IUPAP C13 COMMISSION REPORT
on the
ANNUAL C13 MEETING AND OTHER ACTIVITIES

Prepared by Sekazi K. Mtingwa (C13 Chair)
for the October 2019
Meeting of the IUPAP Executive Council and
Commission Chairs

August 2019
(Proposed Action Items are underlined.)

Figure 1: Group Photo, C13 Commission's 2019 Annual Meeting, AS-ICTP, Trieste
[Left-to-right: Carlo Iorio, François Piuzzi, Sekazi Mtingwa (Chair), Kevin McGuigan, Aba Andam, Andreas Buchleitner, Fernando Quevedo (AS-ICTP Director, Observer), George Thompson (Observer), Kuijuan Jin (Vice-Chair), Ernst van Groningen, Daniela Kneissl, Joe Niemela (Secretary)]

I. Report on C&CC 1-2 Nov 2018 Meeting

Kuijuan Jin, Vice-Chair of the C13 Commission, gave a detailed report on the C&CC meeting, which generated some interesting discussions. A few highlights are the following:

1. C13 recommends that IUPAP clarify what is meant by a **Developing Country**. Apparently, that is of concern to the Council. Applications for conference support from host countries that do not qualify should not be sent to C13. Rather, the conference organizers should be alerted immediately that their applications do not qualify for C13 support, but should be sent to another Commission for support.

2. C13 likes the idea of recognizing those who have made outstanding contributions to IUPAP for at least nine years. There was unanimous support for recognizing Sandro Scandolo, of the Abdus Salam ICTP and the immediate past C13 Chair, for such an honor.

3. C13 suggests that the Working Group on Women in Physics include more men.

4. To increase the rate of post-conference reports, C13 recommends that IUPAP withhold 10% of the funds until the reports are filed. This would not greatly impact the planning of the conferences, but should yield a significant increase in the post-conference reports.

5. To verify the percentage of women's involvement in organizing and participating at various levels in the conferences, C13 recommends that IUPAP perform random checks on the statistics in the post-conference reports.

6. To assist Vice-President Nithaya Chetty in increasing country memberships, C13 recommends that IUPAP consider forming a Working Group on New Memberships.

7. C13 highly recommends that Fernando Quevedo, retiring Director of the Abdus Salam ICTP, be appointed to the C13 Commission. C13 would like to form a Working Group on Latin America, and Quevedo would be the perfect person to lead that effort.

II. IUPAP Medal for Outstanding Contributions to the Enhancement of Physics in Developing Countries

There were five excellent nominations for the Medal. The individual that the C13 Commission chose for this prestigious award is Professor Paul Woafo from the Department of Physics at the University of Yaoundé I in Cameroon. Because of Professor Woafo's outstanding achievements as a scientist, academic teacher, science manager, as well elaborated upon in the nomination and reference letters, C13 concluded that Professor Woafo's contributions, not only to the development of physics within Cameroon but also to an enhanced integration of the Cameroonian Physics community into the global scientific discourse, has been outstanding, well documented, and highly deserving of the IUPAP Medal.

Among Professor Woafo's many outstanding activities are the following:

1. **Founder** of the **Cameroon Physical Society** and first president (2007-2013), leading to Cameroon becoming a member of IUPAP
2. **Member of the IUPAP C3 Commission** (2008-2013)
3. **Co-organizer of the program of cooperation with Brazil** enabling students to do their Ph.D.s in Brazil
4. **Local organizer of the Challenge Physique Experimentale Afrique** (with APSA -Association pour la Promotion Scientifique de l'Afrique) 2017 and 2019, still going on, paper published in EPS news (2018) for the 2017 edition

5. **Organizer** of the Series of International Conferences entitled ***High Level Physics and Appropriate Solutions to Real Life Problems in Developing Countries***, with the sixth edition taking place in November 2109.)
6. **Developer and Manager of the Cooperation Agreement** between the Abdus Salam ICTP for the training in 3D printing of one professor from Cameroon together with the donation of two 3D printers
7. **Founder of the Sci-Tech Service** program, which is dedicated to organizing training sessions and research on topics having an impact on local development.

The C13 Commission soon will decide upon an appropriate citation for Professor Woafo's IUPAP Medal.

Professor Woafo will receive the Medal, Certificate and €3000 during the 2020 IUPAP General Assembly, at which time he will present a paper on his work upon which the Medal selection was based.

III. C13 Conference Sponsorships for Year 2020

The C13 Commission received nine (9) conference applications for funding and made the following decisions:

1. The C13 Commission approved funding in the amount of €7000 for each of the following conferences:

   a. Conference title: *The 6th Biennial African School of Fundamental Physics and Applications, ASP2020*
   Location: Marrakesh, Morroco
   Start date: 05/07/2020
   End date: 25/07/2020
   Name of organizer/contact person: Kétévi Adiklè Assamagan
   Email: ketevi@bnl.gov

   b. Conference title: *Advanced African School & Workshop on Multifunctional Ferroic Materials*
   Location: Carthage, Tunisia
   Start date: 16/03/2020
   End date: 21/03/2020
   Name of organizer/contact person: Najeh Thabet Mliki
   Email: najeh.mliki@fst.utm.tn

   c. Conference title: *6th African School on Electronic Structure Methods and Applications (ASESMA-2020)*
   Location: ICTP-EAIFR, University of Rwanda, Kigali, Rwanda
   Start date: 06/07/2020
   End date: 17/07/2020

Name of organizer/contact person: Omololu Akin-Ojo
Email: oakinojo@eaifr.org.

2. The C13 Commission approved the endorsement of the following conference:

Conference title: *Science, Ethics and Human Development*
Location: Quy Nhon, Vietnam
Start date: 08/04/2020
End date: 09/04/2020
Name of organizer/contact person: Michel Spiro
Email: mspiro@admin.in2p3.fr

3. Each conference funded by C13 should invite one of the members of the *C13 Working Group on Affordable Scientific Equipment*, or another person approved by C13, to offer a Parallel Session at the conference that provides demonstrations of prototype low-cost scientific research and educational equipment. Furthermore, part of the C13 funds to the conference should be allocated to pay for the travel costs of the person offering the Session.

4. Where possible, the person offering the Parallel Session on Affordable Equipment should also offer a presentation on *Ethics in Scholarly Communications*.

IV. Updates on Lightsources for Africa, the Americas, Asia and Middle East Project (*LAAAMP*)

Led by IUPAP and the International Union of Crystallography (IUCr), *LAAAMP* is coming to the end of its first three years of existence, as well as the end of its International Science Council grant. Therefore, it is conducting a 2019 Fundraising Campaign to continue operations in 2020.

LAAAMP's targeted regions are Africa, Mexico, the Caribbean, Southeast Asia, and Middle East. The progress made so far in its various programs consists of the following:

Regional Strategic Plans

A detailed *Strategic Plan for Africa* has been written in close collaboration with the African Light Source Foundation. The *Strategic Plans* for the other four regions are in progress. The current goal is to present the results of all Strategic Plans at the upcoming **2019 World Science Forum** in Budapest Hungary.

Colloquium Program

This program has been extremely successful in alerting researchers, students, government officials, and the public of the tremendous benefits that can be gained by fully utilizing advanced light sources and crystallography. A major accomplishment of this program is the establishment of X-TechLab in Benin, which trains 100 students per year in

crystallography, X-ray diffraction, tomography and mathematical engineering. Approximately half the students are selected from Benin and half from other African countries. The first training session was held during 13-24 May 2019, and the next will convene in 18-30 November 2019. See https://www.xtechlab.co/.

Brochure Publication and Dissemination

LAAAMP has published a brochure entitled ***Advanced Light Sources and Crystallography: Tools of Discovery and Innovation***. Fig. 2 shows the brochure's cover. Hardcopies are being distributed widely at conferences and via mail to many physicists in the targeted regions. Copies also can be downloaded in English, French and Spanish at https://laamp.iucr.org/tasks/brochure. A translation into Arabic will be available by the end of the year, followed by a translation into Portuguese.

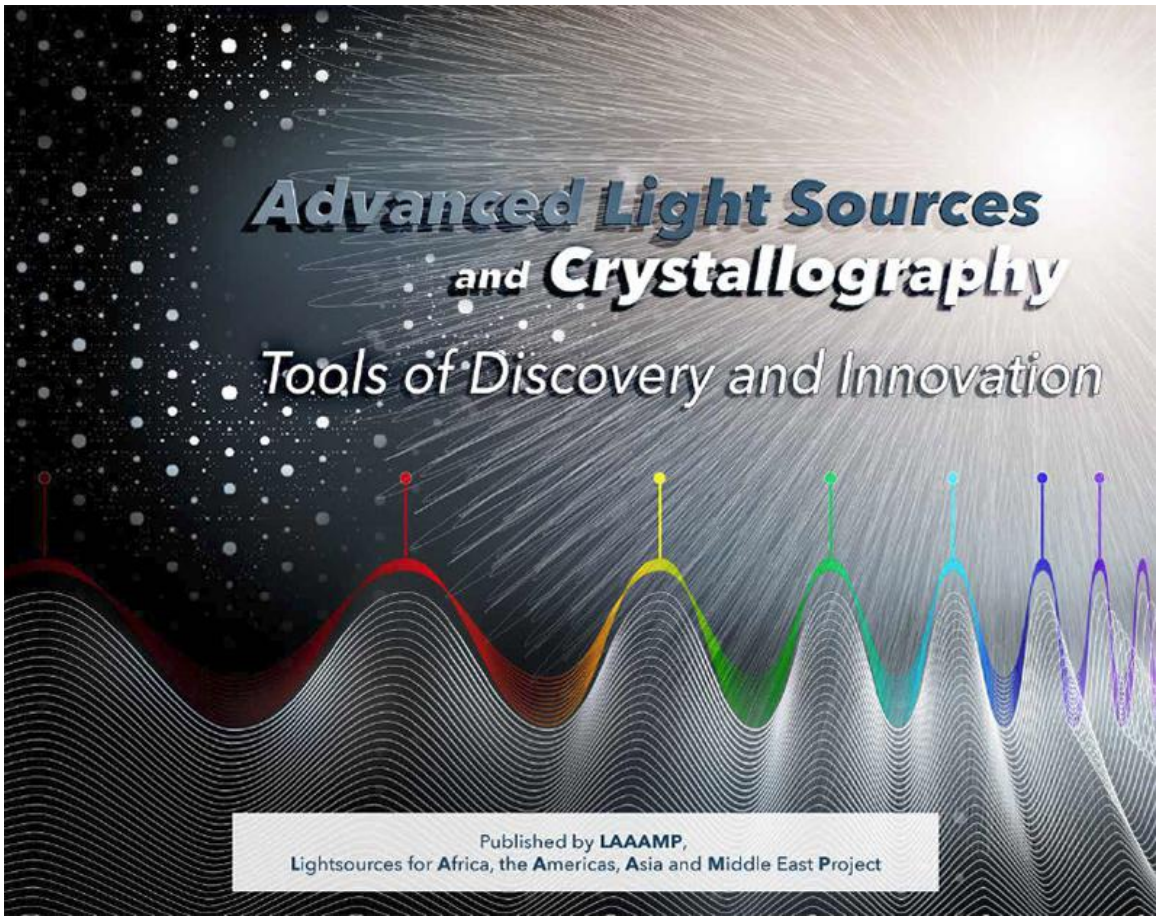

Figure 2: Cover of *LAAAMP* Brochure

Faculty-Student (FAST) Teams

The FAculty-STudent (FAST) Team program sends faculty and their graduate students for two months of training at *LAAAMP*'s partner Advanced Light Sources (AdLSs), focusing on beamline experimental techniques and/or accelerator design and operation. During 2018, 16 FAST Teams participated, with roughly equal representation from each of the five *LAAAMP* targeted regions. For 2019, 15 FAST Teams (30 individuals) have

been awarded training grants. This has been an extremely exciting endeavor for the participants, who have come from a variety of disciplines, including physics, chemistry, biology, medicine, electrical and mechanical engineering, paleontology, cultural heritage studies, and materials science.

Figure 3: Kirsi Lorentz Research Team
(Left-to-right: Yuko Miyauchi, Grigoria Ioannou, Kirsi Lorentz, Iosif Hafez) in the ESRF's XAFS/XRF Beamline Control Hutch

SPARC Program

SPARC is a new *LAAAMP* initiative that stands for Synchronizing Partnerships to Advance Research Characterization. It allows *LAAAMP* researchers to mail in their samples for beamline data acquisition. SPARC is the brainchild of Professor Tabbetha Dobbins of Rowan University in the U.S., who is frequently awarded beamtime at various U.S. advanced light sources. She received approval from the NSLS-II to share her beamtime during the week of June 17, 2019, with Bjorn von der Heyden, an earth scientist from South Africa's Stellenbosch University, who mailed his samples to Tabbetha. The plan is to expand the program as quickly as possible.

It is important to note that *LAAAMP* does not compete with regional AdLS initiatives. On the contrary, it helps to facilitate them, especially via its FAST Team training program and assistance in developing *Strategic Plans*. For example, Kirsi Lorentz and her graduate student, Grigoria Ioannou, who are shown in Fig. 3 with other colleagues from the Cyprus Institute, were *LAAAMP* FAST Team awardees in 2017 and 2018 at the European Synchrotron Radiation Facility (ESRF) in Grenoble, France. Their team became the first users at SESAME in Jordan, where they obtained paleontology data on the XAFS/XRF beamline.

The *LAAAMP* Executive Committee continues to reach out to the international community to spread the word about its activities. During 27-30 November 2018, as seen in Fig. 4, Sekazi Mtingwa traveled to the University of the West Indies-Mona Campus outside Kingston, Jamaica to attend the 21st General Meeting and Conference of the Caribbean Academy of Sciences (CAS) in celebration of the 30th Anniversary of CAS and 70th Anniversary of the University of the West Indies. There was tremendous interest in the *LAAAMP* FAST Team program, and thus *LAAAMP* was able to communicate its activities to more nations throughout the Caribbean.

Figure 4
(left-to-right)
Robert Lancashire, CAS Foreign Secretary, Professor of Chemistry Emeritus,
University of the West Indies, Mona Campus, Jamaica

Tara Dasgupta, CAS Jamaica Chapter President, Professor of Chemistry Emeritus, University of the West Indies, Mona Campus, Jamaica
Winston Mellowes, CAS President, Professor Emeritus of Chemical Engineering, University of the West Indies, St. Augustine, Trinidad and Tobago
Sekazi Mtingwa, *LAAAMP* Chair of Executive Committee, TriSEED Consultants, USA

Fig. 5 shows another outreach effort by a member of the Executive Committee, where on 29 January 2019, Sandro Scandolo of the Abdus Salam ICTP gave a presentation at the ***Periodic Table and Sustainable Development Goals*** Session at the ***Opening Ceremony of the International Year of the Periodic Table 2019*** at UNESCO's Headquarters in Paris. During his address, Scandolo described *LAAAMP* as an example of international collaboration.

Figure 5: Sandro Scandolo at UNESCO's Opening Ceremony of the International Year of the Periodic Table 2019

The future is bright for *LAAAMP*, which has launched its 2019 fundraising campaign so that it can continue its activities beyond the December 2019 conclusion of the International Science Council grant that has provided the bulk of the funds for its activities to this time.

Funds for 2020 tentatively raised to date include the following:

€ 10,000 from IUCr (Pending a matching amount from IUPAP)
€ 10,000 from IUPAP (Still to be confirmed)
US $ 6,000 from the US Liaison Committee for IUPAP
€ 5,000 from the International Science Council's Regional Office for

Africa (Still to be confirmed)
€ 53,000 from IAEA/ICTP to host a Workshop at the Abdus Salam ICTP.

As for the Workshop, the title will be *Advanced Light Sources: Principles, Designs, Developments and Multidisciplinary Applications*. The first week will focus on accelerator physics and the second on applications of synchrotron radiation. It is a joint project of *LAAAMP*, IAEA, ICTP, Elettra and ESRF advanced light sources, and the University of Johannesburg. The tentative dates of the Workshop are 20 April – 1 May 2020, and it will accommodate approximately 30 graduate students.

The organizers of the Workshop are the following:

Nadia Binggeli, ICTP
Simon Connell, University of Johannesburg
Maya Kiskinova, Elettra Sincrotrone
Alessandro Migliori, IAEA
Edward Mitchell, ESRF
Sekazi Mtingwa, LAAAMP
Sandro Scandolo, AS-ICTP
Ian Swainson, IAEA.

V. C13 Commission Assists in Launch of the Union of Physicists from Portuguese Speaking Countries

The **3rd Physics Conference of Portuguese Speaking Countries** convened under the topic, ***Physics for Sustainable Development***, in São Tomé e Príncipe, an island nation located off the west coast of Africa during 30 May – 1 June 2019. The conference culminated in a business meeting that launched the new União de Físicos dos Paises de Língua Portuguesa (UFPLP), or Union of Physicists from Portuguese Speaking Countries.

In addition to the Portuguese Physical Society, Brazilian Physical Society, and the IUPAP C13 Commission, countries represented at the conference included Angola, Brazil, Cape Verde, Mozambique, Portugal, and São Tomé e Príncipe. Approximately 60 researchers and ten students were in attendance, and the speakers discussed major advances in the following: (i) Physics Education, (ii) Energy, (iii) Nanotechnology, (iv) Environment and Climate, and (v) Health Physics. A group photo of the conference participants and government officials is shown in Fig. 6.

Figure 6: Group Photo

In the middle of the first row is Education Minister Julieta Rodrigues. To her immediate right is University Rector Aires Bruzaca Menezes. To her immediate left are Prime Minister Jorge Bom Jesus, Sekazi Mtingwa, and María da Conceição Abreu and Marcos Luz, who are Presidents of the Portuguese and Brazilian Physical Societies and main conference organizers.

VI. C13 Working Group (WG) on Affordable Scientific Equipment

Chair: François Piuzzi
Members: Mmantsae Diale
Carlo Iorio
Samia Charfi Kaddour
Ajith Kumar B.P.
Joseph Niemela
Michael Steinitz

The Group has become quite active in launching its program of spreading information about affordable scientific equipment for research and training around the world. The main vehicle for doing so is attendance at the conferences that C13 co-sponsors. As mentioned previously, each conference that C13 supports with funding should invite a member of this WG to attend and give one or more presentations on affordable scientific equipment and, when possible, ethics in scholarly publications. Accordingly, Michael Steinitz attended the **Second Regional Conference on Women in Physics** at Kathmandu University in Nepal during 27-29 March 2019. See Figs. 7a-c. According to his report,

The quality of the technical talks was very high and the invited talks on the status of women in physics in Southern Asia were very interesting. As always at such gatherings, the networking and establishment of relationships and collaborations was a major outcome. I was able to give two talks. One was on "The Mechanics and Ethics of Scientific Publishing" and the other was on outreach and the activities of Commission 13 of IUPAP.

Steinitz reported the following important data:

1. Countries that participated along with their numbers of participants:
   i. Bangladesh - 6
   ii. India - 1
   iii. Iran - 1
   iv. Japan - 1
   v. Nepal - 85-90
   vi. Pakistan – 3

2. Estimate of overall number of participants - 150 (Including Guests)

3. Estimate of number of student participants - 100

4. Numbers of presentations:
   i. Oral -28
   ii. poster-12
   iii. Invited presentations - 9 + 2 (Guest speakers)

Total Oral=28
Posters=12
Grand Total=40

Figure 7a: Group Photo with Michael Steinitz in the middle of the front row.

Figure 7b: Michael Steinitz with Conference Organizers and Participants

Figure 7c: Conference Session in Progress

In other work, François Piuizzi reported on a number of affordable equipment possibilities for sharing at future conferences. He presented news and examples of frugal science and scientific instruments, reviewed a number of ongoing projects at various places, and finally discussed possible proposals and how to raise funding for the proposals. Other items that he discussed were the following:

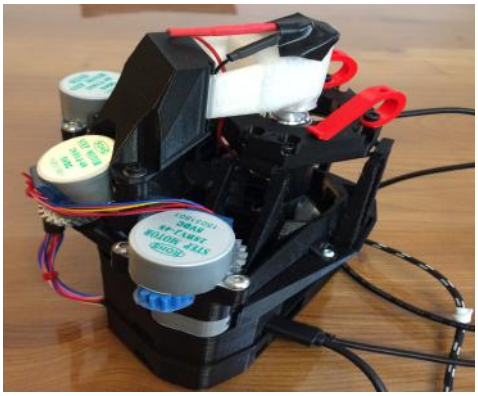

Figure 8: New Version of the Waterscope Microscope

1. New version of the "**Waterscope Microscope**" (Fig. 8) from **Cambridge** and **Bath** universities (malaria detection in blood and bacteria detection in water). He found that the funding of a **Fab Lab in Tanzania** by two universities to manufacture the microscope was an excellent initiative.

2. **Glia** project between Palestine and Tunisia. The leader is Tarek Loubani, a doctor from Gaza. The 3D printing of the stethoscope is extremely significant. https://youtu.be/mX3qH2n-Sco (South-South cooperation).

3. **Electropen** project: After the **Foldscope** and the **Paperfuge,** now the group (Manu Prakash and postdoc Bhamla) has turned to the use of piezo elements taken from gas lighters to manipulate cells through **electroporation**. See https://www.bhamla.gatech.edu/electropen.

4. **European Union UBORA** project (Italy, Netherlands, Finland, Kenya, Uganda) in the field of instruments for biology and medicine

5. **LabHackathon** in Zimbabwe (https://labhackathon.wordpress.com/report-and-materials-from-labhackzim-2018/).

6. Laboratory equipment based on a **sustainable development** approach (3D printing, Arduino, Raspberry Pi, Linux, …).

7. **Instrumentation in the domain of sustainable development goals with frugal science**, such as water purification in India.

   See https://www.thebetterindia.com/110376/innovative-technology-for-waste-water-treatment-bengaluru-dr-rajah-vijay-kumar-fpstar/.

Finally, Piuizzi proposed establishing a repository of affordable scientific equipment and initiating fundraising activities.

VII. Ad Hoc Committee on the Year 2022 Celebrations of the IUPAP Centenary and the International Year of Basic Sciences for Development

Chair: François Piuzzi
Vice-Chair: Carlo Iorio (IUPAP Centenary Celebrations)
Vice-Chair: Michael Steinitz (IYBSD Celebrations)
Members: Aba Andam
Andreas Buchleitner
Kevin McGuigan
Jose Daniel Muñoz Castaño
Ajith Kumar Parambath

As suggested by Piuzzi, the Ad Hoc Committee plans to write a proposal to the IUPAP Council to have a scientific meeting/conference (or a series of meetings) on Physics for Development as part of the Centenary celebrations, with a nominal duration of 4 days. It would be decided later whether to convene the meeting in a developing country or elsewhere. Topics would include all areas of physics research, physics education, open source hardware for laboratory equipment, smartphone science, and other topics related to sustainable development.

In another initiative, the Committee proposes to adopt Michael Steinitz's suggestion to make the Internet accessible to the entire world via the utilization of low Earth orbit satellites. See https://www.cbc.ca/news/politics/satellite-high-speed-internet-1.5222655 and https://en.wikipedia.org/wiki/Iridium_satellite_constellation. This would mesh quite well with the *One Laptop per Child* initiative. See http://one.laptop.org/about/mission. To this end, the C13 Commission states the following for the IUPAP Council's consideration:

> ***The members of the IUPAP C13 Commission requests that the IUPAP Steering Committee for the International Year of Basic Sciences for Development 2022 study the need for, and the feasibility of, making Internet access to all isolated schools in the developing world through the use of Low Earth Orbit Satellites a project of the IYBSD.***

VIII. C13 Working Group (WG) on Doctoral Student Recruitment

Chair: Sekazi Mtingwa
Members: Aba Andam
Andreas Buchleitner
Mmantsae Diale
Carlo Iorio
Kuijuan Jin
Samia Charfi Kaddour
Sandro Scandolo.

The C13 Commission made a return visit to the Scuola Internazionale Superiore di Studi Avanzati (SISSA, http://www.sissa.it) located in Trieste. Translated into English, it is the International School for Advanced Studies. C13 visited SISSA during its Annual Meeting in 2017. The Director, Professor Stefano Ruffo, hosted C13 along with the Heads of is various academic units, other administrators and students. It was an extremely fruitful discussion and Professor Ruffo provided C13 with a host of statistics on the numbers of doctoral students enrolled and who have received Ph.D. degrees over the years, along the countries of origins of the students.

Because the student enrollments tend to be lower from certain developing countries, C13 proposes to assist SISSA with student recruitment from Africa, the Middle East, Southeast Asia and the Caribbean, which are the regions with which C13 has contacts, especially through the *LAAAMP* network.

During the C13 Commission Meeting at AS-ICTP, George Thompson, who is the ICTP Acting Director of the Programmes Division, gave a presentation on the AS-ICTP Training Programmes, which consist of the following:

1. Ph.D. in Physics (with University of Trieste)
2. Ph.D. in Physics and Mathematics (with SISSA)
3. Ph.D. in Earth Science and Fluid Mechanics (with University of Trieste)
4. Joint Master in Physics (with University of Trieste)
5. Master of Arts in Economics (with University of Turin)
6. Master of Complex Systems (with consortium of European universities)
7. Masters in Medical Physics (with University of Trieste)
8. Masters in High Performance Computing (with SISSA).

Thompson emphasized that the AS-ICTP is not allowed to grant Masters and Ph.D. degrees, but it does offer a **Postgraduate Diploma Programme** to prepare young scholars for Ph.D. studies. Since 1991, there have been 790 Diploma graduates, with more than 75% having earned or working toward the Ph.D. degree.

IX. C13 Working Group (WG) on Physics in Africa

Chair: **Joseph Niemela**

Members: Aba Andam
Andreas Buchleitner
Samia Charfi Kaddour
Mmantsae Diale
Fernando Quevedo
Michael Steinitz.

In order to identify programs and activities to promote and enhance physics on the continent of Africa, a new project has been launched called the **Physics in Africa Project**. Those collaborating on the project include the American Physical Society, the U.K. Institute of Physics, European Physical Society, Abdus Salam ICTP, and the South

African Institute of Physics. Joseph Niemela, who is Secretary of the C13 Commission, is one of the leaders of the Project, and he is assisted by members of the **C13 WG on Physics in Africa**.

In his update, Niemela reported that the Project is conducting a survey of African scientists on their activities in the key areas of communications, experimental physics, and physics education. This activity is still in progress and can use some assistance.

Niemela will share the survey with C13, whose members will use their contacts in the unresponsive countries to obtain the completed surveys.

Niemela reported that the new **African Physics Newsletter** published its first issue in February 2019, second in May 2019, with the next issue coming soon.

They are striving to boost the number of subscribers and broaden the sources of the news stories. Toward those ends, they are in the process of setting up a network of contacts (reporters) for the editors to query for each issue about possible news article submissions. The network will include individuals in Africa and organizations in and out of Africa.

To increase awareness of the Newsletter, physics organizations with Newsletters will be asked to allow the **Physics in Africa Newsletter** to publish a brief article about it and include information about how to subscribe and submit news articles.

In other activities, Niemela reported on the creation of new Physics Societies, both regional and national, including a revival of the African Physical Society (Pan-African). Also, there is a move to create a West African Physical Society comprising individual member societies of Benin, Mali, Burkina Faso, Ivory Coast, and Niger. Senegal is also establishing a national society. Finally, one of the most important developments is the establishment of the Abdus Salam ICTP-affiliated East African Institute for Fundamental Research in Kigali, Rwanda.

X. Latin American Strategy for Research Infrastructures (LASF4RI)

Professor Fernando Quevedo, Director of the Abdus Salam ICTP, gave a presentation on ***Latin American Strategy for Research Infrastructures***. The benefits of such strategies are the following:

1. Major advances of knowledge and real hubs of knowledge
2. Fostering international collaborations and science diplomacy
3. Building science capability and science leadership
4. Technology advances and tech transfer to industry
5. Stronger and broader opportunities for STEM education, creating new paths to the forefront of global scientific research

6. Outreach to communities about benefits of science.

According to Quevedo, the following are the main considerations for developing a research strategy:

1. Research infrastructures can impact and benefit more when they are really a global endeavor.
2. Enhancing international alignment and participation is beneficial.
3. From the starting point of a clear **mandate** one obtains
    a. An open community-wide request for input and feedback
    b. Detailed and specific workshops to refine and identify science objectives and priorities
    c. A Roadmap with consideration to funding scenarios
    d. Inclusion on non-regional contributions and perspectives.

The following models already exist:

1. **European Strategy Forum on Research Infrastructure (ESFRI)**
2. **Strategic Plan for US Particle Physics in the Global Context P5 Report**
3. **European Strategy for Particle Physics.**

Quevedo would like to establish a Roadmap for Latin America similar to ESFRI, taking into account the scientific environment in Latin America and coordinating with the regional, as well as international, funding agencies.

Examples of large research infrastructures in Latin American include **Sirius** (Fig. 9a), the 4^{th} generation synchrotron light source in Brazil; **Pierre Auger Observatory**, the high energy cosmic ray experiment in Argentina; **HAWC** gamma ray observatory in Mexico (Fig. 9b); and **ANDES**, the underground laboratory in the future Argentina-Chile Agua-Negra tunnel.

Figure 9a: Sirius
Synchrotron Light Source in Campinas, Brazil
4th Generation Synchrotron with Applications in a myriad of disciplines, including Physics, Materials Science, Chemistry, Biology, Medicine, and Geology

Figure 9b: High Altitude Water Cherenkov Observatory (HAWC)
Gamma Ray Observatory near Puebla, Mexico
Mexico-US Collaboration

At the High Level Ibero-American Ministerial Meeting for Science and Technology in Guatemala in 2018 (Fig. 10), a Declaration was passed that included the need to further

support the scientific activities of researchers at existing infrastructures and the development of new ones through specific mechanisms, such as the ***Latin American Strategy Forum for Research Infrastructures*** **(**https://www.ictp-saifr.org/workshop-on-the-latin-american-strategy-forum-for-research-infrastructure/). This Declaration was ratified at the High-Level Meeting of Heads of State held 15-16 November 2018 in Guatemala.

Figure 10: Abdus Salam ICTP Director Fernando Quevedo gives Presentation at Meeting of the Science Ministers of Ibero-American countries, Guatemala, 2018.

Among the next steps, Quevedo enumerates detailed and specific workshops to refine and identify science objectives and priorities, and the development of a Roadmap that includes various funding scenarios.

XI. Building Scientific Capacity in Developing Countries

Max Paoli, Programme Coordinator at The World Academy of Sciences (TWAS), gave a presentation entitled ***Building Scientific Capacity in Developing Countries***. At TWAS, there are the following programs to support science in the developing world:

1. **Ph.D. Fellowships**
2. **Postdoctoral Fellowships**
3. **Research Grants**
4. **Exchange Associateships**
5. **Prizes and Awards**
6. **Regional Offices**
7. **TWAS Young Affiliates Network (TYAN)**

With funds provided by Sida (Swedish International Development Cooperation Agency), TWAS provides grants to researchers in developing countries for specialized equipment, consumable supplies, and Master's degree students. **Grants are awarded both to individual scientists and research groups.**

The TWAS-Sida Research Grants awarded in 2018 have the following statistics and plots (Figs. 11a,b):

1. **Total number of awards: 52**
2. **Number of awards to individuals: 33**
3. **% women awarded for individuals: 42%**
4. **% Least Developed Countries (LDCs) awarded for individuals: 67%**
5. **Number of awards to groups: 19**
6. **% women awarded for groups: 16%**
7. **% LDC awarded for groups: 68%**

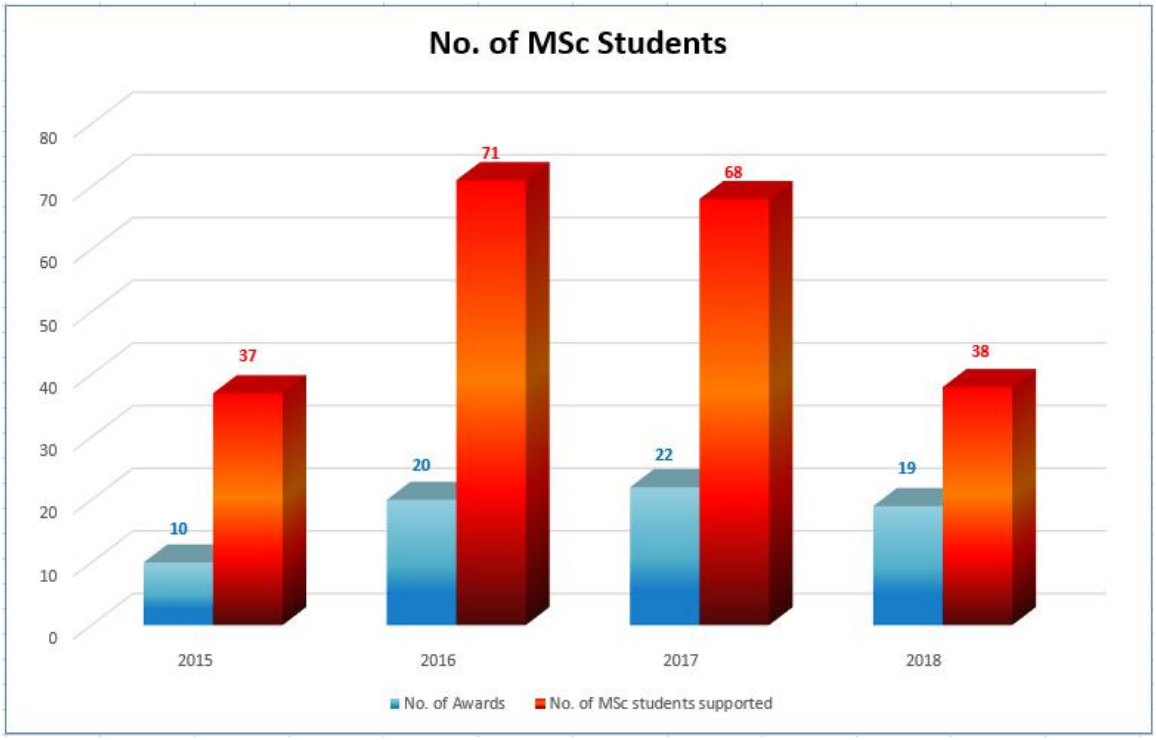

Figure 11a

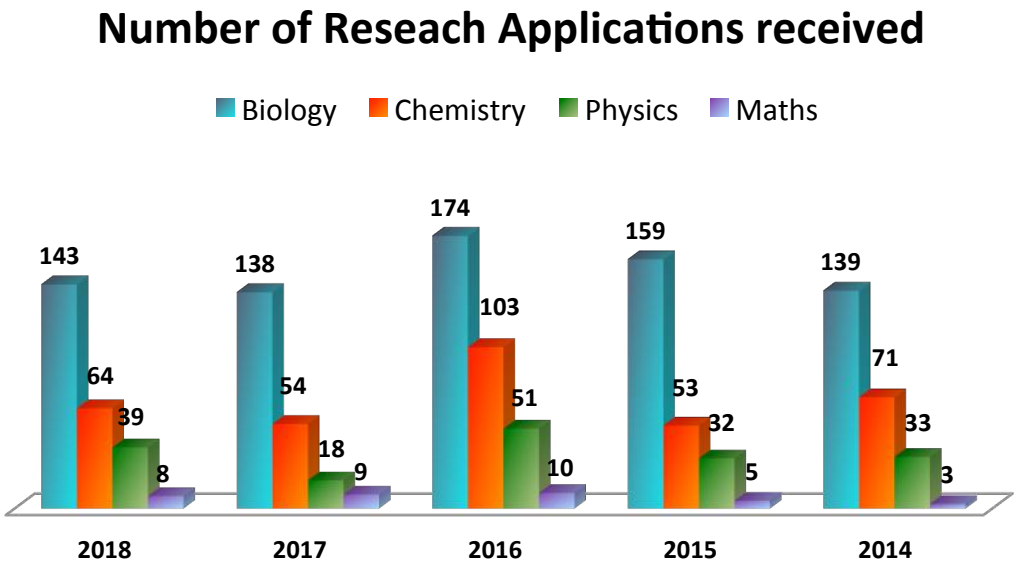

Figure 11b

Grants to research groups started in 2010. 45 out of 81 grants awarded to research groups were in Africa. There were 2,502 grants awarded to individuals and research groups during 1986-2018.

Finally, Paoli noted that the number of grant applications in physics and math have been low.

C13 decided to assist TWAS with increasing the number of grant applications in physics and math.

XII. Alexander von Humboldt Foundation Programs

Dr. Daniela Kneissl, who heads the von Humboldt Foundation's Division for Africa and the Middle East and new Associate Member of the C13 Commission, gave a presentation on the various programs of the von Humboldt Foundation that enhance scientific cooperation between Germany and the world.

The Humboldt Foundation is celebrating Alexander von Humboldt's 250th birthday with a campaign called **Humboldt Today**. See https://humboldt-heute.de/en/.

The core activities of the Foundation are the following:

1. Grant annually about 600 research fellowships and 100 research awards to highly qualified researchers (Ph.D.-holders) from all disciplines and all over the world

2. Enable them to spend extended research stays in Germany and work with German colleagues

3. Offer lifelong sponsorship options for its Alumni ("Once a Humboldtian, always a Humboldtian").

The Foundation sponsors people, and not projects, with the sole selection criteria being academic excellence.

There are 29,000 Humboldtians worldwide, including 55 Nobel Prize Winners.

Figure 12 depicts the 2019 budget.

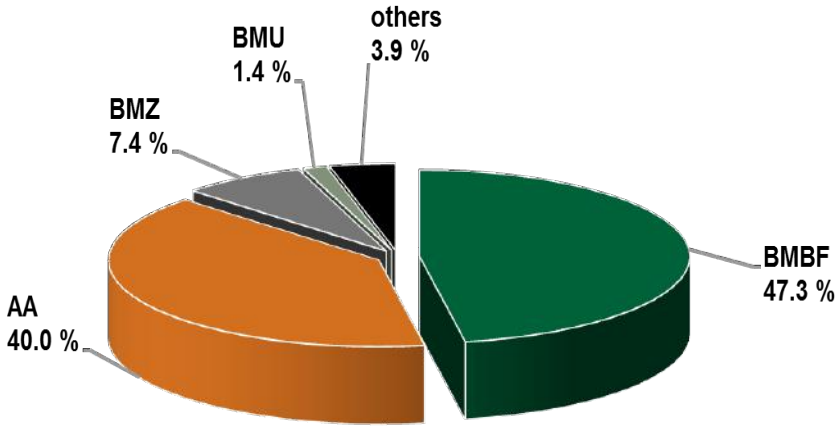

Figure 12
Von Humboldt Foundation Budget for 2019
Approximately €142.7 million, with ~96%Financed by Federal Funds

AA: ***Federal Foreign Office***
BMBF: ***Federal Ministry of Education and Research***
BMZ: ***Federal Ministry for Economic Cooperation and Development***
BMU: ***Federal Ministry for Environment, Nature Conservation and Nuclear Safety***

In addition, 0.2% is provided by the European Union, with the remaining 3.9% being

provided by third parties and income from the Foundation‘s assets.

Figures 13a,b show the origins and disciplines of guest researchers.

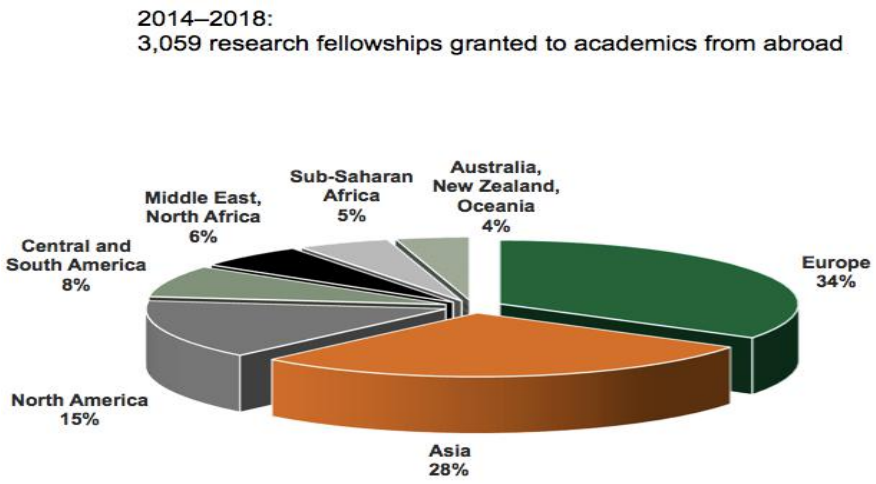

Figure 13a: Origins of Guest Researchers

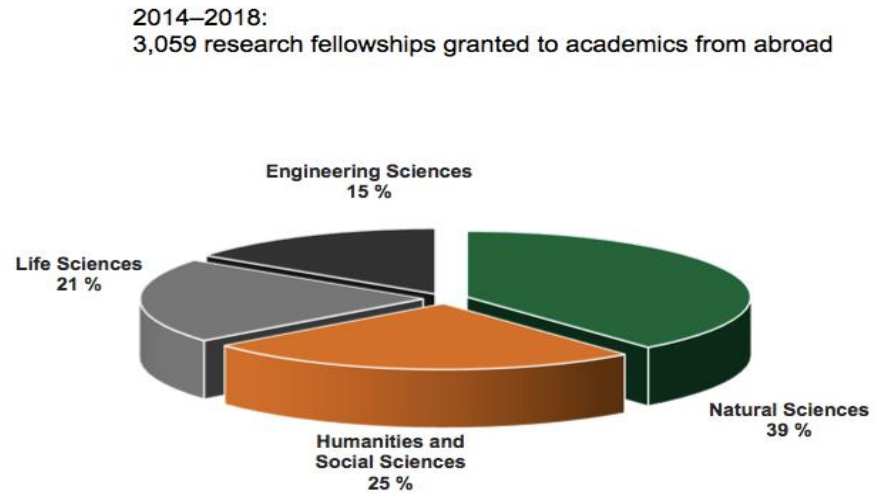

Figure 13b: Disciplines of Guest Researchers

Finally, there are fellowships for physics in Official Development Assistance (ODA, http://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/daclist.htm) and transition countries, with 17 (3% of those worldwide) granted in physics in ODA countries.

XIII. International Science Programme (ISP) at Uppsala University

Ernst van Groningen, Director of the ISP Programme in Physical Sciences (https://www.isp.uu.se/) and new Associate Member of the C13 Commission, gave an overview of ISP. Founded in 1961 by Physics Nobel Laureate, Kai Siegbahn, ISP has the following three subprograms:

1. International Programme in Physical Sciences (IPPS) 1961
2. International Programme in Chemical Sciences (IPICS) 1970
3. International Programme Mathematical Sciences (IPMS) 2001.

ISP is currently funded by the following:

1. Swedish International Development Cooperation Agency (Sida): ~3.2 M€/yr
2. Uppsala University: ~0.3 M€/yr
3. Stockholm University: 0.1 M€/yr
4. Substantial contributions in kind.

Applications for funding support are by invitation only. They are long-term support (15+ yrs), with typically few new projects per year. For physics, there were none in 2015 and one each in 2016 and 2017.

In 2018, ISP supported approximately 60 groups and networks at the annual level of €30 000 – 60 000 per year. Direct support to research groups is restricted to focus countries as decided by the Swedish government. On the other hand, networks can have nodes in almost any country, as long as one or more focus countries are involved.

Past ISP support went to the following:

1. Equipment, consumables, spare parts (+ procurement assistance)
2. Literature, IT
3. Collaborations with more advanced research groups
4. Short-term exchanges of staff and students (regional collaboration)
5. Postgraduate training of sandwich-type programs and training of technicians
    a. Attending and arranging courses, workshops, conferences
    b. Not for salaries, localities, vehicles, etc.

The following provide examples of topics supported in the past:

1. Solar energy/materials science (Ethiopia, Uganda, Kenya, Zambia, Myanmar, Cambodia)
2. Geophysics (Ethiopia, Kenya, Zimbabwe, Laos)

3. Ground water research (Zimbabwe, Laos)
4. Laser physics/Optronics (Kenya, Burkina Faso, Mali)
5. Astrophysics (Uganda, Rwanda)
6. Atmospheric Science (Kenya, Rwanda)
7. Nuclear Physics (Kenya, Myanmar)
8. Magnetic Materials (Bangladesh)
9. Medical Physics (Bangladesh)
10. Nanophysics (Bangladesh).

During the five-year period 2010 – 2014, ISP supported

1. 45 – 50 research groups
2. 19 – 21 networks.

at a total cost of approximately €13 million, resulting in the following:

Output	**per yr**	**per M€**
1. 103 PhD theses	> 20	> 8
2. 503 MSc theses	> 100	> 40
3. 663 publications in refereed international journals	> 130	> 55
4. 364 publications in regional/local journals	> 70	> 30
5. 1333 conference contributions (40% international)	> 260	>110.

During the last few years, ISP has offered the supported groups and networks to apply for extra funding to promote gender equity in physics and mathematics. These funds are earmarked for activities to promote a better gender balance, and to increase gender awareness. Seventeen activities have received such a grant up to now.

ISP recently submitted a proposal to Sida for continued support for 2020-2024.

XIV. IOP UK-Africa *Physics for Africa* Research Collaboration

Kevin McGuigan, Professor of Medical Physics at Ireland's Royal College of Surgeons, Representative of the Institute of Physics (IOP), and new Associate Member of the C13 Commission, discussed this new collaboration. The UK Government asked the IOP to convene a discussion focusing on how the UK can provide momentum and coordination to the UK-Africa Physics Collaboration through the **Global Challenges Research Fund (GCRF)** and other funding streams.

Suggested targeted topics for the collaboration include

1. Artificial intelligence and big data
2. Weather and climate
3. Energy
4. New large-scale facilities,

with stakeholders being

1. Institute of Physics
2. Department for Business, Energy and Industrial Strategy
3. Engineering and Physical Sciences Research Council
4. Department for International Development (UK government)
5. Royal Society
6. Royal African Society
7. University Researchers.

The IOP would like to work closely with C13 in developing the Physics for Africa Research Collaboration and devote some time to this at a roundtable discussion during the activities for the **Grand Opening of the new IOP Building** in London on 4 October 2019.

XV. Use of Type D Conference Support to Increase IUPAP Memberships

Tsuneyuki Ozaki, Chair of the C17 Commission posed the following questions to the C13 Commission:

1. Is preference given to conferences that are held in an IUPAP member country?
2. Could IUPAP make use of Type D conference support to promote new memberships from developing countries?

C13 discussed those questions and proposed the following:

Conference organizers should advocate for the host country to become a member of IUPAP. Moreover, conference organizers should invite governmental officials to one of the sessions, such as the opening or closing session, so that the officials can learn about the advantages of being a member of IUPAP.

To conclude, the C13 Commission has a number of active Working Groups, Committees and Projects. It looks toward working closely with the Council and other Commissions and Working Groups to ensure many successes in the future.