DEI

Brookhaven National Laboratory

U.S. DEPARTMENT OF ENERGY

Kétévi A. Assamagan

P5 Townhall, April 2023

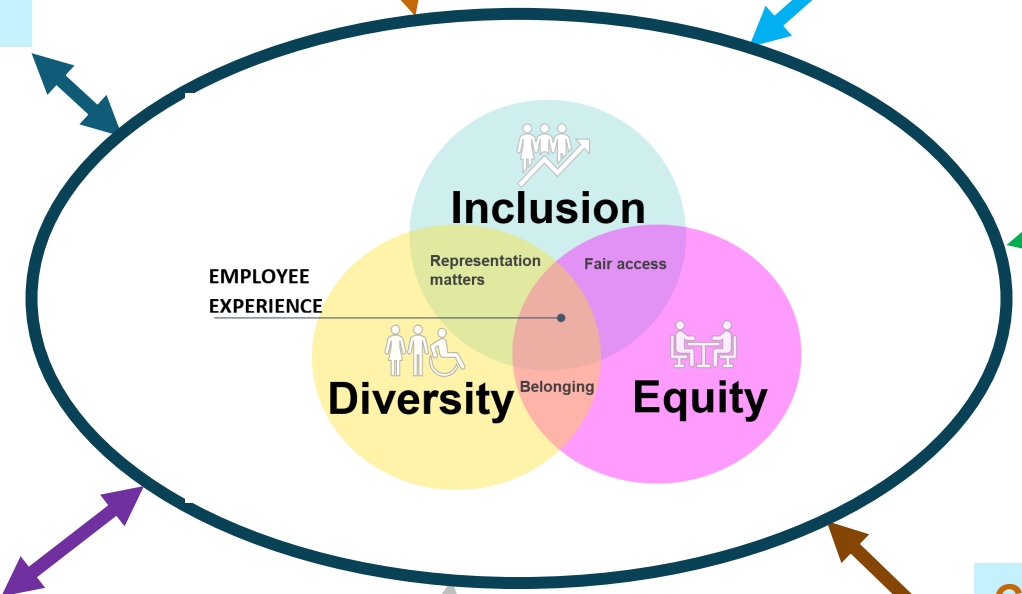
@BrookhavenLab

Outline

- DEI in Snowmass 2021
- DEI at BNL
- Why should the US support physics education and research in emerging countries?
  - The case of African countries
- Conclusions

Brookhaven National Laboratory

DEI is cross-cutting…



Public Education & Outreach

Public Policy & Government Engagement

Physics Education

Career pipeline Development & Retention

Applications & Industry

Climate of the field; excellence & equity in leadership

Environmental & Societal Impacts

How to improve diversity, equity and inclusion in HEP

Snowmass Community Engagement

Activities in Snowmass 2021 were organized into 10 frontiers, one of which was Community Engagement (CEF)

CEF was further subdivided into 7 topical groups, namely

- Application and Industry
- Career pipeline and development
- **Diversity, Equity and Inclusion**
- Physics Education
- Public Education and Outreach
- Public Policy and Government Engagement
- Environmental and Societal Impacts

Each topical group had 2-4 co-conveners. The conveners of CEF were Kétévi A. Assamagan (BNL) and Breese Quinn (University of Mississippi)

I was also appointed to the DPF Ethics Advisory Committee where I contributed to the development of the DPF code of conduct and core principle guidelines—I also served on the code of conduct response subcommittee to address violations

I am a staff physicist at BNL, working on ATLAS. I am not a DEI expert

Snowmass Community Engagement

- CEF received over 100 Letters of Interest (LOI)
- In addition, we organized regular meetings, town hall discussions, expert-panel discussions, workshops and surveys to collect further inputs from the community
- All the above were condensed into 35 contributed (white) papers developed within CEF
  - Details on the CEF white papers are available here, https://snowmass21.org/submissions/cef
- Furthermore, each topical group prepared a report of their activities
- Finally, at the frontier level, we also prepared a frontier report
- The white papers, topical group reports, and frontier report contain recommendations to address the issues studied within the scope of CEF.

Snowmass 2021 work on DEI

Report of the 2021 U.S. Community Study on the Future of Particle Physics (Snowmass 2021) Summary Chapter
https://arxiv.org/abs/2301.06581

Community Engagement Frontier Report
https://arxiv.org/abs/2211.13210

Diversity, Equity and Inclusion topical group report
https://arxiv.org/pdf/2209.12377.pdf

The 11 canons of Community Engagement—impacts on DEI

1. Climate within
2. Work-life balance
3. Accessibility
4. Education, Career Pipeline & Retention
5. Policies & Government Engagement
6. Outreach
7. Societal Engagements
8. International Engagements
9. Technology Transfers
10. Individual Participation
11. Implementation & Progress Monitoring

See additional materials in backup for top level Snowmass recommendations in these areas

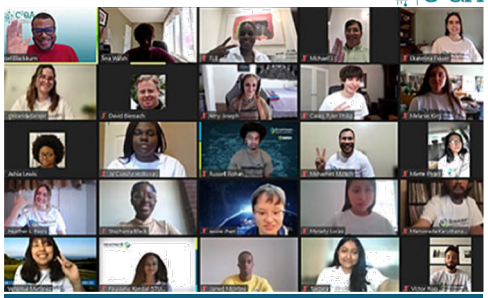
Institutional Efforts

- Institutions have been making efforts in these areas
  - e.g. NSF and DOE; recent initiatives from DOE
    - Reaching a New Energy Sciences Workforce (RENEW)
    - Funding for Accelerated, Inclusive Research (FAIR)
    - Promoting Inclusive and Equitable Research (PIER)
- What is lacking is a coherent approach where best practices are shared and encouraged
  - The HEP community should create the framework where a coherent approach towards improving DEI can flourish.
- What are some of the things we are doing at BNL?

DEI/Workforce Development
Evolving the Lab's Culture and Developing a Diverse Workforce

Evolve the Lab's Culture—Community Engagement starts by improving the climate within

- **Staff Engagement programs:**
  - Diverse Perspectives (1-min. video on DEIA)
  - Quarterly Themes on DEIA Topics for all staff;
  - Lab Connections – Lunch with Leaders and both in-person and virtual Staff
- **The Lab's DEIA effort is integrated into the planning of mission initiatives (PIER, DEIA goals for staff).**
- **Continuing Lab-wide, facilitated, virtual conversations on DEIA with consultant**
- **Holding all staff accountable for DEI goals; providing guidance for impactful goals**
- **Develop Wellness programs for staff both in-person and remotely**
- **Since COVID onset, 963 employees hired: 32.4% women; 17.3% URM**
  - Employees as of 03/31/23: 27.5% women; 13.3% URM



Screenshot from Quantum Summer School

Expand "Circle of Peers" DEI Strategy

- **Cultivating substantive relationships in workforce development and research with MSIs, in alignment with new DOE initiatives – RENEW & FAIR**
- **Minority Professional Associations Program – Associations Expo June 15th & 16**
  - Co-hosted National Society of Black Physicists conference (2020, 2021) and American Association for Blacks in Energy course for high school URMs


First NPT Cohort at STAR last year

"Grow Your Own" DEI Strategy

- **Vibrant intern program: 44% female; 37% URGs (FY16 – FY22)**
- **Partner in Nuclear Physics Traineeship (NPT) and NuSTEAM programs; last summer's C²QA Summer School participants: 50% women; ~90% URMs**

Brookhaven Women in Science (BWIS)

for Equal Advancement BWIS

A diverse and inclusive community that promotes equal opportunity and advancement for all women in support of world-class science. Everyone is welcome!

We sponsor workshops, speaker series, and networking events.

Awards & scholarships:

- Renate W. Chasman Award (STEM)
- Joanna Fowler Award (chemical and biochemical sciences)
- Gertrude Scharff-Goldhaber Award (physics)

Outreach events:

- Girl Power in STEM
- High School Career Day

Brookhaven National Laboratory

Broader Engagement within the US (1)

BNL opening doors to broader community participation

- Support for QuarkNet
  - Long Island teachers development program. Yearly workshops co-organized with Stony Brook
  - Long Island high school students participation in international masterclasses
- Education and Public Outreach
  - Engagement towards MSI and URM. New paradigm in public engagements to improve impact: building lasting relationships, understanding the interests of the communities, involving the communities in organizing programs
  - BNL support for the US-ATLAS SUPER (Summer Undergraduate Program for Exceptional Researchers) broaden to non-US-ATLAS MSI and URM
- Office of Education Programs
  - Science Undergraduate Laboratory Internships (SULI), Research Experience for Undergraduate (REU), hosting summer high school students
  - BNL Summer Sundays for local community engagements. Serving as lecturers or co-organizers of these activities
- Summer lecture series
- MoUs and collaborations with MSI
  - in research and workforce development: e.g., April 19-20, 2023, BNL day@ NC A&T

Broader Engagement within the US (2)

NuSTEAM - Nuclear Science in Texas to Enhance and Advance Minorities

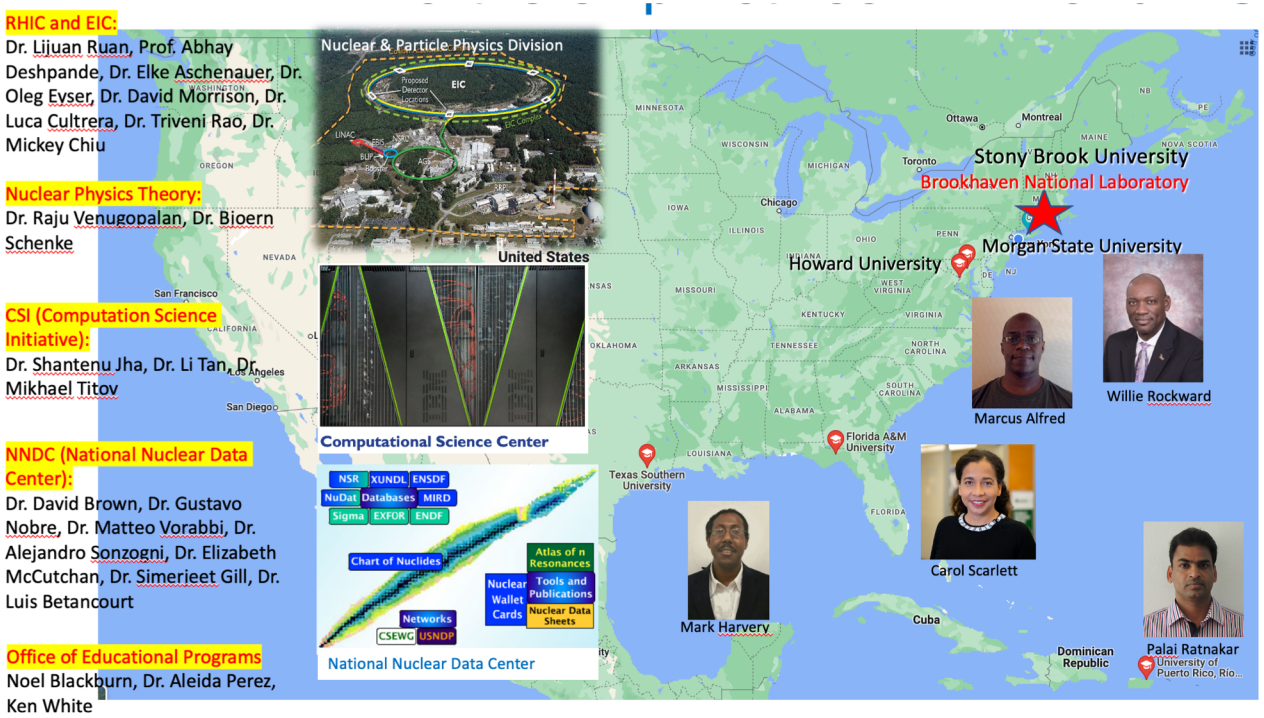
- Is a collaboration between BNL-MSI for undergraduate traineeship to broaden and diversify the NP community;
- 9 students in 2022, onsite (9 students in 2021, remote)
- 2 weeks of training program at BNL with STAR and EDG https://indico.bnl.gov/event/16202/
- Electronics & Detector Group (EDG)
  - Tours: LAr R&D lab, Cold electronics lab, Liquid scintillator lab, Water-based liquid scintillator lab
  - Lectures: LArTPC fundamentals, data analysis, AI/ML applications, etc.

Help with RENEW proposals

- NuPUMAS (Neutrino Physics for Undergraduate Minority Advancement in Science) with U. Houston and TAMU-CC. BNL collaborators on NuPUMAS
- LEAP UP (Long Island High Energy and Astrophysics Undergraduate Pipeline) with SUNY old Westbury. BNL is co-PI on LEAP UP

BNL-MSI PREP-NP Program

Program for Research Excellence and Preparation in NP—BNL/MSI collaborations as a bridge for URM undergraduates and grad. school



- **Started in 2021 with 10 fellows to access talent for NP research in URM**
- **Funded by DOE ONP's "Research Traineeships to Broaden and Diversify Nuclear Physics Program"**

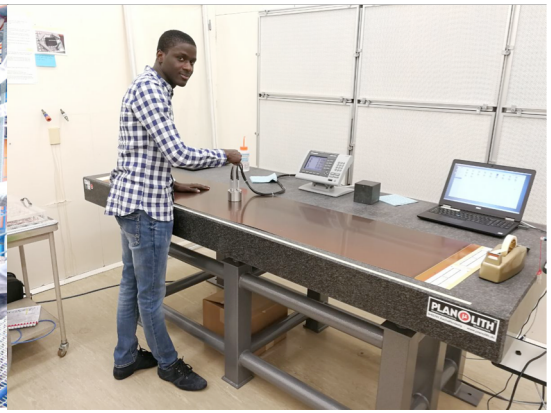
- Student research fellows are paired with BNL scientist and MSI University Mentor for 1 to 2 years, full time during summer and 16 hrs/wk during the academic semesters
- Efficiently leverages existing NP infrastructure and resources (people and equipment) at BNL with talent pool at MSI's and across the country
- Fellows work on a cutting-edge NP research project and learn the tools and skills of a scientist while being supported by mentors
- Program is like a SULI++ or "mini grad student experience", and builds scientific kills and confidence

Brookhaven National Laboratory

BNL International Engagements

Support African School of Physics (ASP)

- Contributions to the ASP budget to support African students participation
- Coverage for BNL staff lecturers in the organization, lecturing and mentoring of African students
- Support African institutes in DUNE and ATLAS



Chilufya Mwewa (Zambia) & Diallo Boye (Senegal), BNL post-docs. They started their HEP journeys through ASP

- Coverage for African students for 3-6 months visits for research at BNL

Brookhaven National Laboratory

We appreciate the DOE HEP support for the program

ASP Alumni at BNL 2019-2023

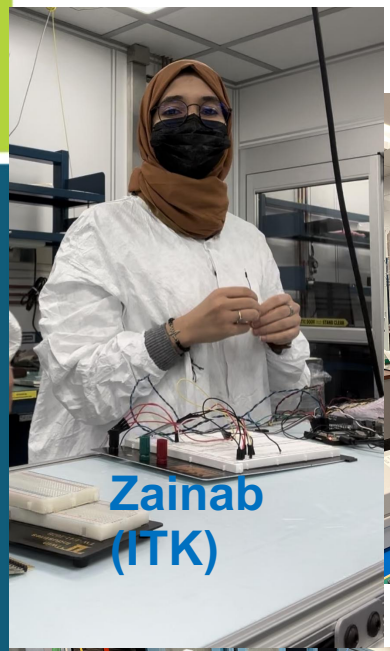
June-December 2019. From left:

In front, Christelle Ekosso (Cameroon), Dr. Mounia Laassiri (Morocco); standing, Diallo Boye (Senegal), Dr. Somiealo Azote (Togo), Jesutofunmi Fajemisin (Nigeria), Hassnae El Jarrari (Morocco), Dr. Kétévi A. Assamagan, Raymond Yogo (Kenya), and Yves Kini (Burkina Faso). **Heba Sami Abdulrahman (Egypt), not in the figure, arrived in September 2019.**

July 2022 – February 2023. From left:
Asmaa Aboulhorma (Morocco),
Zainab Soumaimi (Morocco),
Kétévi A. Assamagan,
Antalia Rabarisoa (Madagascar),
Xola Mapekula (South Africa),
Kayode Dada (Nigeria),
Rado Fanantenana (Madagascar)

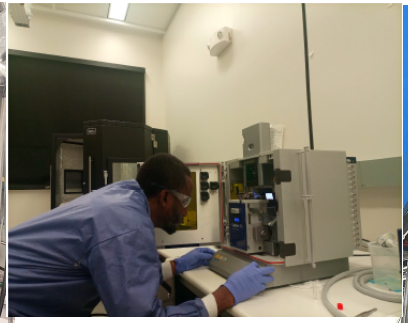
Brookhaven National Laboratory

ASP Alumni short-term visits to BNL for research
Cohort of August 2022-February 2023

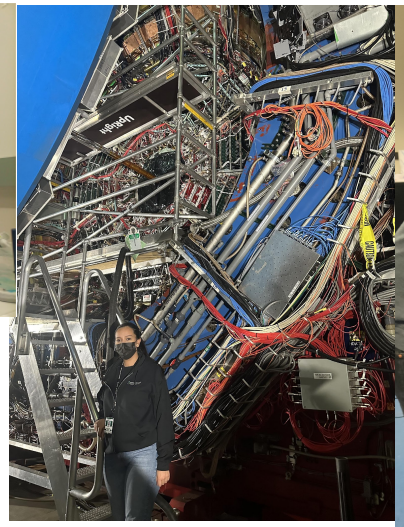


Zainab (ITK)

Rado (DUNE)

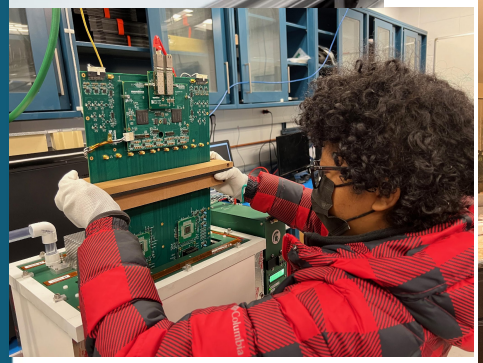


Kayode (CFN)



Asmaa (ITK)

Xola (LGAD)



Antalia (DUNE)

From left:
Asmaa Aboulhorma (Morocco),
Zainab Soumaimi (Morocco),
Dr. Kétévi A. Assamagan,
Antalia Rabarisoa (Madagascar),
Xola Mapekula (South Africa),
Dr. Kayode Dada (Nigeria),
Rado Fanantenana (Madagascar)

Brookhaven National Laboratory

“I didn’t know a physicist could look like you!”

“I didn’t know a physicist could look like you. I always thought they were male, with crazy hair and dusty lab coats. But you… are a young woman, dress well, look normal, and don’t even need a lab coat”. https://blog.hip.fi/i-didnt-know-a-physicist-could-look-like-you/

ASP2022 Geant4 Tutorial for Students

ASP2022 High School Outreach

Dr. Mounia Laassiri attended ASP2016 as a student; she returned to ASP2022 as a lecturer

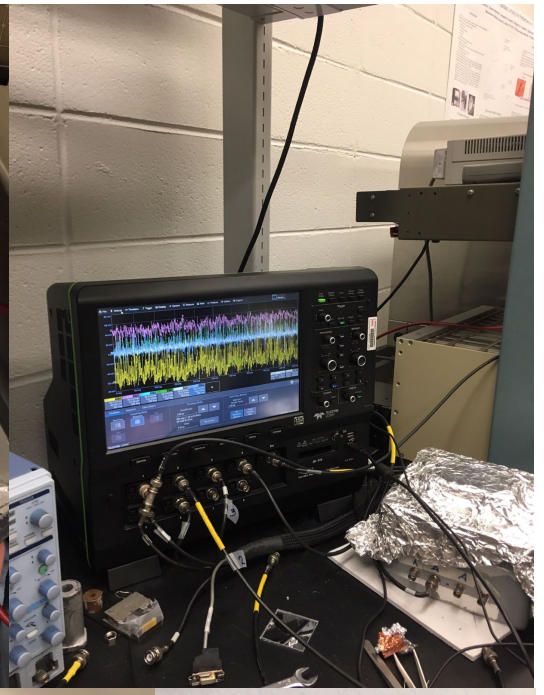
ASP2022 Participants

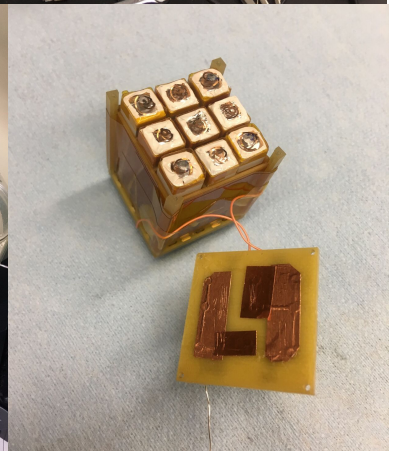
Brookhaven National Laboratory

“I didn’t know a physicist could look like you!”

Dr. Mounia Laassiri
(from Morocco)

- Alumna of ASP2016
- Short-term for research to BNL, Jul-Dec 2019
- Post-doc at HIF, Finland
- Lecturer at ASP2022
- March 2023 visit to BNL—





Mounia collaborating with the BNL Instrumentation Division to study the usage of Cadmium-Zinc-Telluride or germanium detectors for position-sensitive gamma ray detection for 3D imaging with Passive Gamma Emission Tomography

Brookhaven National Laboratory

Why should the US care about HEP in Africa and Latin America?

- It is a legitimate question. Snowmass white paper to answer that question; arXiv:2203.10060
  - U.S. offer studies or programs to improve international engagements and cultural awareness and sensitivities, funded through the Title VI Act
    - Priority placed by the federal government on area studies that serve national interests
  - The UN proclaimed 2022 as the ”international year of basic sciences for sustainable development, to improve the quality of life for people all over the world”
    - Constructive engagements with developing countries, to improve their physics education and research programs, for the benefit of all humankind

Snowmass Recommendations — Engagements with Emerging Countries

Engagement with emerging countries needs improvement for international diversity and pipeline development in HEP, and the global impact and visibility of HEP efforts.

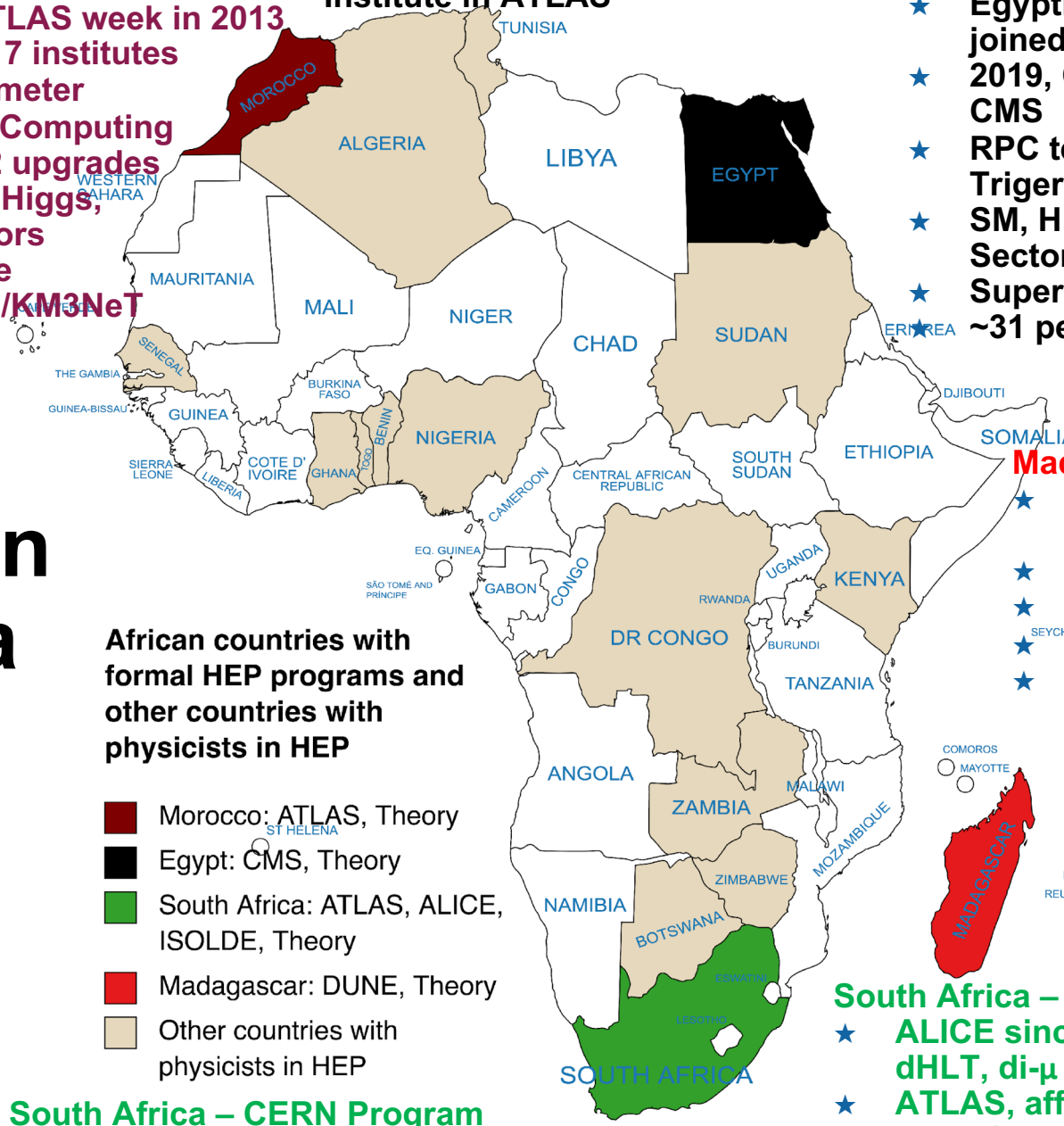
- Universities, laboratories and HEP groups should improve and sustain international outreach, partnerships, schools, workshops, conferences, training, short-visits for research, and development of research consortia.
- Mechanisms should be developed to facilitate the participation of colleagues from developing countries.
- Large international research collaborations should improve efforts to facilitate the integration and participation of research groups from developing countries and support efforts to foster HEP in these countries.

HEP in Africa

Moroccan HEP Cluster
- ★ Joined ATLAS in 1996
- ★ Hosted ATLAS week in 2013
- ★ Cluster of 7 institutes
- ★ EM Calorimeter
- ★ Software, Computing
- ★ Phase 1, 2 upgrades
- ★ SM, BSM, Higgs,
- ★ Dark Sectors
- ★ ~40 people
- ★ ANTARES/KM3NeT

Algeria: Technical Associate Institute in ATLAS

Egypt
- ★ Egyptian Network of HEP joined CMS in 2010
- ★ 2019, CHEP-FU member of CMS
- ★ RPC tests, assembly, Triger; GEM
- ★ SM, Higgs, BSM, Dark Sectors
- ★ Super computer lab
- ★ ~31 people



African countries with formal HEP programs and other countries with physicists in HEP

- Morocco: ATLAS, Theory
- Egypt: CMS, Theory
- South Africa: ATLAS, ALICE, ISOLDE, Theory
- Madagascar: DUNE, Theory
- Other countries with physicists in HEP

Madagascar
- ★ Member of DUNE in 2016
- ★ Near detector CDR
- ★ 7 people
- ★ HEP phenomenology
- ★ HEPMAD conference series since 2001

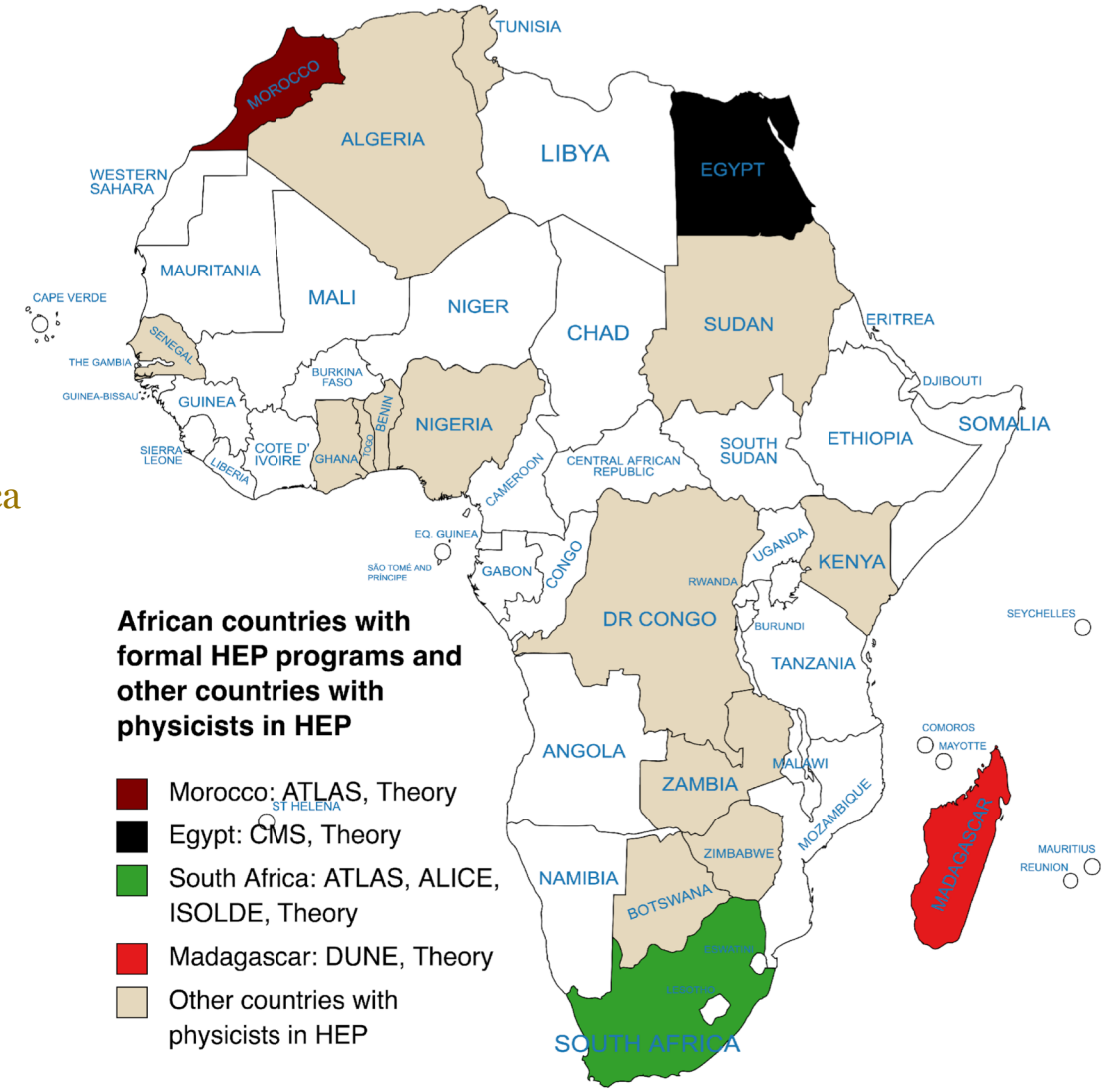
South Africa – CERN Program
- ★ ALICE since 2001, 3 institutes: dHLT, di-μ studies, upgrade
- ★ ATLAS, affiliation to BNL 2008-2010, full member since 2010. Significant group, rich physics

South Africa – CERN Program
- ★ ISOLDE
- ★ Theory, computing

HEP in Africa
Countries with Physicists in HEP

Recent Development
EIC: Senegal, South Africa

Work In progress
Senegal, Togo → ATLAS
Zambia → EIC



Brookhaven National Laboratory

Conclusions

- Many institutions have been making efforts in DEI areas; what is lacking is a coherent approach where best practices are shared and encouraged. The HEP community should create the framework where a coherent approach towards improving the climate can flourish.

- In its prioritization of projects, P5 could recommend, where relevant, implementation of the Community Engagement goals in project planning, development, maintenance and operation.

- DPF should establish a permanent Community Engagement Advocacy Committee. The charge of a such a committee would be to facilitate the community coordination of implementation, best-practice sharing, rewards, encouragements and progress monitoring and reporting.

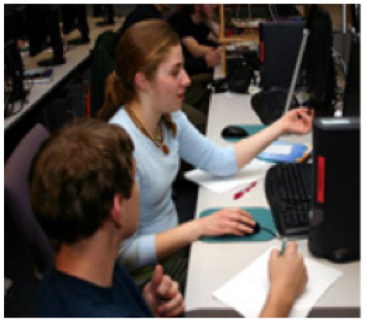
- "The US should care about physics in developing countries to support national interests, values and ideals, with the collateral benefit of seeding self-sustaining development." arXiv:2203.10060

Additional materials

DEI at BNL — Highlights

Community Engagement starts by improving climate within

- Involvement in DEI committees, councils; Leona Woods lectureship; BNL Women in Science; NPP Physicist/DEI, Education, and Outreach Coordinator; Goldhaber Fellowship is partially funded by the NPP DEI Council for URM; the African-American Advancement Group; DEI Quarterly Themes Program; etc.
- Many staff members took part in BNL Scientific & Engineering Development Program
- Active participation in mentors/mentees mentorship programs
- BNL makes the Top 20 Government Employer List for 2023 in the 32nd Annual Equal Opportunity Magazine
- BNL named by the STEM workforce magazine as a top employer: https://www.bnl.gov/newsroom/news.php?a=220795
- BNL became an APS bridge program member with DEI Office and Physics Dept leading/coordinating



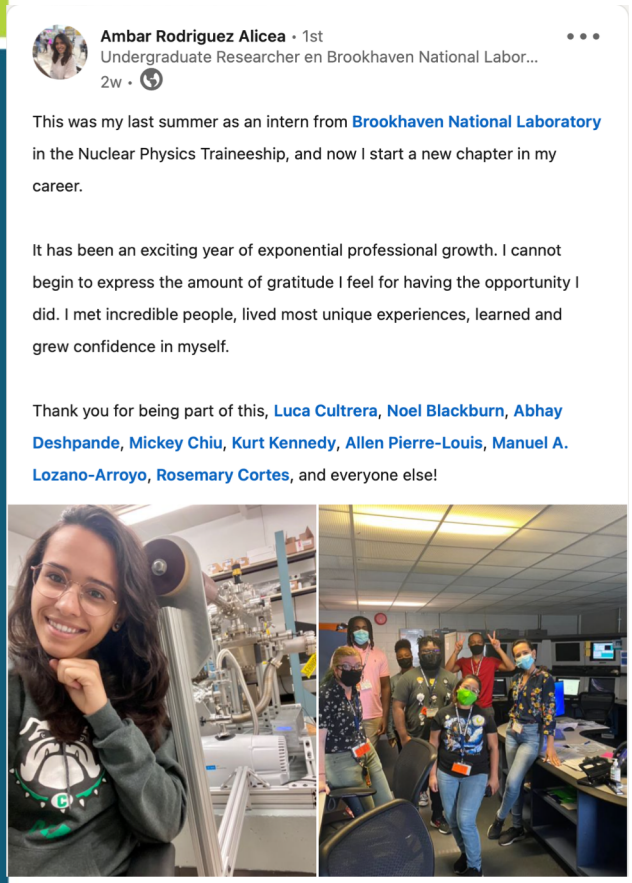
Brookhaven National Laboratory

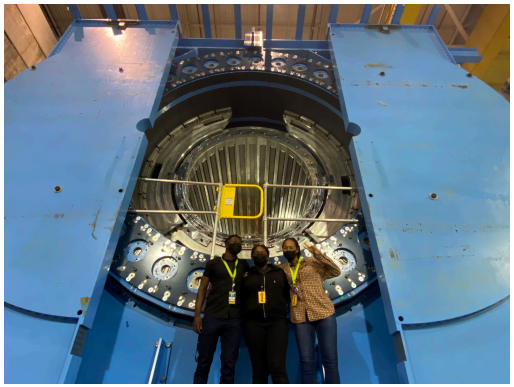
HEP Community Engagement with impacts on DEI

The objective

- Develop strategic engagements with our communities in order to draw support for and strengthen the field of high energy physics (HEP), while playing key roles in serving these communities
- Communicate our field's value
- Maximize impact on global socioeconomic development
- Open doors to broader community participation in HEP

PREP-NP Program Results for the Fellows





- Near conclusion of pilot, 8/10 fellows are in or will be going to graduate school

Graduate Program	Mentor
Stony Brook MS Physics	Abhay Deshpande
Stony Brook MS Physics	Abday Deshpande
Michigan St PhD Physics	Luca Cultrera
Univ of Puerto Rico MS Physics	Luis Betancourt

Graduate Program	Mentor
Morgan St MS Math	Matteo Vorabbi
Michigan St PhD Biophysics	Matteo Vorabbi/David Brown
Michigan MS Applied Physics (Imes-Moore Fellowship)	Mickey Chiu
Vanderbilt Univ PhD Physics	Mickey Chiu

- 2 papers submitted for publication, at least 2 more expected in the coming year

BNL Broader Engagement within the US (3)

CSI Building Connections with Impact

Prof. Mulugeta T. Dugda, sustained engagement via WDTS Champions Outreach, NSF's LSAMP, and DOE's Visiting Faculty programs. Resulted in a successful research proposal to NSF.

Prof. Tanzima Islam, first contact through Sustainable Horizon's lecture series, followed by ECP Sustainable Research Pathways to High Performance Computing Internship program. Received DOE ASCR ECA this summer, part of newly funded ASCR research project with BNL.

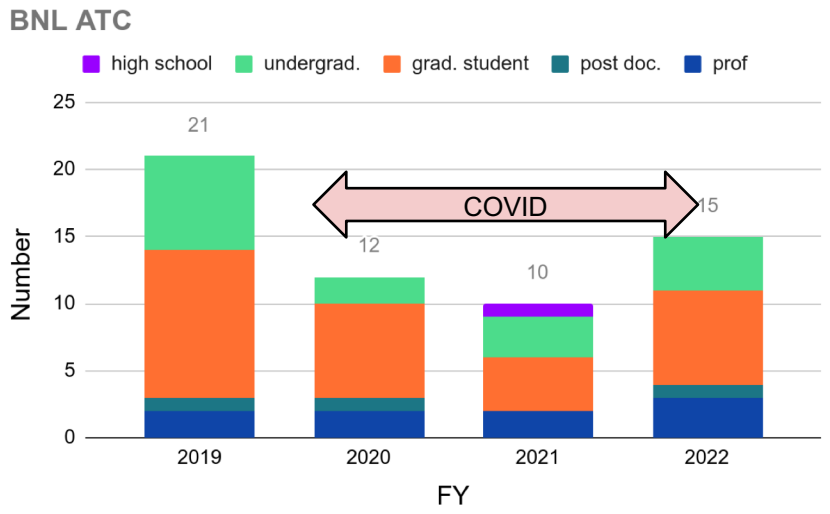
Prof. Remi Megret, Ongoing AI driven Computer Vision research collaboration involving Transmission Electron Microscopy. Aiming beyond computer vision research to expand visiting faculty program and student internships. Several joint papers.

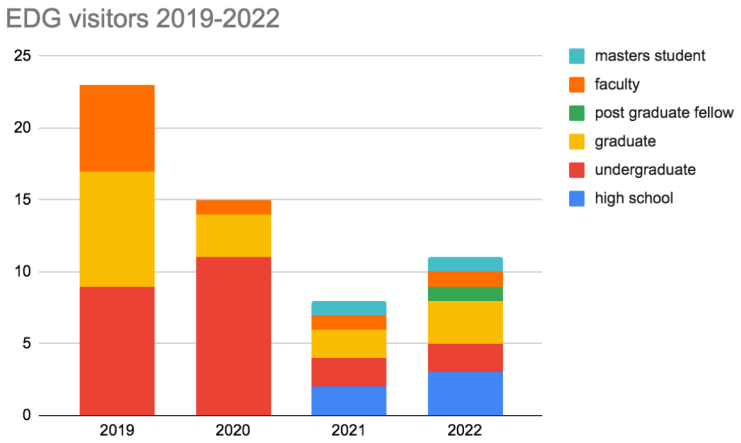
Ongoing collaborations with **Texas A&M** & **Prairie View A&M** several joint funded DOE projects. Part of **Nuclear Physics Traineeship** Project with the University of Puerto Rico, Howard University, Morgan State University, Texas Southern University, and Florida A&M University

Facility Support for HEP Communities

- **The ATLAS Centers (ATC)**
  - BNL is one of four sites
  - COVID-19 depressed number of ATLAS visitors to BNL
  - Most visitors during FY20/FY21 were for Upgrade activities
  - Slowly returning to normal…

Visitors at the Electronics & Detector Group





Brookhaven National Laboratory

BNL Broader Engagement within the US (4)

Veterans and people with disabilities

- Shresht Joshi, a developing leader and veteran in ATRO OPME, is playing a critical program management role on LuSee Night and is the leader of ATRO's DEI council.

Magnets

- Engagement with the ELEVATE program as part of the Applied Superconductivity conference
- Engagement with IEEE Women in Science
- Broad MoU with FAMU in progress. Magnet Division is collaborating FAMU for magnets in axion interactions impacting nuclear decay

Summer students in Instrumentation Division presenting their final projects in August 2022

Howard University team visiting the Instrumentation Division in June 2022

(1) Climate of the field

The climate of the field needs more work:

- The HEP community should improve strategic planning procedures, science workplace norms and culture, ethics and code of conduct guidelines and procedures to encourage adherence to and address violations thereof, and ultimately create an inclusive climate that ensures diversity and equity.

- Achieving these objectives will necessitate partnership with scholars, professionals, and other experts in several disciplines, including but not limited to anti-racism, critical race theory, and social science.

- Improving the climate also consists of implementing practices and programs for participation in HEP by non-R1 institutions.

- Many institutions have been making efforts in these areas; what is lacking is a coherent approach where best practices are shared and encouraged. The HEP community should create the framework where a coherent approach towards improving the climate can flourish.

(2) Work-life balance

Research institutes and universities should do more to maintain the highest standard in work-life balance and mental health of staff. Proper training of staff should be developed to integrate productive work habits that encourage a balance between professional expectations and private affairs, and good mental health.

(3) Accessibility

Funding agencies, laboratories, universities, professional societies and event organizers should do more to make events accessible to all community members, including those with disabilities. Planning for events should include, from the very beginning, effective coverage for accessibility.

(4) Physics Education & Career Pipeline Development

- The lack of diversity in HEP has been linked to, not only the issue of climate, but also to the lack proper education and pipeline development. A diverse pool of candidates cannot be expected at the tertiary or higher levels of HEP engagement, in spite of best efforts and practices, if efforts were not made as far back as the K-12 and university undergraduate levels, to nurture the pipeline.

- It is therefore necessary for the HEP community to create effective programs to support pupils, teachers and students in their local communities, to develop and maintain interests in physics. Educational institutes should develop or expand programs to prepare students with the skills needed for HEP and related applications.

- Our field cannot absorb all the early career members that it produces; funding agencies, laboratories and universities should work together and create training, skills and career opportunities for transitions to, and success in, non-academic environments.

(5) Technology Transfers

Technology transfers between HEP and industry are necessary for the socioeconomic impacts of HEP research and the integration of cutting-edge industrial developments to advance HEP goals.

- Funding agencies and laboratories should improve policies and programs to foster technology transfers and collaborative programs with industry on targeted technology development beneficial for HEP.
- Laboratories and universities should improve targeted partnerships on HEP projects.
- The HEP community should make efforts to maintain connections with networks of alumni to facilitate HEP–industry relations and HEP advocacy.

(6) Public Policy & Government Engagement

- The HEP community should be proactive in providing resources to sustain and grow the annual HEP Congressional advocacy efforts.
- HEP groups should coordinate efforts by laboratories and universities in order to extend advocacy to the federal executive branch, state and local governments.
- Considering that HEP research draws international collaborations, HEP groups should improve concerted efforts toward international advocacy to facilitate the reach of HEP and, in particular, to support HEP communities of developing countries.
- HEP advocacy for non-HEP funding issues is highly encouraged and can be beneficial for HEP goals.

(7) Physics Outreach

- Funding agencies, universities and research institutes should encourage staff to spend appropriate time on outreach, DEI and climate improvement efforts. Such time spent should be included favorably in staff evaluation, career progressions and grant evaluations.

- In designing outreach programs, it is important to understand the needs of the audience, include its members in the design of programming and pay attention to its interest – the HEP community should take a foundational approach to successful outreach by building lasting relationships with target communities. Successful outreach programs cannot be transactional with the target communities.

(8) Environmental & Societal Impacts

- Laboratories, universities and research collaborations should work to improve environmental impacts of HEP activities, including the design, development and operation of HEP research facilities and detectors. Good community relations are important to integrate community needs and feedback in site selections, and subsequently, operation of HEP facilities.

- HEP communities should build synergistic collaborations with other communities to draw on a broader spectrum of funding sources for work on technologies that could benefit HEP.

(9) Engagements with Emerging Countries

Engagement with emerging countries needs improvement for international diversity and pipeline development in HEP, and the global impact and visibility of HEP efforts.

- Universities, laboratories and HEP groups should improve and sustain international outreach, partnerships, schools, workshops, conferences, training, short-visits for research, and development of research consortia.

- Mechanisms should be developed to facilitate the participation of colleagues from developing countries.

- Large international research collaborations should improve efforts to facilitate the integration and participation of research groups from developing countries and support efforts to foster HEP in these countries.

(10) Individual Participation in Community Engagement

- The aforementioned goals and suggestions for improvement will be beneficial to the individual HEP researchers in establishing a climate of inclusivity, diversity and equity that fosters scientific excellence.

- Furthermore, progress in these goals will improve the socioeconomic, societal and environmental impacts of HEP. In so doing, HEP as a whole will benefit from societal advocacy. It is therefore important for the HEP communities to encourage more participation in community engagement.

- In particular, during future Snowmass activities, the work of this frontier should not be relegated to a handful of community members.

(11) Implementation & Progress Monitoring

How to implement the aforementioned goals and suggestions, and how to monitor progress, was hotly debated.

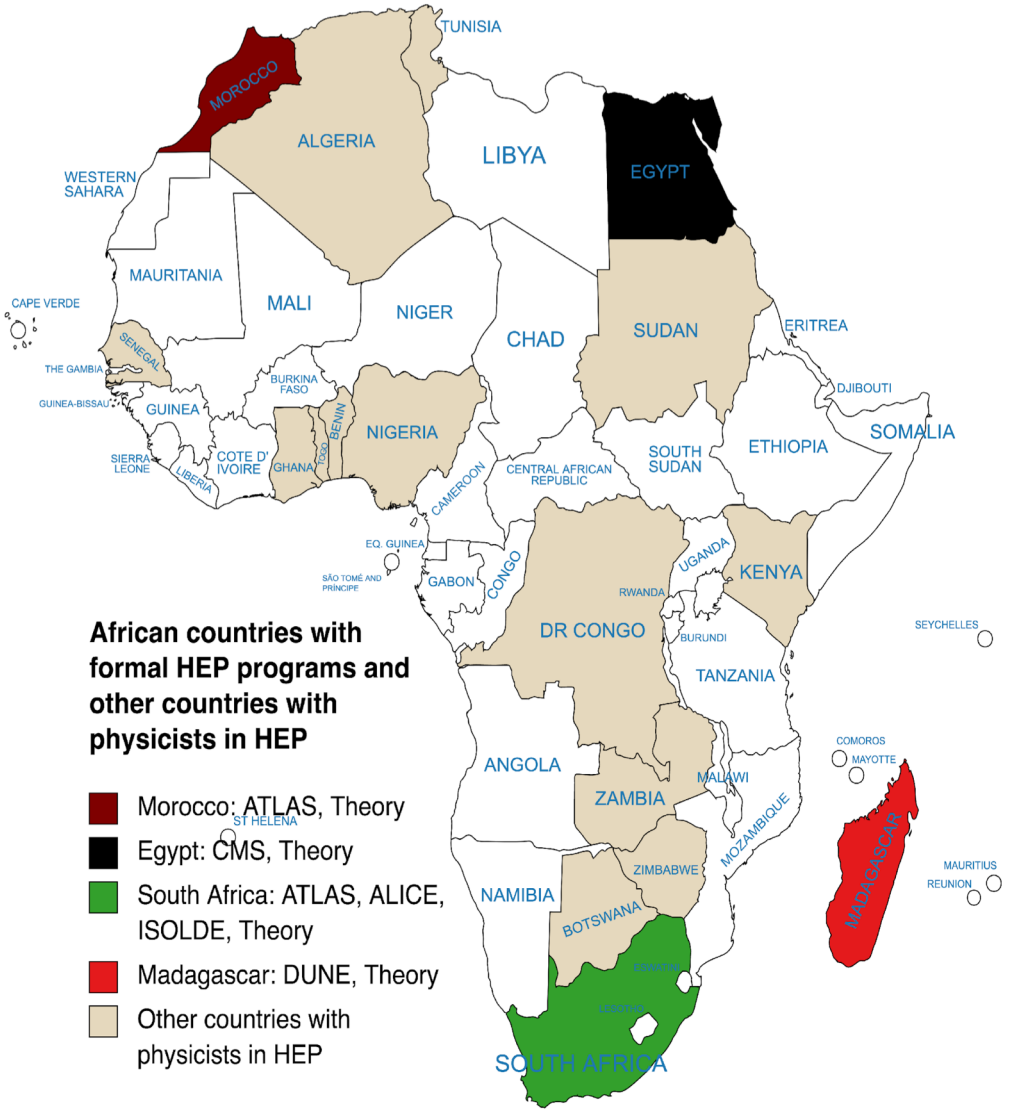
- It was generally agreed that, in its prioritization of projects, P5 could recommend, where relevant, implementation of the Community Engagement goals in project planning, development, maintenance and operation.

- Furthermore, the Division of Particles and Fields of the American Physical Society should establish a permanent Community Engagement Advocacy Committee. The charge of a such a committee would be to facilitate the community coordination of implementation, best-practice sharing, rewards, encouragements and progress monitoring and reporting.

HEP in Africa — Morocco

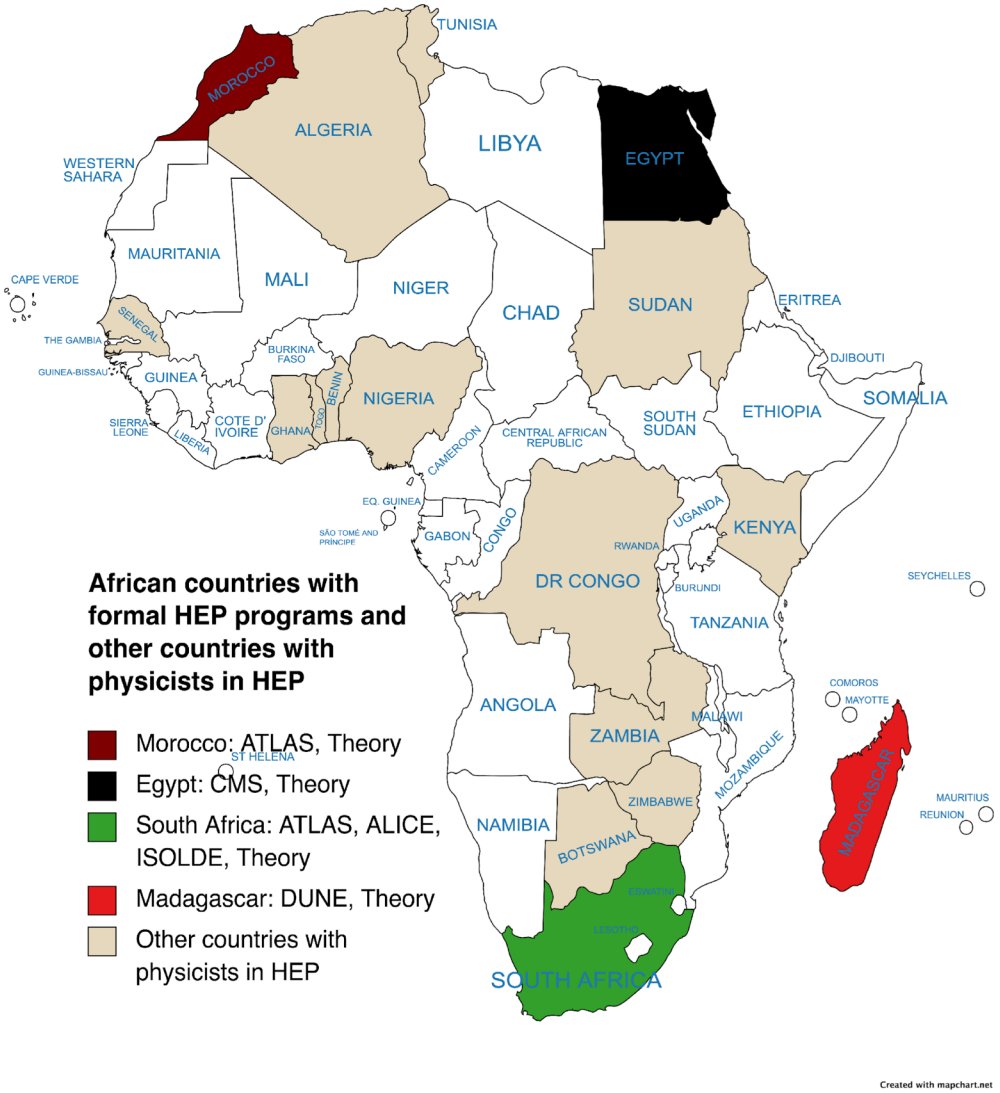
Moroccan HEP Cluster

- ★ Joined ATLAS in 1996
- ★ Hosted ATLAS week in 2013
- ★ Cluster of 7 institutes
- ★ EM Calorimeter
- ★ Software, Computing
- ★ Phase 1, 2 upgrades
- ★ SM, BSM, Higgs,
- ★ Dark Sectors
- ★ ~40 people
- ★ ANTARES/KM3NeT



Brookhaven National Laboratory

HEP in Africa—Egypt

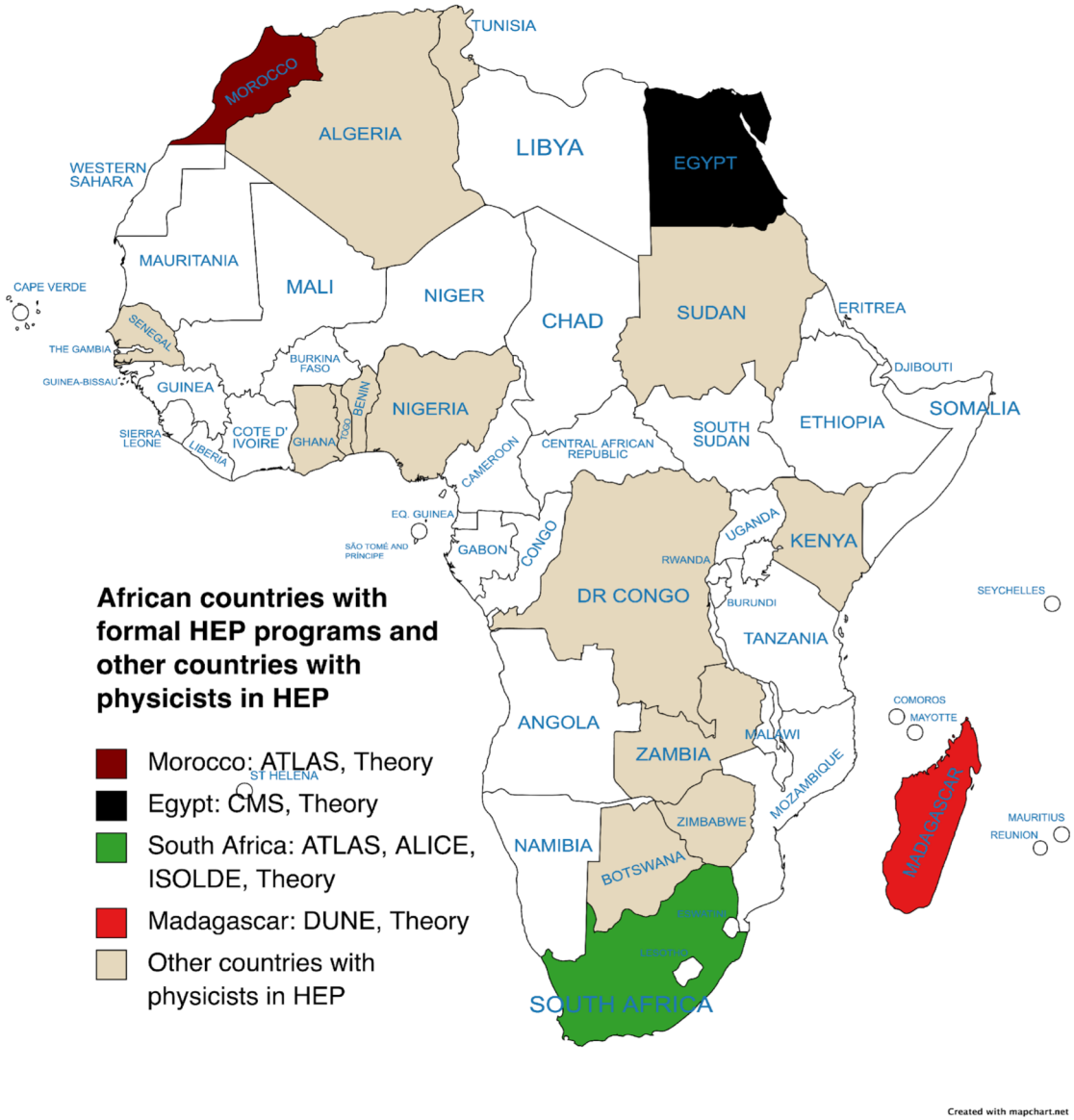


Egypt

- ★ Egyptian Network of HEP joined CMS in 2010
- ★ 2019, CHEP-FU member of CMS
- ★ RPC tests, assembly, Triger; GEM
- ★ SM, Higgs, BSM, Dark Sectors
- ★ Super computer lab
- ★ ~31 people

Brookhaven National Laboratory

HEP in Africa—Madagascar

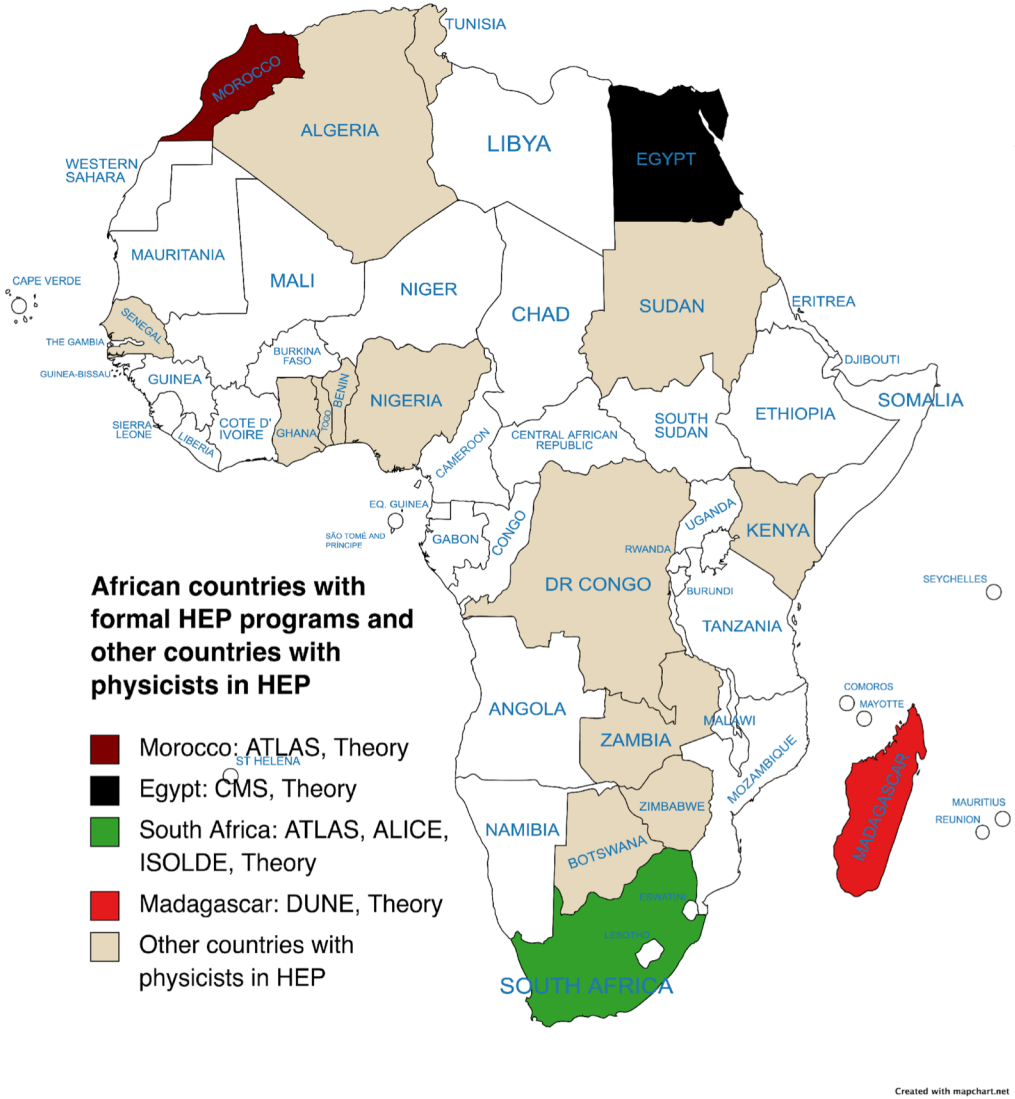


Madagascar

- ★ **Member of DUNE**
- ★ **Near detector CDR**
- ★ **7 people**
- ★ **HEP phenomenology**
- ★ **HEPMAD conference series since 2001**

Brookhaven National Laboratory

HEP in Africa—South Africa

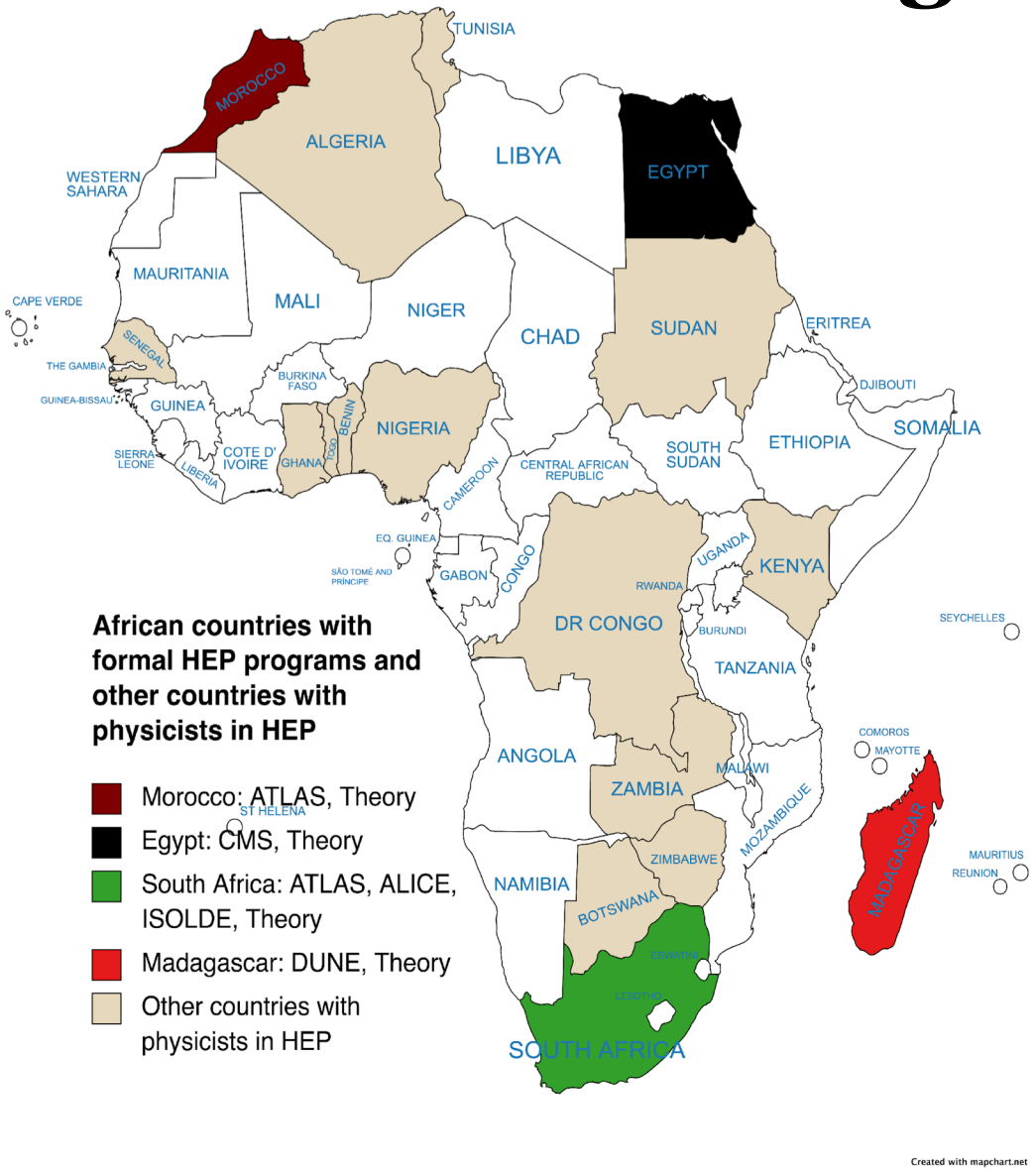


South Africa – CERN Program

- ★ **ALICE since 2001, 3 institutes: dHLT, di-μ studies, upgrade**
- ★ **ATLAS, affiliation to BNL 2008-2010, full member since 2010. Significant group, rich physics**
- ★ **ISOLDE**
- ★ **Theory, computing**

Brookhaven National Laboratory

HEP in Africa—Algeria



Algeria: associate member of LHCb (UFRJ, Brazil) — however, this did not succeed

Algeria: Technical Associate Institute in ATLAS:

- **Porting ATLAS software to parallel architectures—help ATLAS with computing challenges in LH-LHC**
- **Monitoring conditions of database access**

Brookhaven National Laboratory

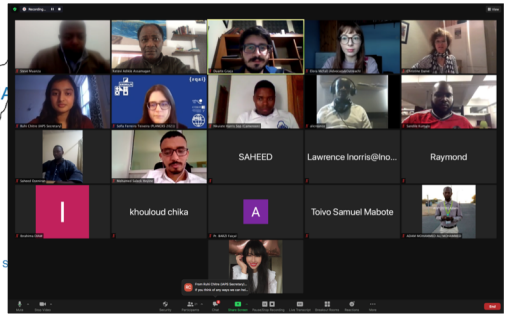
Building capacity—the African School of Physics (ASP)

High School teachers

3-6 months US research visits

High School Outreach

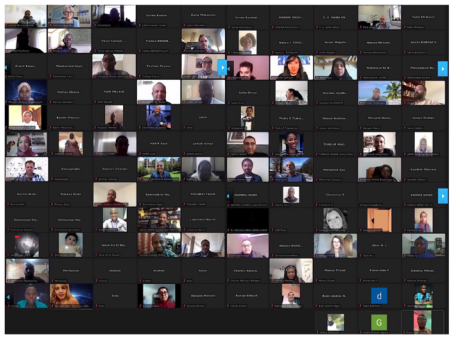
Student Mentorship



Online lectures

The Second Biennial African Conference on Fundamental Physics and Applications

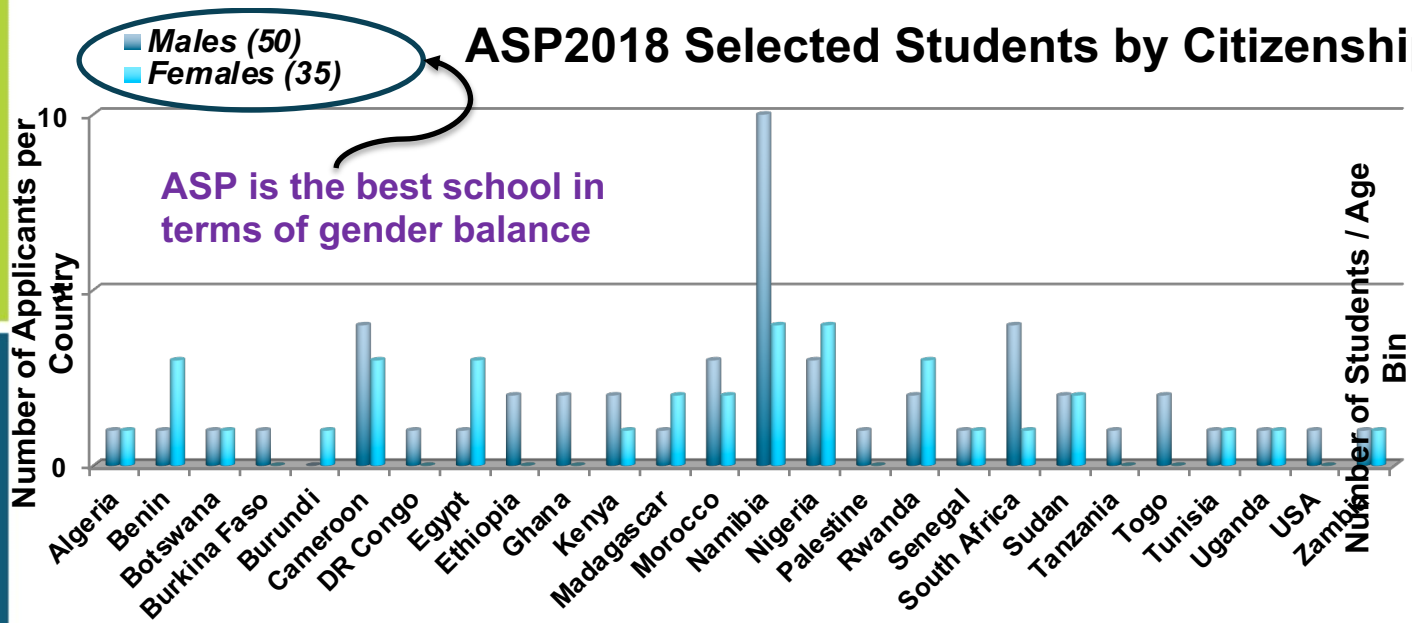
March 7-11, 2022

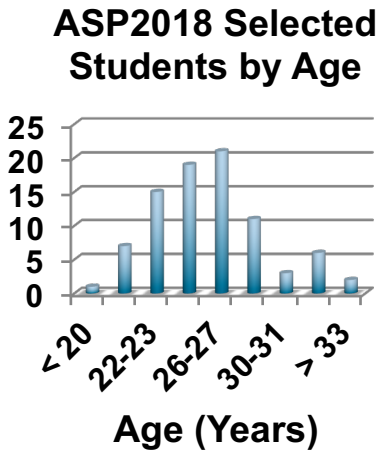


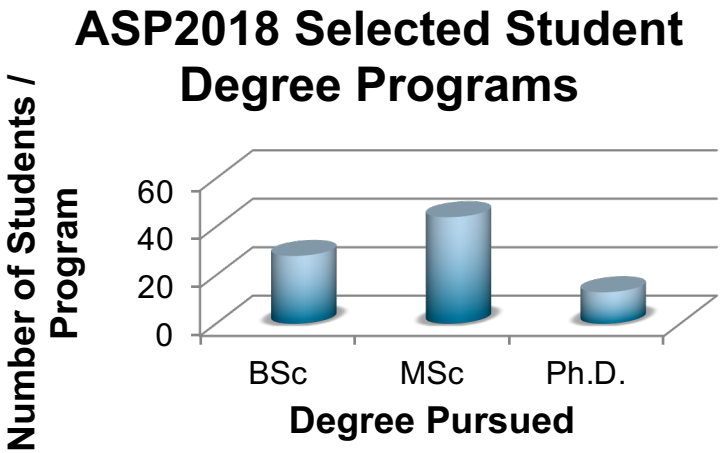
Over 2k student applicants;
Selection rate: 1 in 5

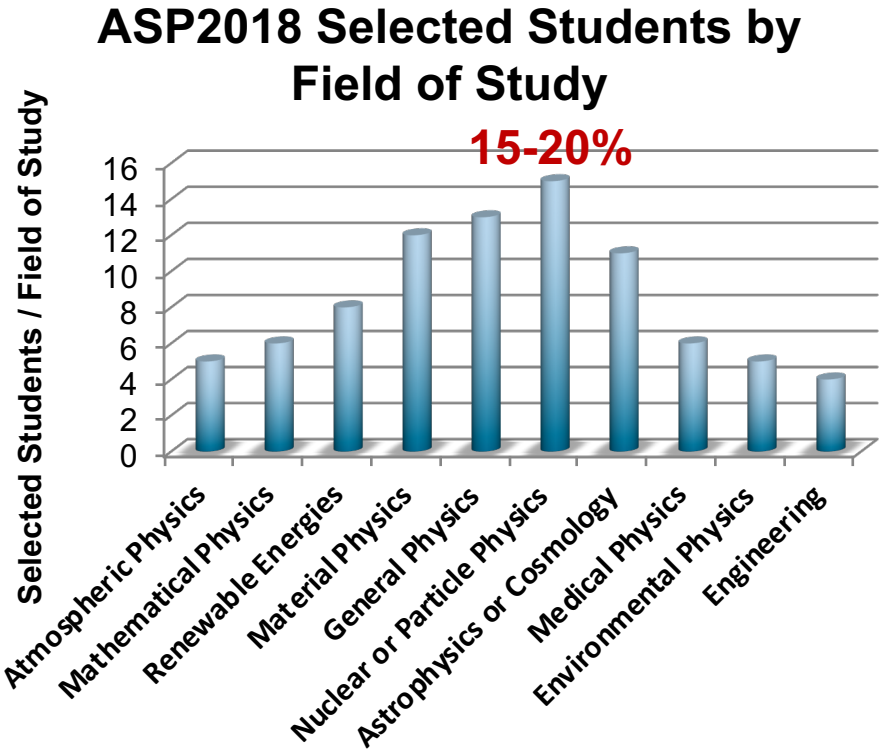
- ASP is much more than a school;
- it's a system of physics activities for
- education & research development

Engagement with Policy makers









523 applications in 2018
85 selected; 30 waiting list

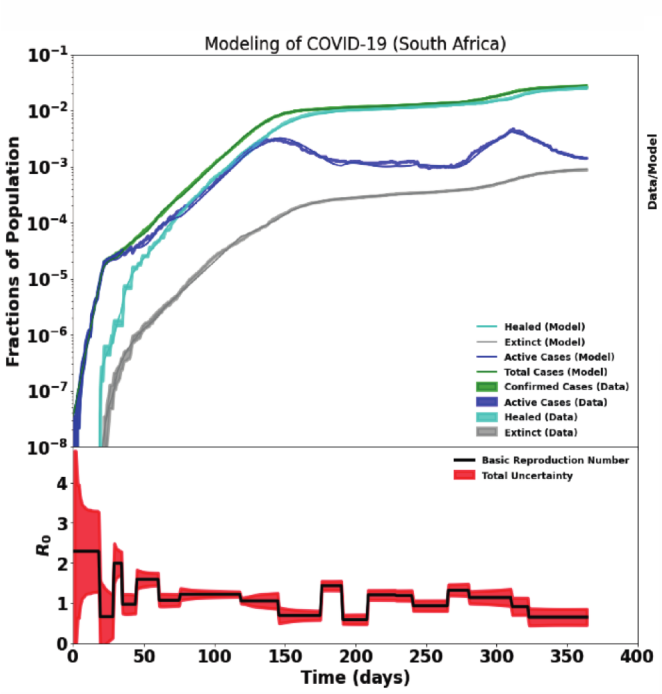
Brookhaven National Laboratory

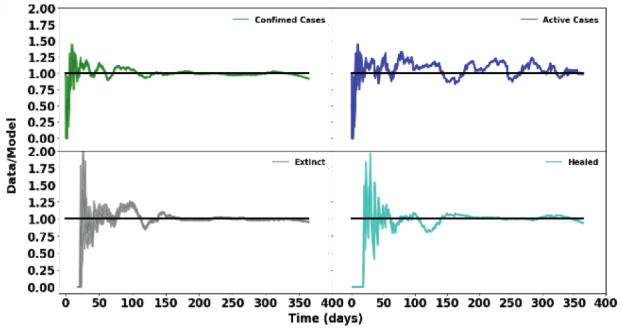
During the COVID-19 pandemic

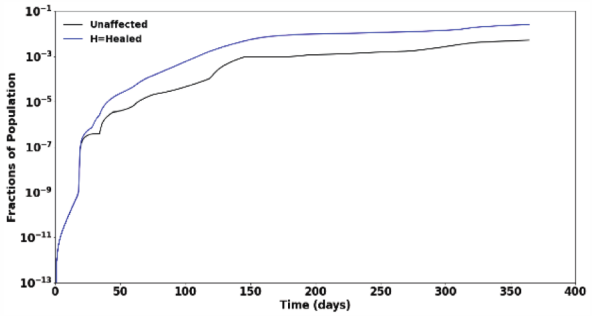
- ★ 20 ASP student alumni obtained PhD in physics; about 1/3 in HEP
  - ★ There were many others before the pandemic
- ★ ASP2020 postponed; organized online in 2021
- ★ African students modeled 1 year of COVID-19 data of their own countries. 10 countries considered; over 50% of entire COVID-19 cases in Africa in this study; results published in the Scientific African DOI https://doi.org/10.1016/j.sciaf.2021.e00987

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

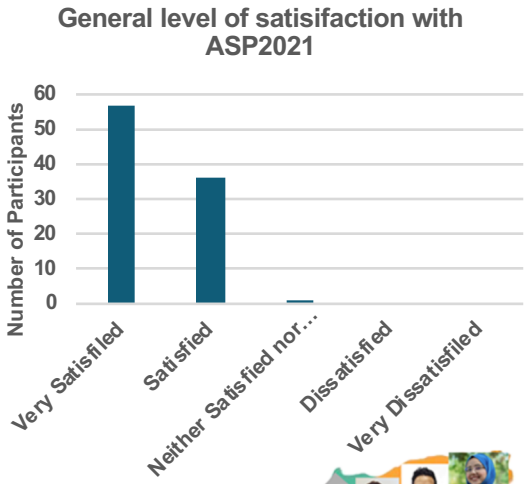


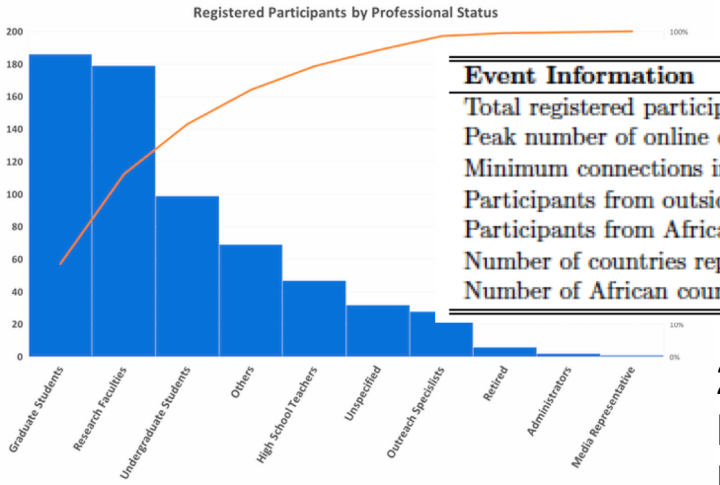




Challenging online efforts: worked with students with full fluency only in French, English or Portuguese

During the COVID-19 pandemic





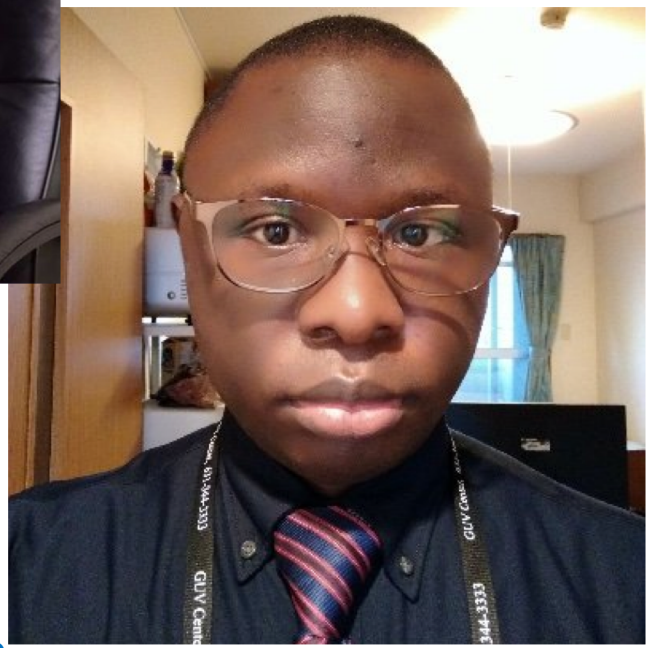
Event Information	Number of Engagements
Total registered participants	649
Peak number of online connections	191
Minimum connections in plenary sessions	120
Participants from outside Africa	86
Participants from Africa	563
Number of countries represented	54
Number of African countries represented	33

2nd African conference on Fundamental and Applied Physics, March 7-11, 2022

ASP Alumni impacts…

Dr. Laza Rakotondravohitra
Alumnus of ASP2010
PhD at Fermilab on MINERvA,
thanks to Prof. Young-Kee Kim.
Laza was instrumental in getting his country, Madagascar, into DUNE. Thanks to David Martinez

Dr. Marie Chantal Cyulinyana
Alumna of ASP2016
PhD, Renewable energies
Uni. of Johannesburg
Rwandan Ministry of Education
Rwandan Association of Women in Science & Engineering (RAWISE)



Dr. Benard Mulilo
Alumnus of ASP2010
PhD at RIKEN Japan on PHENIX.
Now, working to develop a heavy ion physics program in his country, Zambia and join the EIC

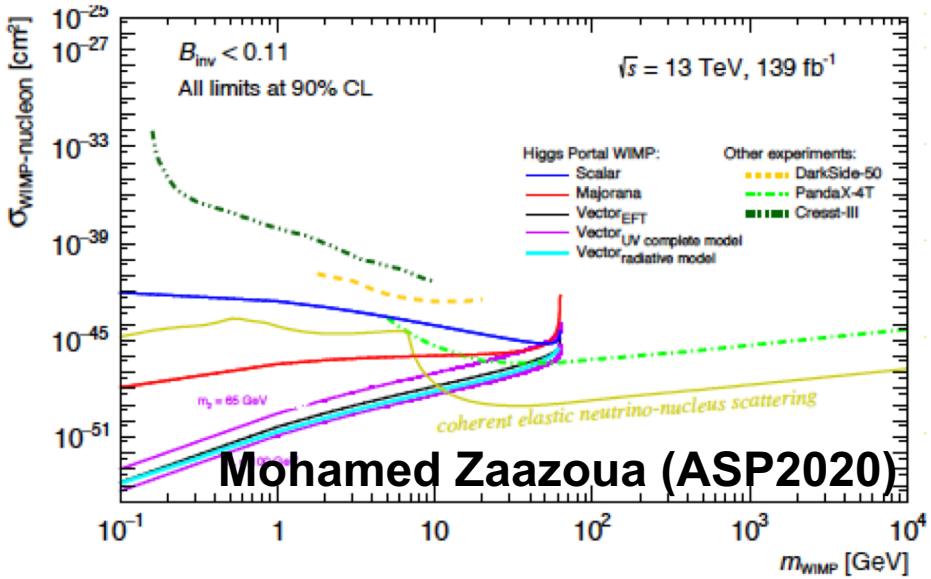
Brookhaven National Laboratory

Africans in Snowmass 2021

- **We had African participants in Snowmass and CSS**
- **Small but worth noting**
- **Cameroon, Nigeria, Senegal, South Africa, Togo, Tunisia, Zambia, Egypt, ..., were represented**

Dr. Diallo Boye
Alumnus of ASP2012
Post-doc at BNL on ATLAS.
He gave a CSS talk on "Testing DM with the Higgs boson" based on this white paper
https://doi.org/10.31526/lhep.2022.270

Proposal to add vector DM interpretation and extension below 1 GeV



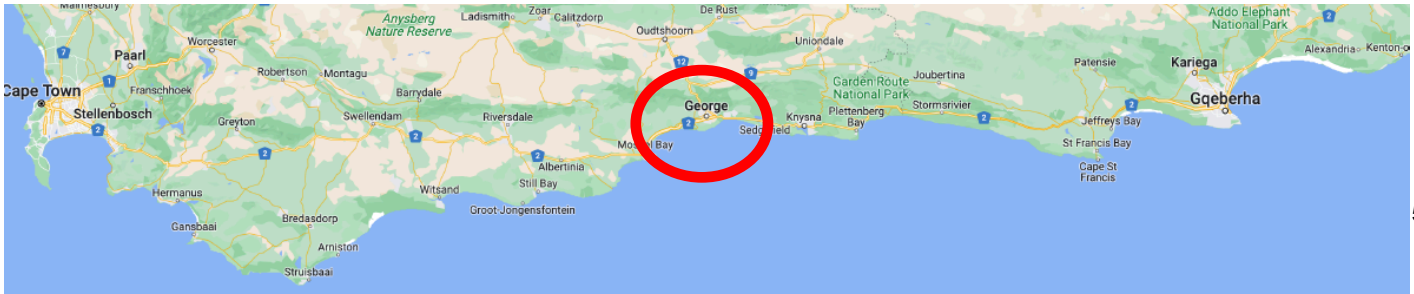
Prof. Azwinndini Muronga
Heavy Ion Physics Theorist
Dean of Science
Nelson Mandela University, South Africa
Snowmass Advisory Committee. Co-convener of CEF05. Co-author of many white papers and TG report

Contributed paper jointly by Mohammed V University Morocco, Uni. of Johannesburg South Africa and BNL, in EF10

Brookhaven National Laboratory

https://indico.cern.ch/event/1229551/

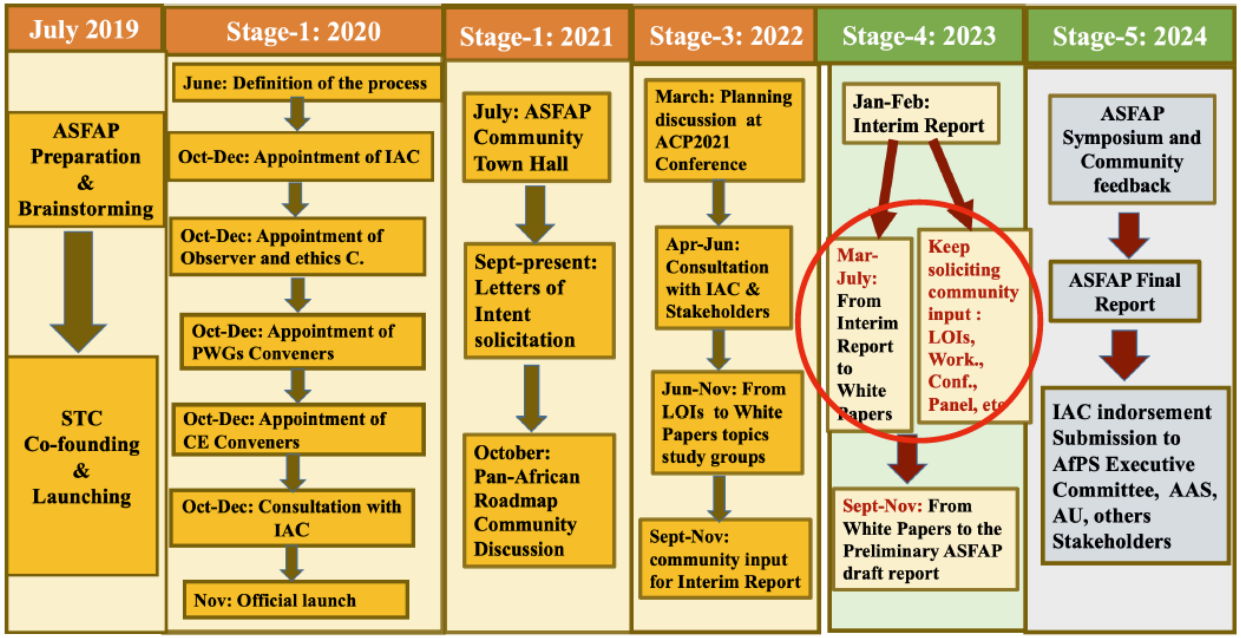
Coming soon — the 3rd edition of the African Conference on Fundamental and Applied Physics, ACP2023



Brookhaven National Laboratory

In progress — the African Strategy for Fundamental and Applied Physics (ASFAP)

- Mandated by the African Physics Society (AfPS)
- Includes other fields in addition to HEP
- Follow the steps of our colleagues in Latin America
- Learn the process of community-driven physics roadmap exercise
- Strengthen AfPS
- Complement top-down strategies
- Slow but steady progress; interim report submitted to the IAC in February 2023



PHYSICS GROUPS

Accelerators
Astrophysics & Cosmology
Atomic & Molecular Physics
Biophysics
Computing & 4IR
Earth Science
Energy
Fluid and Plasma
Instrumentation & Detectors
Light Sources
Condensed Matter & Materials Physics
Medical Physics
Nuclear Physics
Particle Physics
Optics and Photonics
Complex Systems

ENGAGEMENT

Community Engagement
Observers Committee
Ethics Committee
Physics Education
Women in Physics Forum
Young Physicists Forum

Brookhaven National Laboratory