

Report to EC&CC Meeting & the GA of IUPAP

C13: Physics for Development

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1. The IUPAP Kennedy Reed Medal

The commission has proposed to rename the “IUPAP Medal for Outstanding Contributions to the Enhancement of Physics in Developing Countries” to the “IUPAP Kennedy Reed Medal for Outstanding Contributions to the Enhancement of Physics in Developing Countries” and this change was resolved in the EC&CC Meeting in 2023, as a sign of recognition to IUPAP’s past President, Kennedy Reed, who worked tirelessly to improve the condition of physics and physicists in the developing world.

The commission further discussed and recommended Prof. Malik Maaza, from South Africa, for the 2024 IUPAP Medal, for his outstanding contributions to Physics development in developing countries.

2. *LAAAMP*

Within the C13 Annual Meetings over the past three years, we have given a significant amount of attention to the *LAAAMP* project. From the presentations given by Sekazi Mtingwa and subsequent discussion, the commission understood that there were substantial advantages to having a synchrotron located in a developing region as opposed to merely sending users to the nearest one in more developed region, specifically in terms of the consequent growth of the regional scientific ecosystem and its impact on the economy.

Sekazi provided a comprehensive history of various light sources including progress towards an African Light Source. The so-called FAST teams associated with *LAAAMP* were shown to be particularly efficient at professional development, and he noted a proposal for additional funding in order to have an

additional 6 teams. C13 was in agreement with this idea, and the proposal had been approved at the EC&CC meeting of IUPAP in 2023.

Specifically, the proposal would double the support for LAAAMP project to \$30K each year. Currently the funding partners are IUPAP, ICTP and IUCr each having committed to \$5k annually. IUPAP and ICTP have each agreed to increasing their funding to \$10k annually, and given that, we (Michel Spiro, President, Silvina Ponce Dawson, President-Designate, Kuijuan Jin, Vice-President and Chair of the C13, IUPAP) have written a letter to IUCr (Professor S. Garcia-Granda, President, Professor G.C. Diaz de Delgado, Vice-President, Professor A.M. Stanley, Chief Executive Officer, International Union of Crystallography) requesting that they increase their contribution to LAAAMP accordingly, i.e., from \$5k to \$10k annually.

3. Conference selection sponsored by IUPAP

In 2022, the commission discussed three proposals for 2023 submitted to IUPAP for funding under Type-D Conference Grants:

- 1) Celebration of the International Year of Basic Sciences for Sustainable Development (IYBSSD 2022) in Ghana (2023)
- 2) The new era of Astronomical exploration. Alpha-Cen meeting and Guatemalan School of Astrophysics (a-Cen/GUASA 2023) (Guatemala)
- 3) 7th African School on Electronic Structure Methods and Applications (ASESMA-2023)

All three activities were considered to be excellent and funding at the requested amount was approved for all of them by a unanimous vote of those voting members present.

In 2023, the commission has discussed 7 proposals for 2024 submitted to IUPAP, and recommended the following 4 for funding under Type-D Conference Grants:

- 1) The 8th African School of Fundamental and Applied Physics (Marrakesh, Morocco)
- 2) Regional Integration in Science: Conference on Physics, Astronomy, Climate Change, and Mathematics in Copan (Copan, Honduras)
- 3) The African Biophysics School on Experimental and Computational Sciences (Addis Ababa, Ethiopia)
- 4) Women in Physics in Zimbabwe (Bindura, Zimbabwe)

In 2024, the commission discussed 8 proposals for conference funding for 2024 submitted to IUPAP, and recommended the following 4 for funding under Type-D Conference Grants (7000 Euros each) and 1 conference for endorsement by IUPAP:

- 1) Advanced School and Workshop: StatPhys in Kigali --Rwanda
- 2) Bangkok School and Workshop on Cosmology –Thailand
- 3) 8th African School on Electronic Structure Methods and Applications (ASESMA-2025) --Ghana
- 4) First Mesoamerican Workshop on Reconfigurable X-ray Scientific Instrumentation for Cultural Heritage –Guatemala
- 5) The commission also recommends a **no-cost endorsement** of HEPNP2025, to be held in Chile (No funding was requested).

4. Associate Members

At the annual C13 Meeting in 2022, we had suggested four candidates for invitation to becoming Associate Members. These associate members can provide critical knowledge and experience in areas that are of concern to Commission 13. The associate members approved by IUPAP are listed below:

- 1) David Hutchinson (New Zealand, M)

Invited for his experience in development of Pacific Island states and the potential role in bringing some Pacific Island states to IUPAP membership.

2) José David Manguera Viana (Brazil, M)

For his work on Brazil related to the Brazilian Physics Olympiad for Public Schools and the recent collaboration on the Portuguese-speaking communities' Physics Olympiads.

3) Angie Sanchez (Honduras, F)

For her work done for woman in physics in developing countries as a very active female in the developing country.

4) Sekazi Mtingwa (US, M)

For his excellent and leading role played in LAAAMP, and the essential and unique connection between LAAAMP and C13 (IUPAP).

We also suggested Ajith Kumar to be an associate membership in C14, which was approved by C14 and IUPAP.

In 2023, the commission discussed and approved the recommendation of ANISA QAMAR, from WG5 (Women in Physics), to be an Associate Member of C13, to aid in strengthening the necessary links between C13 and WG5.

In 2024, we discussed and recommended K. Renee Horton to be the candidate of an Associate Member of WG21, to aid in strengthening the necessary links between C13 and WG21.

5. UNESCO's International Day of Light

The three-year reporting period saw the celebration of three editions of the United Nations (UNESCO) International Day of Light on 16 May 2022, 16 May 2023, and 16 May 2024. The International Day of Light covers broad themes across the science of light and its applications, and links strongly with C17 (Laser Physics and Photonics) as well as C13 (Physics for Development) and C15 (Atomic, Molecular and Optical Physics.) Of course, given its

interdisciplinary nature, the International Day of Light touches on essentially all areas of physics to some extent.

The International Day of Light gathers detailed reporting information every year, and the summary statistics are as follows. The three International Day of Light celebrations 2022-2024 saw over 1000 events take place in over 70 countries and through online worldwide campaigns. Based on organizer feedback, participation in targeted local and national events is estimated as reaching an audience of over 350,000, with a much larger number (approaching a million) involved in online events, including following the progress of the Lunar Eclipse on 16 May 2022. International Day of Light activities cover themes in basic science, photonics, lighting, astronomy, healthcare, and education. Typically, around 10% of activities take place in schools or as a result of school visits to universities or research institutes. The social media impact of the International Day of Light saw mentions and messages from multiple UN agencies, major science and policy organizations, and partners around the world in both the public and private sectors. The social media audience is estimated to exceed 500,000 each year. More information can be obtained from the International Day of Light newsletter archive: <https://www.lightday.org/newsletter-archive>

It is worth noting that the Steering Committee Chairs of the International Day of Light are both members of IUPAP Commissions (John Dudley C17, Joseph Niemela C13). Given their experience working with the United Nations system, Dudley and Niemela were heavily involved in preparing the International Year of Quantum Science and Technology 2025 (IYQ 2025) during the period 2022-2024. Niemela chairs the IYQ Executive Committee, and led the delegation to the United Nations in New York to present the proposal to representatives of Member States. The International Year of Quantum Science and Technology 2025 was declared formally by the United Nations General Assembly on 7 June 2024, led by the Mission of Ghana and supported by over 70 other countries. It is essential to stress the critical long-term role that IUPAP commissions have played in establishing the contacts with international scientists that allowed such broad support to be obtained.

IUPAP will no doubt see extensive celebrations of IYQ 2025 to highlight the central role of quantum science in physics. This said, it is important to stress that while IUPAP may naturally think that this is a “physics celebration,” an International Year goes far beyond that and really touches on trying to raise awareness of the need for science investment and education amongst all citizens of the world as well as political and diplomatic leaders. If all that we do within IUPAP is spend a year “patting ourselves on the back” for the invention of quantum mechanics, then that is a huge wasted opportunity to actually make a significant positive change for the future. In this regard, it is important to consider IYQ 2025 and the annual International Day of Light celebrations as part of the longer-term mission of the IUPAP-initiated International Decade of Science for sustainable development which began in 2024 and which runs until 2033.

Below are 3 examples of recent events, out of many, combining optics and development:

1) Maker Faire Trieste (Aug 31-01 September 2024): An optics outreach event with two young women students from developing regions (from Pakistan and Iran) and one male scientist from Cuba providing facilitation of the outreach to the general public in Trieste, Italy. Coordination of the UNESCO-ICTP stand by J. Niemela (C13 and IDL)

2) East African Summer School on Optics and Lasers, Nairobi Kenya, 6-17 May 2024. An optics school and workshop that included special presentations on the International Day of Light. The IDL provided a grant to fly an expert from Pakistan to Nairobi to participate in the activity which was aimed at boosting the professional development of young scientists, mostly in East Africa. UNESCO-ICTP Organizer: J Niemela (C13 and IDL).

3) Winter College on Optics: Terahertz Optics and Photonics 6-17 February 2023 at UNESCO-ICTP. Local Organizer: Joe Niemela (C13 and IDL). The activity brought around 60 students of early career scientists, over 40% of whom were female, from developing countries to learn about an important

area of optics. Included an invited talk by Prof. Imrana Ashraf on “Educational Outreach and Gender Equity in Pakistan” to support IDL goals.

6. Further Considerations

Listed below are several other matters which we believe to be important for IUPAP and falling within the mission of C13:

- i) Online experiments for the International Year of Quantum Science and Technology (by Horacio Fernandes).

Horacio has described two experiments that could be accessed remotely by students everywhere having internet connectivity. They were relatively low cost to set up and would demonstrate principles of quantum science for the Year of Quantum Science and Technology in 2025. The committee was in favor of pursuing this line and helping Horacio with fund-raising from universities and the private sector-- through an official endorsement-- in order to replicate and diffuse the experiment, particularly in developing countries.

- ii) Women in Physics in Developing Countries (by Mmantsae Diale)

Some progress being made in gender equity in physics, but many of the efforts to lower the barriers to careers were easier to adopt in richer countries, while developing countries are lagging behind. Mmantsae is also using her platform of Africa Materials Research Society to address the plight of women in physics in developing countries and with Farida Fassi from Morocco, they are planning to launch women in Physics in Africa in 2025, hoping that country project will have attracted many more countries.

- iii) C13 Proposal to endorse certain activities for 2025: The International Year of Quantum Science and Technology (By Joe Niemela)

The International Year of Quantum Science and Technology provides a global platform to raise awareness and appreciation of its importance in addressing

many challenges that face all countries, and developing countries in particular, including the basic needs of food, health, sustainable cities and communities, communications, clean water, energy, and a better understanding of the risks from extreme weather and climate change. Because the role quantum theory plays in deepening our understanding of the universe we live in, and its inherent fascination, the year is an opportunity to encourage more young people to take an interest in science-- especially girls and young women-- in all countries, including developing ones. Finally, quantum science and technology is an economic driver and its applications can be considered as “enabling” technologies that promote growth of the private technological sector in these countries. We expect that there may be a number of activities or initiatives focused on quantum science and technology in developing countries, including the interface between mature quantum technologies and applications that can improve peoples’ lives, and are requesting that the commission be able to formally endorse a subset of them that are in line with C13’s mission and IUPAP principles, following an email vote of its members. One such activity, a remotely accessible experiment that explores quantum science presented by one of our members, has been flagged for such formal commission endorsement at our annual meeting just concluded, should that be possible.