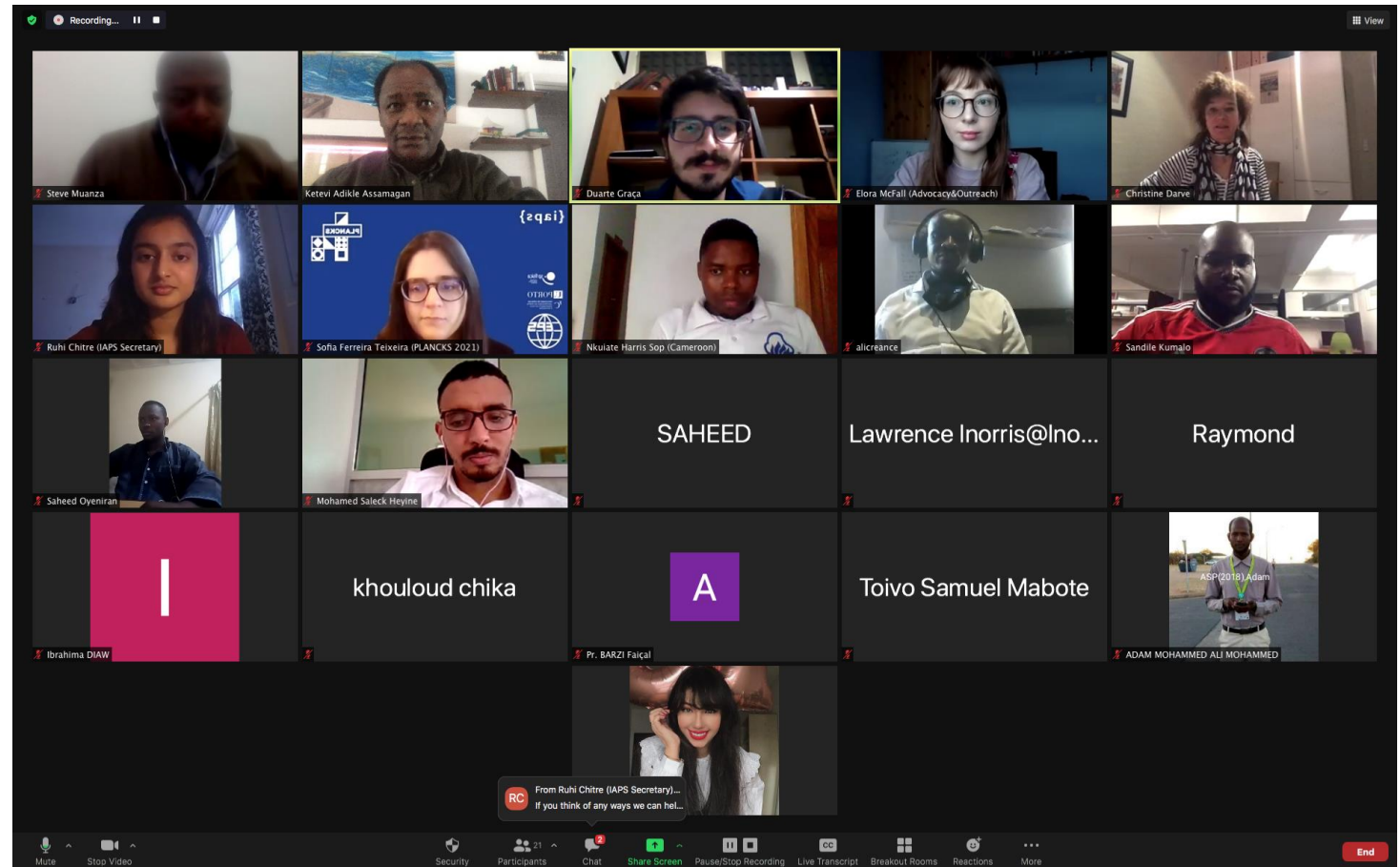
Being able to manage the space allocated to the ATLAS dCache despite the large amount of data that comes into it is a great challenge for analysts at the Brookhaven National Laboratory. The main goal of our work is to classify these data according to their importance for physics. To do this, we have, at first glance simulating data in the ideal case, discussing experiences which in reality have made it possible to obtain them. And we then apply a Machine Learning algorithm to our simulated data in order to find solve the storage issue.

**Lucrèce Zahoundo (Bénin), alumnus ASP2018**  
**MSc thesis study done using Deep Learning Tools**

**Many other cases like this**

# 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

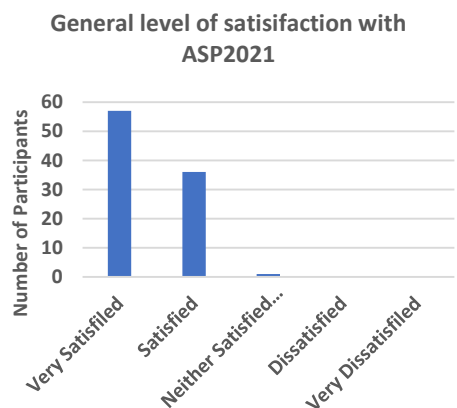
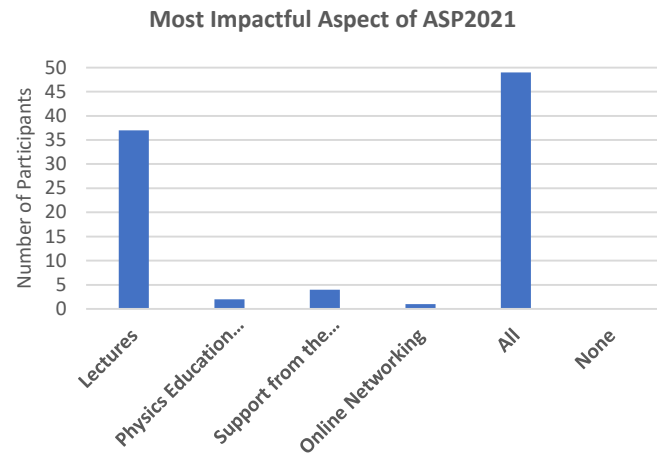
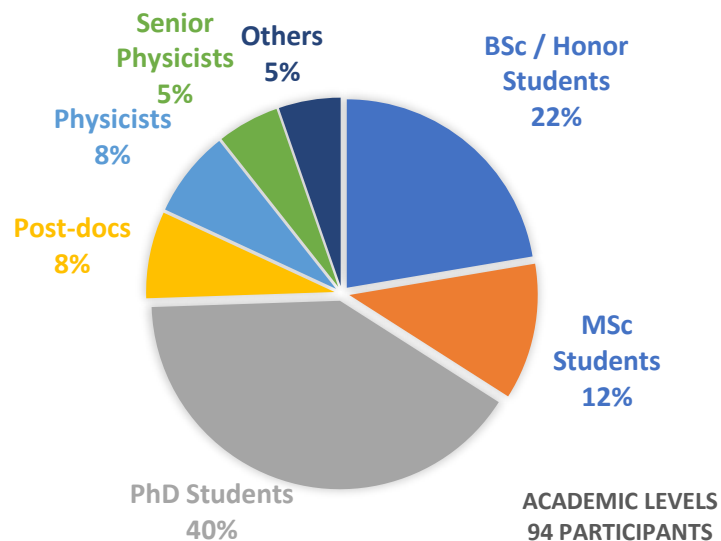


September 2, 2021 — joint session with the International Association of Physics Students (IAPS)

Dr. Kétévi A. Assamagan (BNL)

# ASP2021, July 19-30, 2021; online school

- **ASP2020-Morocco**
  - Cancelled because of COVID-19
  - A 2-week online version organized as ASP2021



## THE SIXTH BIENNIAL

 African School of Fundamental Physics and Applications

July 19-30, 2021

Virtual Edition



[www.africanschoolofphysics.org](http://www.africanschoolofphysics.org)





# Second African Conference on Fundamental and Applied Physics ACP2021

- **ACP2021 should have been the 3<sup>rd</sup> week of ASP2021**
  - We thought ACP2021 would in-person in December 2021
  - Postponed to March 7-11, 2022
  - Changed to virtual because of Omicron

**THE SECOND BIENNIAL AFRICAN CONFERENCE ON FUNDAMENTAL PHYSICS AND APPLICATIONS**  
7-11 March 2022  
Co-organized by Mohammed V University in Rabat & Cadi Ayyad University in Marrakesh, Morocco  
at Faculty of Science Semlalia, Marrakesh

**ASP**  
Ministère de l'Éducation Nationale, de la Formation professionnelle, de l'Enseignement Supérieur et de la Recherche Scientifique

**ACP**  
To increase capacity development in fundamental physics and related applications in Africa. The ASP has evolved to be much more than a school. It is a program of actions with directed ethos toward physics as an engine for development in Africa

**SCIENTIFIC PROGRAM**  
► TOPICS

- Astrophysics & Cosmology
- Nuclear & Particle Physics
- Accelerator, Radiation & Medical Physics
- Renewable Energies & Energy Efficiency
- Materials Physics
- High Performance Computing
- Physics Education
- Physics Communication
- Quantum Information

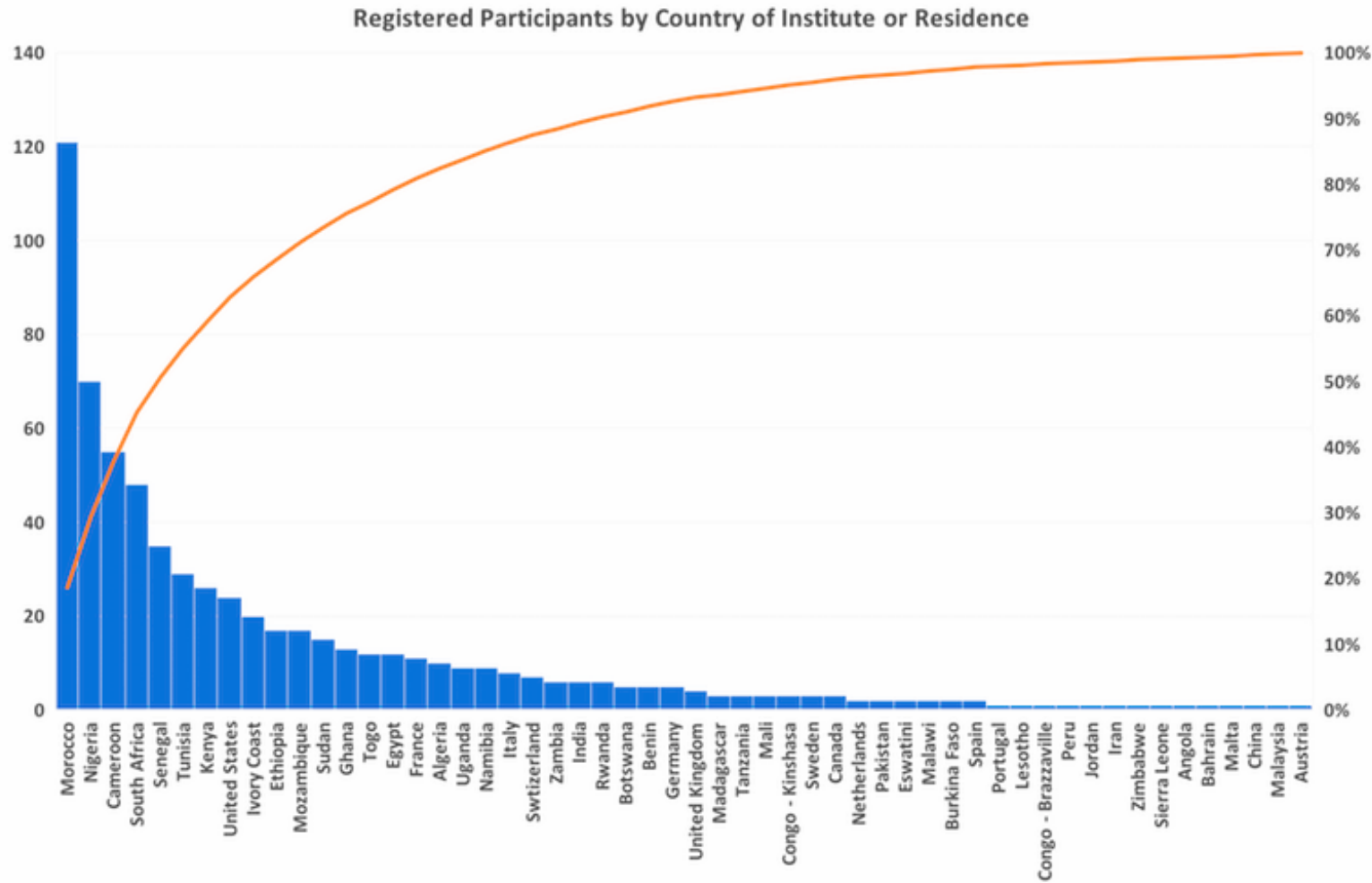
[www.africanschoolofphysics.org/acp2020/](http://www.africanschoolofphysics.org/acp2020/)





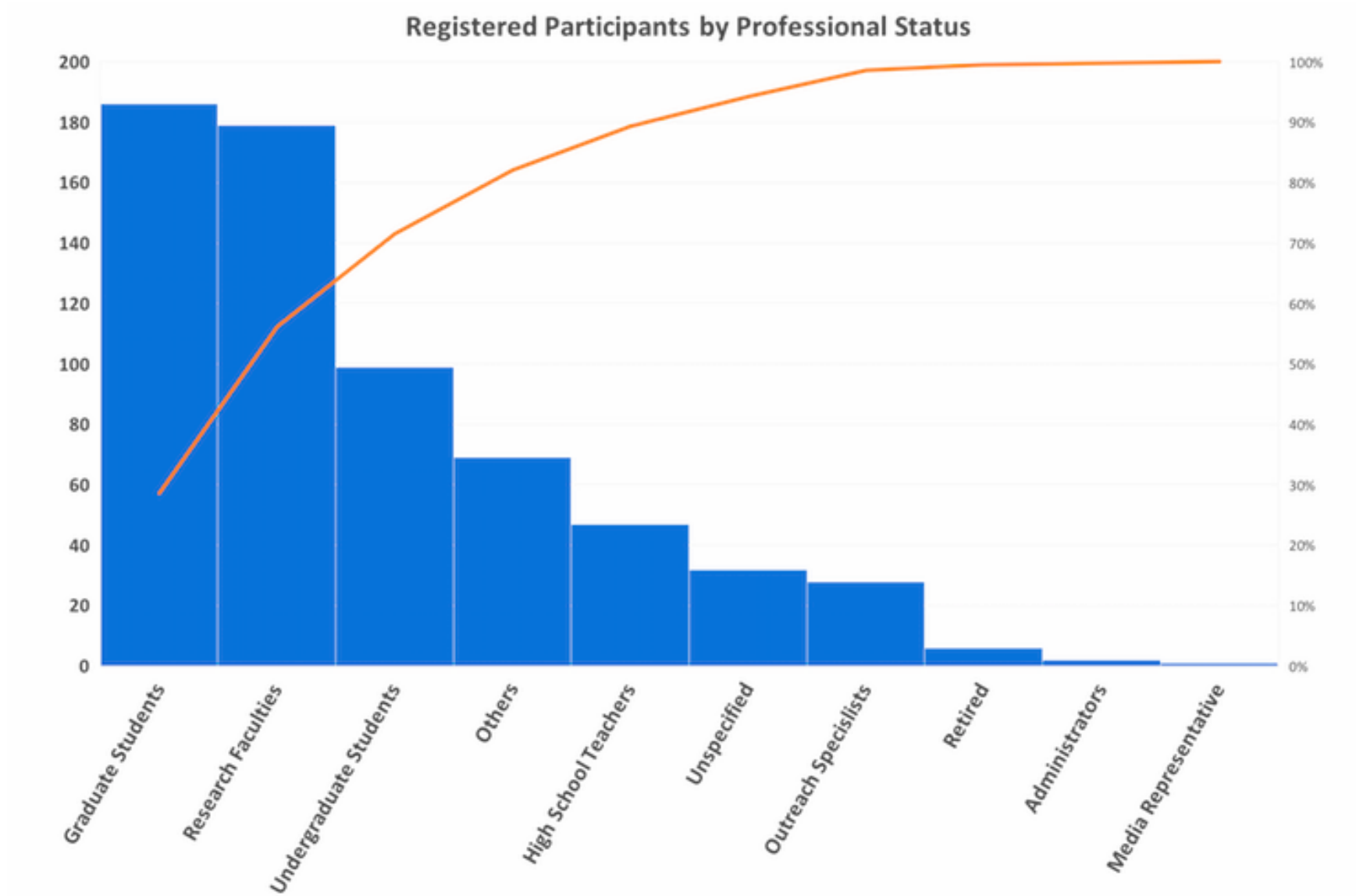
# TOTAL: 649

# ACP2021, March 7-11, 2022

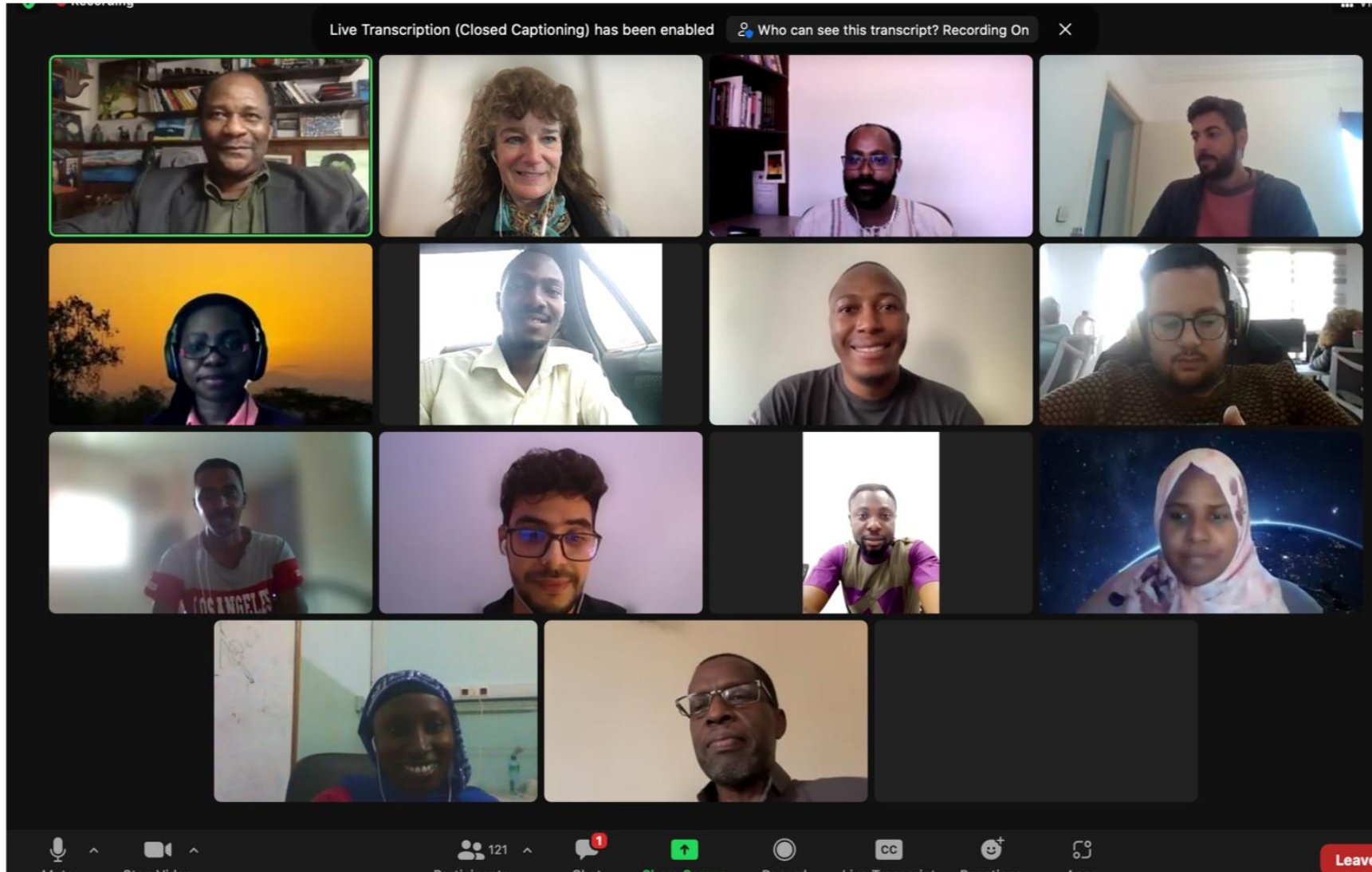


**African countries where 563 participants have institutional affiliations**

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



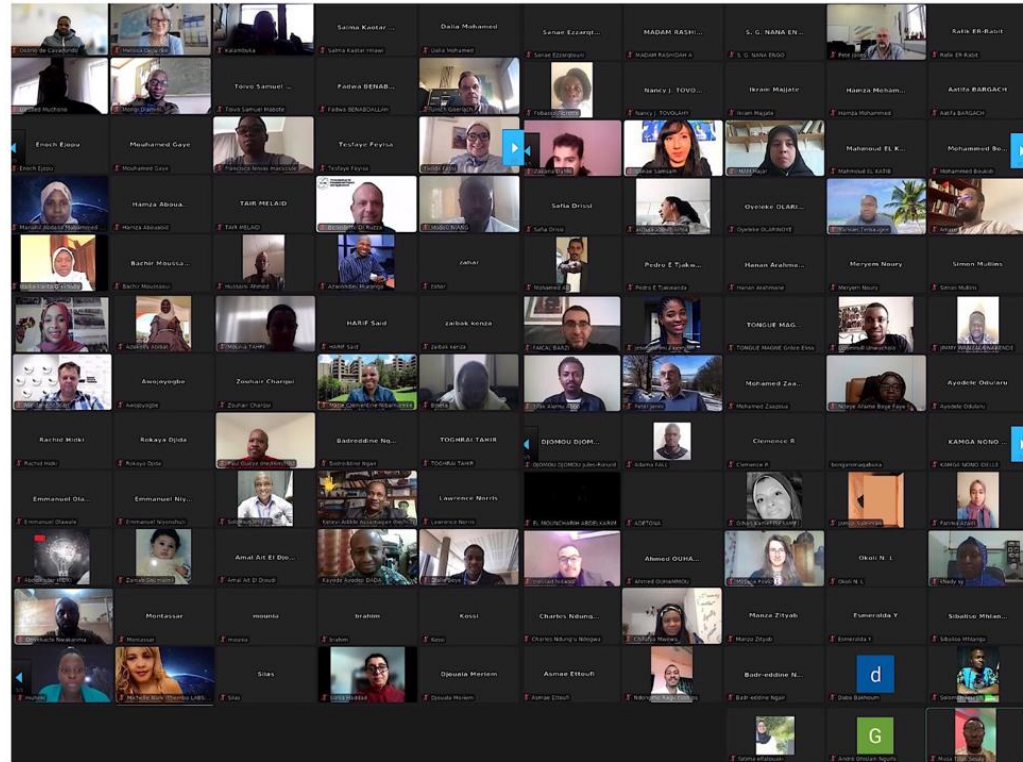
# Winners of contests of best oral and poster presentations ACP2021, March 7-11, 2022—photo with selection committee members



# Participant group photo, March 11, 2022

## The Second Biennial African Conference on Fundamental Physics and Applications

March 7-11, 2022



# ASP2022/ ACP2022— South Africa

- The next host country of ASP is selected 2.5 years earlier
- The next host invited to join the organization of current ASP
- South Africa was selected in December 2019 to host ASP2022
- At Nelson Mandela University in
- See the next talk by Prof. Azwinndini Muronga

# Conclusions

- **ASP was started in 2010**
  - as a 3-week biennial event in high energy physics (and applications) for university students
- **It has since been extended to include, in addition**
  - 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

# Conclusions

**ASP was started in 2010, but has since evolved to be much more than a school—it has grown to become a program of continuous activities with directed ethos towards physics as an engine for development in Africa.**