Panel on: Africa & Middle East: achievements and expectations from IUPAP

Conveners: Igle GLEDHILL and Rudzani NEMUTUDI

Panelists: Marielle AGBAHOUNGBATA / Andrea LAUSI / Ahmadou WAGUE

Some notes from IUPAP100 - Igle Gledhill 2022-10-14

1. The Membership session: Why it is important to be a member?

IUPAP has an important mission: to assist in the worldwide development of physics research and physics education, to foster international cooperation in physics, and to help in the application of physics toward solving problems of concern to humanity. At present, there are sixty-five members, who work together through the General Assembly, the Commissions, and the Working Groups, proposing and hosting major international conferences, taking up concerns with publication and research facilities, awarding prizes, and fostering the progress of young scientists. Through their joint work, the members defend the free circulation of scientists and the equitable treatment of all scientists. At this session of the Centennial Event, members had the opportunity to discuss the importance of being a member of IUPAP, and to share thoughts about the evolution of membership into the future.

The membership session was convened on behalf of the IUPAP Vice-President for New Members, Prof. Nithaya Chetty, by Prof. Irvy (Igle) Gledhill; both are from South Africa, one of "The Thirteen" founders of IUPAP. The Panel members were:

- Prof. Silvina Ponce Dawson, IUPAP President-Designate, and Principal Researcher of the Argentinian National Research Council CONICET;
- Prof. Christophe Rossel, Past President of the European Physical Society and a member of the Board of the Swiss Academy of Sciences, and therefore also representing "The Thirteen" oldest members of IUPAP; Emeritus Research Staff Member, IBM Zurich Research Laboratory, condensed matter physics;
- Prof. Anisa Qamar, of the University of Peshawar, President of Pakistan Physical Society.

Igle Gledhill introduced the session by beginning with the benefits of membership for a nation contemplating joining IUPAP. National physics derives benefits from international recognition, and forming a Liaison Committee

attracts national attention to physics within a country. The national Science-Policy interface benefits from global inclusion, and high-profile International Conferences can be invited to the country. The country's physicists are eligible for IUPAP awards, and it is a noticeable benefit for a national science system that membership of IUPAP is prestigious – and *not* being a member is noticeable.

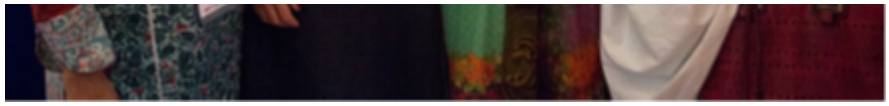
Member representatives make up the General Assembly and vote in resolutions: each member is involved in historic decisions such as "What are the names of the elements?" and "How is the kilogram to be defined?". Nationals of member states are eligible for Commissions and play a leading role in global scientific strategy.

Members participate in global projects, and have a voice in global physics – including within the International Science Council. Silvina Ponce Dawson introduced the new corporate category of membership. IUPAP is reaching out to people working outside academia, to strengthen liaison with physicists and physics-trained professionals who work in environments such as industry and government. Another new category is under discussion: because membership fees can form a barrier for low- and low-middle income countries, a new category of Associate Territorial Members is currently being discussed by Council that will aim to attract low and lower-middle income countries to the Union. This was welcome news, particularly in 2022, the International Year for Basic Sciences and Sustainable Development.

IUPAP is also acting as a link between people who start their careers and people that could help them follow different types of career paths; for example, IAPS, the International Association of Physics Students, is now an affiliated commission of IUPAP.

Christophe Rossel is a member of the newly-formed Working Group on Physics in Industry. This new Working Group has the mandate to assist in the worldwide development of physics, to foster international cooperation in physics amongst academia and industry, and to help in the application of physics toward solving problems of concern to humanity.

Anisa Qamar described IUPAP as "a ray of hope for physicists in Pakistan". A small, but highly enthusiastic, group of physicists gained membership for the nation in 1951, but it was lost in 1955. Through the empowerment of women in physics by IUPAP, two regional conferences were held in Islamabad (2016) and Nepal (2019), and the topic of women in physics in the forefront of socio-economic development came to the fore at the 2017 IUPAP International Conference on Women in Physics, to which Malala Yousafzai, Nobel Laureate, was invited as a plenary speaker. In 2017, Pakistan became a full member again, as a result of determination and goodwill. One of the regional IUPAP Centenary Conferences was hosted in 2022, on plasma physics, condensed matter physics, and high energy physics. In the region, IUPAP is seen as promoting physics education and physics teaching, popularising physics, and reducing the gender gap through celebrating past women in physics, supporting present women in physics, and inspiring future women in physics.



Conference delegates ICWIP2017 Birmingham UK with special guest speaker Malala Yousafzai (Image Credit: ICWIP2017)

It was clear that interest had been sparked in IUPAP membership in the corporate category, and through the Associate Territorial Membership proposal, during the discussion and in conversations over coffee.

2. The Africa and Middle East session

IUPAP is a Union that is organised and run by the physics community itself. It is a stated aim of IUPAP that it seeks to assist the worldwide development of physics. Physics has taken strides in Africa and the Middle East in recent years, and collaborative projects have thrived. The session was convened by Dr. Rudzani Nemutudi and Prof. Irvy (Igle) Gledhill. Talking about experiences and expectations in the region were:

- Dr. Rudzani Nemutudi, Associate Secretary General, IUPAP and Deputy Director, iThembaLABS, South Africa
- Dr. Marielle Agbahoungbata, Director of X-TechLab in Benin
- Prof. Andrea Lausi, Scientific Director, SESAME - Synchrotron-Light for Experimental Science and Applications in the Middle East, Jordan
- Prof. Ahmadou Wagué, the President of the African Physical Society, who is Professor of Physics at the Dakar Cheikh Anta Diop University, in Senegal.

Rudzani Nemutudi introduced the session as a space for broad and diverse discussion, and a time for reflection on IUPAP and the physicists of Africa and the Middle East.

During her talk Mariella Agbahoungbata introduced West Africa, and the extensive “alignment of stars” that led to the X-TechLab training platform for X-ray techniques, involving grants and partnership from the International Council for Scientific Unions, the International Union for Crystallography, LAAAMP, Sèmè City, and the Benin government. The platform has hosted 80 graduate students, post-docs and engineers from 12 African countries

learning techniques in crystallography and X-ray diffraction in one major track, and absorption and phase contrast X-ray imaging in the second track. The expectations for 2030 were set out very clearly: the aims are to raise the student numbers to 500, to include all African countries, and to fund cutting-edge equipment (for example, in X-ray diffraction, microtomographs, X-ray fluorescence, Scanning Electron Microscope and Nuclear Magnetic Resonance equipment).

X-TechLab (Image credit X-TechLab)

Andrea Lausi underscored the way in which the existence of SESAME presents an excellent opportunity for IUPAP to catalyse research collaborative frameworks and general co-operation between Africa and the Middle East Regions: “friendship and science meet at SESAME”. He described the foundation of this facility in the spirit of bringing together scientists across political barriers, and the significant challenges that have been overcome.

The HElmholtz-SEsame Beamline (HESEB) for soft X-ray light had just been inaugurated. Ahmadou Wagué, as President of the African Physical Society (AfPS), described the Society’s role as a forum for African physicists. He provided its history, starting with the inception of the Society of African Physicists and Mathematicians in 1983, through its first participation as an observer the 1999 IUPAP GA, to the announcement of AfPS at iThembaLABS in South Africa in 2007. AfPS was launched in Dakar, Senegal, in 2010, and led by Prof. Francis Allotey as the first President. Subsequent meetings attracted participants from all over Africa, and there are strong links with the African Laser Atomic Molecular and Optical Science Network (LAM Network), with the Edouard Bouchet Abdus Salam Institute (EBASI), with the National Society of Black Physicists in the USA, and with the African Laser Centre (ALC) in Pretoria. Both the African Light Source and the African Strategy for Fundamental and Applied Physics became hot topics at the virtual meeting of 2020 held with ICTP and the East African Institute for Fundamental Research EAIFR, based in Kigali, Rwanda.

An historic photo: launch of AfPS with the President of the Republic of Senegal, January 11, 2010 (Image Credit AfPS)

There was interest from students at the symposium about opportunities for them in the region, and Andrea Lausi and Rudzani Nemutudi mentioned the student programmes at SESAME and iThemba LABS (now designated as an IAEA Regional Training Center for Accelerator Based Science). Rudzani Nemutudi later remarked, “as human beings we make history every passing day of our existence, but only such history as we can make”.

3. General notes (submitted earlier)

Monica Pepe-Alterelli: the *influence* that IUPAP can exert is significant

Michel Spiro: it was not easy to persuade the UN to accept IYBSSD [but it is worth it]

Roberto Lalli: the three principles behind IUPAP: [maybe scientific study, being truly international without exclusion,

ensuring the dignity of the scientist]: these are really important and unifying!

Yves Petroff: the lapse of activity in many countries during the history of IUPAP and the effect on IUPAP; the subsequent revival and growth, and how that was accomplished; the story of ICSU’s loss on the stock exchange [it’s worth knowing the stories – we mustn’t lose the lighter side of our history!], visa problems and how they affected meetings. [I believe this is important history because no doubt we will face similar circumstances again.]

Anatoly Zagorodny: the shelling of the neutron source, the killing of 10 scientists in the Ukraine, and the real concerns about the impact of conflict on science; gratitude for the IUPAP statement

Tataaki Tajita: I (I.G.) have never seen theory with error bars before – an eye-opener!

Stewart Prager: the very significant nature of the threat of use of nuclear arms, to which attention should be paid by the physics community

Gillian Butcher: what is the meaning of diversity in a global context?

Lilia Meza Montes: bringing the voice of indigenous communities to the international table, those who suffered subjugation, marginalisation, exclusion, dispersion

Chandra Singh: self-efficacy fosters physics Joe Niemela: flexibility for those who say “Dear Professor, I’m pregnant” and the sense of belonging

Bill Phillips: practical units and legal units! Asking the awkward questions that challenge assumptions in metrology:

what if Mean Sea Level, a part of many definitions, is changing? Has our understanding of “the vacuum” changed profoundly from the theoretical textbook vacuum? Is the fine structure constant really constant? Shaking the foundations of physics

Jaume Navarro: the historical perspective reveals the real difficulties of pulling an international organisation together during world conflict [I believe this is important history because no doubt we will face similar circumstances again.]

Timothy Palmer: real fundamental contributions of physics to thinking about the complexity of climate phenomena, chaotic models of earth’s systems that exhibit dual-mode behaviour, using the Lorentz attractor as an illustration; putting stochastic models to work in earth system model understanding; “there’s no CERN for climate change” [I think this introduction of a serious fundamental physics view of climate change into the physics community is extremely important; it may be that physicists have been assuming that there is little linkage between physics and climate change, but this talk changed that. In addition, the discussions of the influence that IUPAP can exert, its role in science diplomacy, mean that we will need a good fundamental grounding in speaking aobu the subject.]

Donna Strickland: Maria Goeppert-Mayer (why should atoms absorb only one photon at a time? They should be able to absorb two or three!), to the first multi-photon experimental observations in 1961 Laura Greene: how citizens can talk to the legislative branch in the USA – and the call for sustainable *reliable* funding

Cathy Foley: a practical guide to science policy in the US context, and the translation of information into policy and diplomacy – providing a process; the ability to discuss ideas rather than pursue competition Samia Kharfi Chaddour: accelerating the shift to green economies Giogio Parisi: first hand experience of the battles that take place battles to get governments to support research and development in the discussion on science policy Silvina Ponce-Dawson: the best way to train scientists to talk to non-scientists? the best way for IUPAP to exert influence on policy decisions?

Chandra Singh: the humanising of physics teaching.

The photo contest: stunning! Regular introduction of art into physics conferences works well and changes the sometimes intimidating face of physics.