

From Diplomacy to Physics and Back Again: The Changing Roles of IUPAP in the Second Half of the 20th Century

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PART II
RESHAPING IUPAP AFTER WORLD
WAR II

From Diplomacy to Physics and Back Again

The Changing Roles of IUPAP in the Second Half of the 20th Century

Roberto Lalli

Following an interwar period marked by scientific inactivity and political failures,¹ the International Union of Pure and Applied Physics (IUPAP) underwent a major renovation after World War II. In 1947, IUPAP resumed its activities with new political foundations, completely redesigning the scope and functions of the organization. The emergence of a new world order, and the changing role of physics within it, presented the architects of IUPAP's revival with a set of constraints and goals in the pursuit of making the institution more relevant in the international arena. Simultaneously, the establishment of the United Nations (UN) as the leading organization for maintaining the emerging world order provided a framework, both in terms of organizational structures and objectives, with which international scientific institutions had to engage.²

IUPAP's transformation paralleled those of its sister unions and their umbrella organization, the International Council of Scientific Unions (ICSU), as they were all influenced by the evolving global context.³ However, as a union focused on a specific discipline that had rapidly become crucial for national security and international relations, physicists involved in IUPAP's revival faced unique challenges and issues distinct from other unions. The elevated status of physics following World War II, partly due to its contributions to the Allied military effort,⁴ resulted in a significant increase in the number of physicists employed in governmental organizations, for national policies viewed a large pool of physicists as necessary scientific manpower

¹ See the chapters by Fauque and Fox, and Navarro in this volume.

² Clare Wells, *The UN, UNESCO and the Politics of Knowledge* (London: Palgrave Macmillan UK, 1987).

³ For historical accounts of other ICSU unions, see Adriaan Blaauw, *History of the IAU: The Birth and First Half-Century of the International Astronomical Union* (Dordrecht; Boston: Kluwer Academic Publishers, 1994); Roger Fennell, *History of IUPAC, 1919–1987* (Oxford; Boston: Blackwell Science Ltd, 1994); Olli Lehto, *Mathematics without Borders: A History of the International Mathematical Union* (New York: Springer, 1998); Johannes Andersen, David Baneke, and Claus Madsen, *The International Astronomical Union: Uniting the Community for 100 Years* (Cham: Springer International Publishing, 2019); Danielle Fauque, "1919–1939: The First Life of the Union," *Chemistry International* 41 (2019): 2–6; Norbert Schappacher, *Framing Global Mathematics: The International Mathematical Union between Theorems and Politics* (Cham: Springer International Publishing, 2022); Thierry Montmerle and Danielle Fauque, eds., *Astronomers as Diplomats: When the IAU Builds Bridges Between Nations* (Cham: Springer International Publishing, 2022).

⁴ Richard Rhodes, *The Making of the Atomic Bomb* (New York: Simon & Schuster, 1986).

during political or military crises.⁵ Physicists became essential members of national advisory bodies and diplomatic endeavors.⁶ Some of them even emerged as public figures in the nuclear arms control debate.⁷

In this paper, I will examine how global political forces and individual agendas intersected in the daily activities of IUPAP's officers. It aims to elucidate on the nature of IUPAP as an international scientific institution, and on how its constitutional goals evolved in different political contexts. Since the establishment of the UN, a legal distinction has been made between intergovernmental (IGOs) and non-governmental organizations (NGOs), whereas prior to 1945, this distinction was less clear for international law.⁸ Consequently, it is in the post-World War II period that IUPAP, along with ICSU and all its unions, became legally defined as NGOs.⁹ As discussed in the "Introduction" to the volume, scholars studying scientific internationalism have suggested looking into the dichotomy between NGOs and IGOs by developing two-type taxonomies distinguishing, e.g., between spontaneous and bureaucratic organizations,¹⁰ or between autoletic and heteroletic organizations.¹¹

While these categories can be useful, IUPAP does not entirely fit into taxonomies. It is legally classified as an NGO and should, in principle, operate as spontaneous or autoletic. But the previous chapters in this volume have demonstrated that this was not entirely the case during the interwar period. This paper further confirms it by showing that IUPAP's post-World War II activities were marked by several transitions from one mode of operation to another. I will discuss these transitions by proposing a four-phase periodization including the interwar period discussed in previous chapters:

1. Foundation to the end of World War II (1922–46).
2. Refoundation and growth as a predominantly Western organization (1947–56).
3. Transformation into a bridge between the East and the West during the Cold War (1957–89).
4. Reconfiguration as a global organization aligned with the UN sustainable growth agenda in the post-Cold War era (1990 to the present).

⁵ David Kaiser, "Cold War Requisitions, Scientific Manpower, and the Production of American Physicists after World War II," *Historical Studies in the Physical and Biological Sciences* 33, no. 1 (2002): 131–59.

⁶ For the US case, see Daniel J. Kevles, *The Physicists: The History of a Scientific Community in Modern America* (Cambridge, Mass: Harvard University Press, 1987).

⁷ S. Waqar and H. Zaidi, "Scientists as Political Experts: Atomic Scientists and Their Claims for Expertise on International Relations, 1945–1947," *Centaurus* 63, no. 1 (2021): 17–31.

⁸ Kerstin Martens, *NGOs and the United Nations: Institutionalization, Professionalization and Adaptation* (Basingstoke: Palgrave Macmillan, 2005).

⁹ For the role in world affairs of NGOs, see Akira Iriye, *Global Community: The Role of International Organizations in the Making of the Contemporary World* (Berkeley: University of California Press, 2002).

¹⁰ Elisabeth Crawford, Terry Shinn, and Sverker Sörlin, "The Nationalization and Denationalization of the Sciences: An Introductory Essay," in *Denationalizing Science*, ed. Elisabeth Crawford, Terry Shinn, and Sverker Sörlin (Netherlands: Springer, 1993), 1–42.

¹¹ Aant Elzinga, "Modes of Internationalism," in *Internationalism and Science*, ed. Aant Elzinga and Catharina Landstrom (London: Taylor Graham, 1996), 3–20.

By focusing on the basic features of these phases and the dynamics of the transition from one phase to another it emerges that one primary aim of IUPAP was related to exercises that we call today “science diplomacy.”¹² I thus suggest that IUPAP should rather be viewed as a hybrid science diplomacy organization where the balance between different modes of operation was actively negotiated. I argue that understanding IUPAP as a hybrid science diplomacy organization may provide a more useful historiographical perspective, for a thorough historical examination is necessary to determine how the balance between the two modes unfolded. Furthermore, the paper shows that, despite IUPAP’s inclusion in a larger organizational system of international science, various historical processes related to general political issues were autonomously managed within the organization. In spite of their diversities, individual agendas did play a fundamental role in the decision-making processes in this way building an institution whose historical development was significantly different from that of similar institutions.

The Refoundation of IUPAP in 1947

IUPAP underwent a complete restructuring during the first post-World War II assembly held in Paris in January 1947. This refoundation process was characterized by two key factors which blended scientific and diplomatic ambitions, urging to restart international scientific collaboration while sidestepping the geopolitical divisions of the Cold War. Firstly, individual physicists who had a leading role in the organization advocated for a new approach to international collaborative work. Their goal was to facilitate the establishment of an international community of physicists despite geopolitical barriers. These physicists were aware of IUPAP’s previous failures and of the changing societal and public roles of physics in the aftermath of World War II. Consequently, they envisioned an organization operating differently from its interwar predecessor to address the post-war challenges and support international cooperation in physics.

The thirty delegates present at the fifth IUPAP General Assembly in January 1947 did not assume the organization’s survival as a given. Charles Galton Darwin, for instance, one of the main representatives of the UK delegation, even proposed to dissolve IUPAP, arguing that the Union “had never done anything worthwhile.”¹³ The temporary Secretary General, Paul P. Ewald—a German physicist and crystallographer who had opposed the Nazi regime and emigrated to the UK in 1937—opposed

¹² For current discussion on science diplomacy, see, e.g., Tim Flink and Ulrich Schreiterer, “Science Diplomacy at the Intersection of S&T Policies and Foreign Affairs: Toward a Typology of National Approaches,” *Science and Public Policy* 37, no. 9 (2010): 665–77; Daryl Copeland, “Science Diplomacy,” in *The SAGE Handbook of Diplomacy*, ed. Costas M. Constantinou, Pauline Kerr, and Paul Sharp (SAGE, 2016), 628–41; Pierre-Bruno Ruffini, *Science and Diplomacy: A New Dimension of International Relations* (New York, NY: Springer Berlin Heidelberg, 2017); Charlotte Rungius and Tim Flink, “Romancing Science for Global Solutions: On Narratives and Interpretative Schemas of Science Diplomacy,” *Humanities and Social Sciences Communications* 7, no. 1 (2020): 1–10.

¹³ P. Ewald to L. Kerwin, January 19, 1972, series E2 “Correspondence with Council Members,” vol. 1 “A–R,” folder E, IUPAP, Gothenburg Secretariat (hereafter IUPAP Gothenburg), Center for the History of Science, Royal Swedish Academy of Sciences.

Darwin's proposal. While acknowledging that they were trying to "resurrect [a] body, which ha[d] never shown much sign of life" he advocated for a new role for IUPAP in world affairs.¹⁴ This role implied an explicit definition of the political relations within IUPAP, which Ewald argued should be based on three principles. The first was that IUPAP should remain a strictly scientific institution, free from governmental influence in any form. The second underlined that IUPAP should be truly international avoiding the exclusion policies implemented after World War I. Ewald contended that IUPAP officers should rather invite the former enemy countries in World War II to cooperate as soon as the political conditions allowed. Finally, Ewald stressed that IUPAP should promote a positive public image of the physicists in contrast to the one that saw the physicists as "cogs in the military machine," an image that was becoming widespread because of the role physicists had been playing in the development of nuclear weapons.¹⁵ Ewald's forceful proposal can be seen as part of a broader movement among scientists to revamp institutionalized forms of international scientific cooperation across various disciplines. As a matter of fact, Ewald himself had been instrumental in the establishment of a new union, the International Union of Crystallography, in 1946,¹⁶ and attempts to build institutionalized networks in other specific fields like optics were underway.¹⁷

In addition to these bottom-up efforts, the overall institutional framework of international scientific cooperation was also changing. The creation of the United Nations Educational, Scientific and Cultural Organization (UNESCO) prompted a reorganization of the activities of ICSU and its unions.¹⁸ In December 1946 ICSU and UNESCO signed an agreement of close cooperation to promote the natural sciences. This agreement provided substantial funding for ICSU and its unions to expand their activities and set a framework aligning the unions' agendas with that of UNESCO.¹⁹ In part, this was clearly stated in the agreement between ICSU and UNESCO according to which ICSU should accept the principles that had inspired the foundation of UNESCO, but it was *not* a strict legal requirement, for ICSU and its unions maintained full independence (Figure 3.1).²⁰

Since the foundation of UNESCO many started to think that international scientific ventures should be related to UNESCO and then, to its main goals understood

¹⁴ Paul P. Ewald to B. Gross, January 16, 1947, vol. 3 "Fleury correspondence 1947–1963," folder 21 "Commission on Cosmic Rays," IUPAP, Quebec Secretariat (hereafter IUPAP Quebec), Center for the History of science, Royal Swedish Academy of Sciences.

¹⁵ IUPAP, *Minutes of the Fifth General Assembly, September 1947*, 17, series B2aa, vol. 1 "1923–1966," IUPAP Gothenburg, translation from the booklet *IUPAP 1922–1992*, available at <https://archive2.iupap.org/wp-content/uploads/2013/04/history.pdf>.

¹⁶ Kamminga, H. "The International Union of Crystallography: Its Formation and Early Development," *Acta Crystallographica Section A Foundations of Crystallography* 45, no. 9 (1989): 581–601.

¹⁷ John N. Howard, "The Early Meetings of the International Commission for Optics," *Optics & Photonics News*, June 16–17, 2003.

¹⁸ Wells, *The UN, UNESCO and the Politics of Knowledge*; James Patrick Sewell, *UNESCO and World Politics: Engaging in International Relations* (Princeton, NJ: Princeton University Press, 1975); Aant Elzinga, "UNESCO and the Politics of International Cooperation in the Realm of Science," in *Internationalism and Science*, ed. Aant Elzinga and Catharina Landstrom (London: Taylor Graham, 1996), 89–131.

¹⁹ Frank Greenaway, *Science International: A History of the International Council of Scientific Unions* (Cambridge: Cambridge University Press, 1996).

²⁰ IUPAP, *Minutes of the Fifth General Assembly, September 1947*, 2, series B2aa "General Reports," vol. 1 "1923–1966," IUPAP Gothenburg.

the main difference was the status of these commissions. Rather than being created within IUPAP, these were existing organizations that were incorporated into IUPAP and remained partly autonomous. The first, and for twenty-five years the only one, affiliated commission was the International Commission for Optics (ICO).²²

The creation of commissions became the focal point of IUPAP's revitalized scientific activities, indicating its shift from an organization focused on establishing international standards to one dedicated to promoting international exchange and cooperation in various sub-fields of physics. This trend is exemplified by the first post-World War II specialized commission. Initially focused on standardization in thermodynamics, it quickly expanded its scope becoming the *Commission on Thermodynamics and Statistical Mechanics* in 1948.²³ This commission, along with the second specialized commission on cosmic rays, served as examples of the range of actions that specialized commissions could undertake, particularly in organizing and sponsoring international meetings. On the one hand, this redefinition of IUPAP's activities was in line with the overall framework of the UNESCO-ICSU agreement, which encouraged project-oriented endeavors, and therefore led IUPAP officers and commissions to focus on specific activities. But it also aligned with the efforts of individual physicists to revitalize the Union by including discussions on scientific activities, as well as the general trend of institutionalizing growing international scientific networks, as in the case of affiliated commissions.²⁴

However, the activities under the UNESCO-ICSU agreement introduced some confusion regarding the prioritization and funding of different activities. Initially, there was a broad interpretation of improving the circulation of scientists and adopting a project-oriented approach. IUPAP officers utilized UNESCO funds to provide research travel grants and explored the possibility of supporting specific research projects. These actions produced criticism too. Former IUPAP President Robert Millikan argued that the limited funds available to IUPAP would make such policies unsustainable in the long run and risked undermining its broad scope. Millikan also believed that IUPAP was now “a body which exists primarily for promoting international peace and good will,” in line with UNESCO's agenda of “build[ing] the foundations for lasting peace through stimulating as much as possible acquaintance, friendliness, and understanding between the nations.”²⁵ We don't have any document shedding light on IUPAP officers' reactions to Millikan's views, but the initial activities in support of travel grants and projects rapidly faded away, hence suggesting that they informed IUPAP's initiatives. From the late 1940s, the Union shifted its focus to primarily promoting and sponsoring conferences on specific fields or themes, which continue to shape the core scientific activities of its topical commissions to this day.

²² Howard, “The Early Meetings of the International Commission for Optics.”

²³ IUPAP, *Minutes of the Sixth General Assembly, July 1948*, series B2aa, vol. 1 “1923–1966,” IUPAP Gothenburg.

²⁴ The inclusion of affiliated commissions was a matter of contention within IUPAP, which preferred to support financially growing scientific networks without extending the number of affiliated commissions. This is why the second affiliated commission, the International Society on General Relativity and Gravitation, was only established in 1974. See Roberto Lalli, *Building the General Relativity and Gravitation Community During the Cold War* (Cham: Springer International Publishing, 2017).

²⁵ Robert Millikan to Pierre Fleury, May 19, 1948, series E2 “Correspondence with Council Members,” vol. 1, folder M, IUPAP Gothenburg.

A Western-Driven Organization in the Early Cold War, 1947–1956

Between the fifth and sixth General Assemblies in 1947–48, the few physicists who were involved in IUPAP redesigned the organization's function and activities, relatively free from governmental pressures, in a situation where the majority of the Union's members were political allies of the Western camp. After the re-foundation phase, French physicist Pierre Fleury, an expert in optics and a former student of Henri Abraham, became the Union's Secretary General. Fleury had played a crucial role in the organization of the 1947 General Assembly in Paris and had been instrumental in the establishment of ICO.²⁶ Fleury and the other officers started immediately working to modify the perception of IUPAP as an inactive and useless organization. The first post-World War II decade of IUPAP focused on defining criteria for creating new specialized commissions and engaging renowned international physicists to support their activities. Simultaneously, Fleury and the other IUPAP officials sought to re-activate and enhance the work of the two general commissions created in the interwar period, such as the SUN Commission and the Commission on Publications, aiming to ensure that their decisions were acceptable to all physics national communities in IUPAP member countries.

During this phase, a significant portion of IUPAP's activities involved joint commissions recently established by ICSU to address urgent scientific issues. In 1951, IUPAP's involvement in joint commissions included topics like radioactivity, physico-chemical data, the ionosphere, spectroscopy, and scientific abstracts.²⁷ While the subjects of these joint commissions overlapped with the themes of the newly formed IUPAP topical commissions, joint commissions were designed as short-lived organizations for the rapid resolution of pressing problems, particularly related to standardization. In contrast, IUPAP's own commissions aimed for long-term cooperation in organizing the international development of specific research areas.

Over this first post-World War II decade, this new function was implemented and expanded through an organization primarily composed of national members from the Western bloc. This situation was common to many international organizations at that time due to the Soviet Union's isolationism under Stalin's rule and the absence of the newly formed People's Republic of China (PRC) after the civil war victory of the Chinese Communist Party in 1949. Apart from a few countries, other continents than North America and Europe were also greatly under-represented.

The political, ideological, and practical consequences of these absences have been extensively discussed in the case of UNESCO and were similar in other international scientific organizations associated with it, including IUPAP.²⁸ Until the mid-1950s, US interests dominated these organizations promoting the concept of free science in

²⁶ A. Maréchal, "Pierre Fleury 1894–1976," *Nouvelle Revue d'Optique* 7, no. 6 (1976): 403.

²⁷ For the functioning of inter-union commissions see the chapter by Fauque and Van Tiggelen in this volume.

²⁸ Sewell, *UNESCO and World Politics*; Wells, *The UN, UNESCO and the Politics of Knowledge*; Elzinga, "UNESCO and the Politics of International Cooperation in the Realm of Science."

contrast to the view of science planning dominant in totalitarian regimes.²⁹ Consequently, the principle of open membership envisioned by Ewald in 1947 could not be fully realized during the first ten years after IUPAP's re-establishment. In 1951, only seventeen out of the twenty-six countries listed as IUPAP national committees had representatives at the seventh General Assembly in Copenhagen, with the majority being representatives from the United States, the United Kingdom, and their political allies in the Cold War context.³⁰

This situation led to a partial resolution of the major political issue that had hindered IUPAP's operations in previous decades: the official cooperation with German physicists. The foreign policies of the Federal Republic of Germany (FRG) aimed at integrating with the Western bloc aligned with West German leading scientists' aspiration for the full participation in Western-driven international scientific ventures. In 1952, the IUPAP Executive Committee accepted the FRG's membership request, which was then ratified by the IUPAP General Assembly in 1954, even before the FRG acquired full sovereignty in 1955 (Figures 3.2 and 3.3).

This initial phase played a crucial role in shaping the regulatory role of IUPAP in the scientific arena. However, the dominance of Western bloc members had implications, as evident in the 1951 recommendation by the IUPAP Commission on Publications for abstracts to be published in both French and English, as well as the emphasis on having an information and translation service for papers in Russian.³¹

This phase in IUPAP's post-war history consolidated its role as a sponsor and promoter of international conferences in specific research areas, which became the main activity of the newly created specialized commissions. This reconfiguration of participation by national committees allowed physics communities to organize events with long-lasting positive consequences for the development of physics in their countries and the re-establishment of international contacts after the isolation experienced during World War II. This is exemplified by the efforts of Japanese physicists in organizing the International Conference of Theoretical Physics in 1953³² and the Italian Physical Society's effort to take a leading role in organizing IUPAP-sponsored international meetings during the late 1940s and 1950s.³³ Because of their country's positioning during World War II, Japanese and Italian physicists sought more than others to regain a leading position in the international scientific arena, as promoters of international scientific cooperation ventures.

In addition to standardization and conference organization, some IUPAP specialized commissions still tried to pursue a more project-oriented approach. The Cosmic Rays Commission was established in 1947 in order to "study where and

²⁹ For a discussion on the use of the ideology of scientific freedom in the US psychological warfare during the Cold War see Audra J. Wolfe, *Freedom's Laboratory: The Cold War Struggle for the Soul of Science* (Baltimore: Johns Hopkins University Press, 2018).

³⁰ IUPAP, *Report of the Seventh General Assembly, July 1951*, series B2aa, vol. 1, IUPAP Gothenburg.

³¹ IUPAP, *Report of the Seventh General Assembly, July 1951*, 9–10, series B2aa, vol. 1, IUPAP Gothenburg. For the historical context of use of languages in the sciences, see Michael D. Gordin, *Scientific Babel: How Science Was Done before and after Global English* (Chicago; London: The University of Chicago Press, 2015).

³² See the chapter by Kenji Ito in this volume.

³³ Roberto Lalli, "Cento anni di IUPAP," *Il Nuovo Saggiatore* 39 (2023): 45–56.



Figure 3.2 Eight IUPAP General Assembly in London in 1954. Mott is at the center of the first line, to his left Karl K. Darrow and IUPAP Secretary General Pierre Fleury. To his right one sees Werner Heisenberg who officially represented the German commission when it was officially admitted in IUPAP

Source: Courtesy AIP Emilio Segrè Visual Archives, Marshak Collection.

GA 1954



created with [historic.almoart.net](https://historicalmapchart.net/)

Figure 3.3 IUPAP national members in 1954

Source: Members listed in *IUPAP, Report of the Eight General Assembly, July 1954, 19–20, 1954*, series B2aa, vol. 1, IUPAP Gothenburg. Created by the author with <https://historicalmapchart.net/>.

how international planning of work would be most useful.”³⁴ This commission had the ambitious goal to discuss the coordination of research, with special reference to the coordination of observations at different altitudes, which was put forward by its First Secretary Pierre Auger, a key figure in the future establishment of the European Organization for Nuclear Research (CERN).³⁵ This activity included a mapping of the observatories in IUPAP member states,³⁶ but later involved the support to Indian physicist Homi J. Bhabha’s proposal for the creation of a UNESCO high-altitude laboratory in the Himalaya range (which ultimately did not materialize).³⁷ The project-oriented approach of the Cosmic Rays Commission differed from other commissions due to the unique nature of cosmic-ray research and its significance in the planning of the International Geophysical Year—one of the most important international cooperation projects initiated by ICSU in the 1950s that involved a complete reconfiguration of participation in international endeavors.³⁸

Following Stalin’s death and the conclusion of the Korean War in 1953, there were significant changes in Soviet internal and foreign policies. These led to increased Soviet participation in international organizations such as UNESCO, ICSU, and its affiliated unions which contributed to make them less “Western,” especially as the involvement of the Soviet Union consequently prompted greater participation from other Eastern European scientific institutions.³⁹ IUPAP was no exception to this trend.

IUPAP as a Venue for East-West Negotiations in the Cold War Scenario, 1957–1989

In November 1956, the IUPAP Executive Committee accepted the membership request of the Soviet Union, a decision ratified by the ninth IUPAP General Assembly held in Rome in 1957. The involvement of the Soviet Union immediately resulted in the participation of most countries from the Soviet Bloc and other communist nations in the activities of IUPAP (Figures 3.4 and 3.5). Starting from 1957, this change in membership marked the beginning of a new phase for IUPAP characterized by a reconfiguration of the Union’s science diplomacy role. Whether explicitly recognized by IUPAP officers or not, governments became more involved in its organizational affairs. The participation of scientists of Eastern European countries in international ventures were centrally controlled by politicized state apparatuses. From the Western camp, the participation of Eastern Bloc countries meant that such international

³⁴ P. Fleury to Pierre Auger, January 22, 1947, vol. 3, folder 21 “Commission on Cosmic Rays,” IUPAP Quebec.

³⁵ A. Hermann et al., *History of CERN, I: Launching the European Organization for Nuclear Research* (Amsterdam; New York: North Holland, 1987).

³⁶ P. Auger, Project and questionnaire, undated, vol. 3, folder 21 “Commission on Cosmic Rays,” IUPAP Quebec.

³⁷ P. Petitjean et al., eds., *Sixty Years of Science at UNESCO 1945–2005* (Paris: Unesco, 2006), 56.

³⁸ Roger D. Launius, James R. Fleming, and David H. DeVorkin, eds., *Globalizing Polar Science: Reconsidering the International Polar and Geophysical Years* (New York: Palgrave, 2010).

³⁹ Konstantin Ivanov, “Science After Stalin: Forging a New Image of Soviet Science,” *Science in Context* 15, no. 2 (2002): 317–38.



Figure 3.4 IUPAP General Assembly at Basel in 1966. In the first row, far left, is Fleury and third from his left is Soviet physicist Dmitry I. Blokhintsev, who became President in that General Assembly, followed by Louis Néel, Paul Huber, Clifford Butler, Gordon Sutherland, J. Lecomte, and M. Kotani

Source: Larkin Kerwin, “The International Union of Pure and Applied Physics,” *Physics Today* 22, no. 5 (1969): 53–5, on 55, with the permission of the American Institute of Physics.

scientific organizations were re-interpreted as a venue for negotiation and exchange of information crossing the East-West divide. One immediate change that shaped the institution was that a balance between the numerical representation of the two superpowers, and of the two Cold War blocs, became an imperative.⁴⁰

High-ranking IUPAP officers were fully aware of the impact that enlarged membership within the political context of the Cold War would have on the organization. As argued by Cozzoli in this volume, Edoardo Amaldi was elected as the new President in 1957 precisely because IUPAP officers saw him as the ideal figure to lead IUPAP through this delicate transformation of membership and role.⁴¹

During Amaldi’s three-year presidency, he faced significant political challenges while overseeing the growth of IUPAP’s scientific activities. The major political controversies he encountered at the beginning of this new phase were related to membership requests from national institutions situated in territories whose political independence was hotly contested. Between 1958 and 1959 the IUPAP Executive Committee received membership requests from the PRC, from the ROC in Taiwan,

⁴⁰ See, e.g., the chapter by Hof in this volume.

⁴¹ See the chapter by Cozzoli in this volume.

and from the German Democratic Republic (GDR). At the time, both the PRC and the ROC claimed to represent all of China, while the status of the GDR was challenged by the FRG. Since 1955, the FRG implemented the Hallstein Doctrine, which threatened to sever diplomatic relations with any nation recognizing the GDR. In cases of territorial conflicts, IUPAP membership, which was based on the concept of national membership, could provide semi-official international recognition to these territories. Hence, participation in IUPAP and similar international bodies carried symbolic diplomatic value for the respective governments.

The diplomatic dimension of these issues became soon evident to the officers involved. When it became known that the IUPAP Executive Committee was considering Taiwan's Chinese Physical Society membership request, the Chinese Physical Society of Beijing threatened to withdraw. The US State Department was particularly committed to advocating the inclusion of Taiwan as a national member of IUPAP (as was the case in other unions).⁴² Similarly, the West German national committee opposed the request for membership of the GDR's Physics Society, arguing that Eastern German physicists could be included in a unique German national committee, aligning therefore with their country's foreign policy of the Hallstein Doctrine.

Detailed analyses of these negotiations are presented in other chapters of this volume,⁴³ but it is important to recall here how they influenced the officers' understanding of IUPAP's changing role. While IUPAP officers sought suggestions from ICSU and other unions, they ultimately had to make their own decisions autonomously. So, in 1959, one year after accepting the membership of the Chinese Physical Society of the PRC, the IUPAP Executive Committee discussed the membership request from the Chinese Physical Society of the ROC during a meeting in Moscow. The majority of the committee voted in favor of accepting the application, although this decision was not uncontroversial.⁴⁴ To accept the Taiwanese Physical Society, IUPAP officers had to explicitly redefine the interpretation of "national membership" in the IUPAP statutes. The majority agreed to interpret literally the statutes' definition, which referred to "territories that are scientifically independent."⁴⁵ However, they added that this interpretation did not carry any political implications regarding the recognition of the independent status of these territories. This autonomous decision was in line with the Principle of Political Non-Discrimination issued by ICSU in 1958,⁴⁶ but it didn't go uncontested. In fact, this perspective sharply contrasted with Joseph Needham's understanding of the definition of national membership

⁴² For a compelling analysis of this process in the IAU, see Ronald E. Doel, Dieter Hoffmann, and Nikolai Krementsov, "National States and International Science: A Comparative History of International Science Congresses in Hitler's Germany, Stalin's Russia, and Cold War United States," *Osiris* 20, no. 1 (2005): 49–76; Thierry Montmerle, "When China Left the IAU: A Reappraisal," in *Astronomers as Diplomats: When the IAU Builds Bridges Between Nations*, ed. Thierry Montmerle and Danielle Fauque (Cham: Springer International Publishing, 2022), 169–98.

⁴³ See chapters by Hu, Liu, and Yin, Olšáková, and Cozzoli in this volume.

⁴⁴ Réunion de Comité Exécutif, Moscou, 1959, *Compte-rendu succinct*, box 106, folder 1, subfolder 6 "Corrispondenza Fleury 1959–1960," fondo Edoardo Amaldi, subfondo Archivio Dipartimento di Fisica (hereafter AEA), Physics Department Archives of Sapienza University of Rome.

⁴⁵ E. Amaldi to N. Mott, November 24, 1959, box 106, folder 1, subfolder 4 "Corrispondenza Presidente 1957–1960," AEA.

⁴⁶ ICSU, Resolution on Political Non-Discrimination, Washington DC, October 1958, Appendix D in ICSU, *Universality of Science. Handbook of ICSU's Standing Committee on Free Circulation of Scientists*



Figure 3.5 Map of IUPAP national members in 1960

Source: Members listed in *IUPAP, Report of the 10th General Assembly, September 1960*, 4–5, series B2aa, vol. 1, IUPAP Gothenburg. Created by the author with <https://historicalmapchart.net/>.

in his subsequent letter arguing against Taiwanese membership in ICSU-related international organizations.⁴⁷

A few months later, when confronted with controversies arising from the membership request of the East German physical society, the decision regarding Taiwanese membership served as a precedent that led the IUPAP Executive Committee to accept the membership of the GDR committee, despite protests from the West German national committee. Amaldi summarized the rationale behind this decision, stating that the Executive Committee could not adopt different approaches in two cases that held similar political implications from opposite sides of the Iron Curtain.⁴⁸ The IUPAP Executive Committee stood by its decisions even accepting that the PRC delegates withdrew membership on the ground that it could not participate in any organization that recognized the ROC, even if implicitly. For the first time, the minutes of the General Assembly held in Ottawa in 1960 explicitly documented the representatives' votes on membership requests, revealing political divisions among members (Figure 3.5).⁴⁹

It was immediately evident that the loss of the PRC physics community constituted a significant setback for IUPAP's global ambitions, given China's scientific potential. Amaldi attempted to convince the President of the Chinese Physical Society in Beijing not to withdraw by emphasizing that the IUPAP Executive Committee had

(Stockholm: ICSU, 1990), 14. Copy in series E8 "Correspondence concerning visa problems," vol. 1, "1975–1996," IUPAP Gothenburg.

⁴⁷ Joseph Needham to Rudolph Peters, May 20, 1960, box 106, folder 1, subfolder 4 "Corrispondenza Presidente 1957–1960," AEA.

⁴⁸ E. Amaldi to Ferdinand Trendeleburg, March 17, 1960, box 106, folder 1, subfolder 4 "Corrispondenza Presidente 1957–1960," AEA.

⁴⁹ *IUPAP, Report of the 10th General Assembly, September 1960*, 22, series B2aa, vol. 1, IUPAP Gothenburg. The delegations of the USSR, Poland and Czechoslovakia voted against the admission of Taiwan, while the delegation of East Germany, Spain and Japan abstained. See also E. Amaldi to N. Mott, September 22, 1960, box 106, folder 1, subfolder 4 "Corrispondenza Presidente 1957–1960," AEA.



Figure 3.6 18th IUPAP General Assembly held at the International Center for Theoretical Physics, Trieste in 1984. It was the first General Assembly in which physicists from both PRC and Taiwan attended as official representatives

Source: ICTP Photo Archive/Ludovico Scrobogna.

maintained a neutral stance by accepting both East German and Taiwanese members. However, this strategy proved unsuccessful. Physicists in mainland China only joined IUPAP twenty-five years later, over a decade after the easing of political tensions between the United States and the PRC had begun, and only after IUPAP officially amended its statutes during the 1981 General Assembly, changing the definition of membership from national to liaison committees (Figure 3.6).⁵⁰ This change resulted from lengthy negotiations between IUPAP officers and representatives of the PRC, and was a necessary condition for the PRC membership. These negotiations spanning several decades exemplify the internal struggles within IUPAP to establish principles and rules that could provide a balance amidst the political and ideological divisions of the Cold War.

These cases underscore the subtle yet explicit diplomatic functions that IUPAP assumed during this period, as the organization endeavored to define its role as a non-governmental organization in which, however, the actual negotiations made clear references to governments' needs, strategies and goals. On one hand, governments considered highly important the participation of their national scientific organizations in such international NGOs and, in some cases, were actively involved to pursue

⁵⁰ *IUPAP General Report 1982*, series B2aa, vol. 2, IUPAP Gothenburg.

politically relevant goals, even though only scientists were officially involved in the negotiations. On the other hand, a group of Western-based IUPAP officers genuinely sought to establish principles independently, demonstrating that they were not merely acting under pressures from the United States and its Western allies' governments, which politically supported Taiwan. Years later, the admission of East Germany's scientific organizations to IUPAP, ICSU, and other unions was hailed as a seminal moment in which officers in these organizations acted against the will of their own governments, with IUPAP being the first union to accept a scientific organization representing the GDR.⁵¹

Another important aspect that signifies the changing role of IUPAP after 1957 is evident in the negotiations surrounding the selection of Edoardo Amaldi's successor. Initially, Amaldi was expected to serve two terms, totaling six years. However, recognizing the necessity for a more rapid turnover, given the evolving membership and the new responsibilities undertaken by IUPAP, he decided to step down at the end of his first term.⁵² Consequently, he campaigned to establish a norm where a single term of service would be the standard. Simultaneously, the long-serving Secretary General, Fleury, also offered his resignation. While many officers acknowledged Fleury's significant contributions during IUPAP's renovation phase,⁵³ others held differing opinions. Dissatisfaction among members of the US national committee arose due to their concerns regarding Fleury's handling of the role. The latter were eager to witness a rejuvenation in the position of Secretary General after Fleury had occupied it for over fifteen years.⁵⁴

The prospect of losing both Amaldi and Fleury brought forth the question of ensuring continuity in the process of renewal. At the 1959 meeting in Moscow, the IUPAP Executive Committee members agreed to amend the statutes and introduce a new officer position: the First Vice-President. This role was designed to serve as the President in the subsequent term, providing three years to acquire the necessary knowledge and experience. Determining the next set of officers initiated a lengthy exchange of letters among IUPAP officers, revealing diverse views on the organization and the relationship between the selection of officers and the composition of IUPAP membership. Additionally, this process shed light on the fact that the decision-making nucleus was actually a small subsection of the Executive Committee. The IUPAP Vice-President, Robert B. Brode, who was also a member of the US national committee, along with Amaldi and Mott, deliberated on the matter for months before presenting a solution to the other officers. However, even among the three of them, no consensus on a shared proposal could be reached.⁵⁵

⁵¹ Statement by Harrison Brown, 8th Meeting of the General Committee of ICSU, September 9, 1977, 3, vol. 1, folder 9/1 "Kerwin's Correspondence 1971–1977, ICSU—Libre circulation des scientifiques," IUPAP Quebec.

⁵² E. Amaldi to N. Mott, July 28, 1959, box 106, folder 1, subfolder 6 "Corrispondenza Fleury 1959–60," AEA.

⁵³ Hans H. Staub to P. Fleury, February 17, 1960, box 106, folder 1, subfolder 6 "Corrispondenza Fleury 1959–60," AEA.

⁵⁴ Robert B. Brode to J. H. Van Vleck, July 18, 1957, box 1, folder 15 "Correspondence 1949, 1957," Robert B. Brode Papers, Bancroft Library, University of California Berkeley.

⁵⁵ N. Mott to E. Amaldi, August 1, 1959, box 106, folder 1, subfolder 4 "Corrispondenza Presidente 1957–1960," AEA.

The discussion revolved around geographical and geopolitical balance, categorized into the West and the East, although the interpretations of these terms varied among individuals. Amaldi included India and Japan among the Eastern countries based on geographical, cultural, and historical considerations. He envisioned a long-term alternation between East and West in the IUPAP presidency. Consequently, he believed that his successor should be a representative of the East, favoring the Indian nuclear physicist Homi J. Bhabha. In contrast, the First Vice-President should be a prominent figure from the West, specifically an US physicist, followed by a Soviet First Vice-President in the subsequent election.⁵⁶ While adhering to the concept of alternation, others employed a more politically oriented interpretation of the East-West balance. Amaldi sought to understand the position of the US national committee regarding the suggested names and the underlying rationale of the proposed scheme.⁵⁷ Although Brode generally accepted the scheme, he advocated for the immediate election of a Soviet President as a representative of the East, contrary to Amaldi and Mott, who preferred Bhabha. Upon receiving contrasting opinions from the Executive Committee at large, Amaldi proposed Bhabha as the successor.⁵⁸ To ensure continuity, Fleury accepted to remain as Secretary General for three more years, while a new figure, the Associate Secretary General, would have the same three-year period as the First Vice-President to familiarize themselves with the duties of the Secretary General.

From a structural standpoint, this debate led to establish the position of the First Vice-President to guarantee continuity in the functioning of IUPAP. The new position was officially incorporated into the statutes at the tenth General Assembly in Ottawa, although the succession from the First Vice-President to President was not made automatic.⁵⁹ At the 1960 General Assembly, Bhabha became the seventh President of IUPAP. However, Amaldi's overall plan for alternation with a US Vice-President did not materialize. Instead, a representative from France, solid-state physicist Louis Néel, was elected as the First Vice-President. The discussion and outcome of the debate on the appointment of future officers highlight how IUPAP was maturing as an organization, with a strong self-perception of its various roles, thanks to its increased and more diverse membership.

The Eastward enlargement of IUPAP membership in the post-1957 period brought about significant reconfigurations in the organization's activities, primarily influenced by Cold War concerns. Three key themes emerged during this period, the first two being highly interconnected. The first theme was the focus on physics education, which coincided with a reform of the physics curriculum in the 1960s.⁶⁰ Although IUPAP had previously been involved in educational activities, the establishment of a Commission on Education in 1960 marked an official commitment. It also chimed with the aims and goals of UNESCO, which aimed to support the development of scientific education. Since the signing of the agreement with ICSU there were

⁵⁶ E. Amaldi to N. Mott, September 9, 1959, box 106, folder 1, subfolder 4, AEA.

⁵⁷ E. Amaldi to R. Brode, November 23, 1959, box 106, folder 1, subfolder 4, AEA.

⁵⁸ E. Amaldi to H. Bhabha, May 23, 1960; H. Bhabha to E. Amaldi, July 6–8 1960, box 106, folder 1, subfolder 4, AEA.

⁵⁹ E. Amaldi to N. Mott, September 22, 1960, box 106, folder 1, subfolder 4, AEA.

⁶⁰ See chapter by Simon in this volume.

expectations that ICSU unions would do just that, in line with UNESCO's agenda, but it only became a priority after the Eastward enlargement of the membership.⁶¹

A second theme emerged prominently in this phase: the support for physics in developing countries. UNESCO promoted activities in this direction, which gained momentum after the Soviet Union joined the UN organization. In 1957, the IUPAP General Assembly "invite[d] the President and the Secretary General to contact U.N.E.S.C.O. about the possibility of helping *under-developed countries* in matters concerning the development of physics."⁶² This focus on developing countries shifted IUPAP's priorities. Assuming that such countries were more interested in applied physics for industrial applications rather than basic research, IUPAP started addressing issues related to applied physics, which had not received significant attention previously.⁶³ Furthermore, IUPAP directed its focus on physics education to explore effective ways of articulating physics education in developing countries.⁶⁴

The third theme that emerged during this period was closely tied to Cold War imperatives and initially centered around the status of East Germany. After the East German Physical Society had become an IUPAP national member in 1960, the issue of obtaining visas for physicists from all member states to attend IUPAP-sponsored international conferences became a challenge. East German physicists faced enormous difficulties in attending conferences in NATO countries.⁶⁵ This visa problem led to a debate at the 1963 General Assembly in Warsaw, where a resolution was passed emphasizing that "the free travel possibilities of all scientists forms an indispensable basis for successful international co-operation."⁶⁶

In connections with the discussion in other unions and in ICSU that were experiencing similar problems, in 1963 this issue was reconceptualized as the principle of the "free circulation of scientists," which became a major focus of ICSU. As argued by Turchetti in this volume, the East German problem in attending conferences in NATO countries sparked a controversy between IUPAP and NATO, which was pivotal in the creation of the ICSU Standing Committee on the Free Circulation of Scientists (SCFCS) aiming to prevent the exclusion of scientists based on political discrimination from international congresses sponsored by the ICSU family.

IUPAP officers made this issue a primary matter of concern. This redefined the organization's role, with the visa problems becoming independent of the original East German issue and informing a variety of other cases of discrimination globally. Political conflicts between IUPAP member states disrupted the activities of committees, and hampered participation to conferences for scientists of a number of nationalities.

⁶¹ Petitjean et al., *Sixty Years of Science at UNESCO 1945–2005*, 77–80.

⁶² IUPAP, *Minutes of the Fifth General Assembly, September 1947*, 27, series B2aa "General Reports," vol. 1 "1923–1966," IUPAP Gothenburg.

⁶³ See chapter by Martin in this volume. See also Presidential Address by Professor Robert F. Bacher at the 14th General Assembly, Washington, September 1972, IUPAP General Report 1973, 94–103, series B2aa, vol. 2, IUPAP Gothenburg.

⁶⁴ See, e.g., folder 4.31 "International commission on Physics Education, 1965–83" Larkin Kerwin fonds (P202), subseries P202/B4 IUPAP, *Division de la gestion des documents administratifs et des archives*, Université Laval, Quebec, Canada (hereafter IUPAP Kerwin).

⁶⁵ See the chapters by Olšáková and Turchetti in this volume.

⁶⁶ Report 11th General Assembly, Warsaw 1963, 20, series B2aa, vol. 1, IUPAP Gothenburg.

From 1967 an increasing number of cases depended on the disruption of diplomatic relations between the USSR and Israel after the Six-Day War.⁶⁷

The issue of the free circulation of scientists underscored IUPAP's increasing role in science diplomacy. This was exemplified by Canadian physicist, Larkin Kerwin, IUPAP Associate Secretary General from 1963. In *Physics Today*, Kerwin summarized the main purposes of IUPAP this way: "The Union's purpose is to foster international physics meetings, more rapid dissemination of information and the establishment of international standards, units and nomenclature. Its *unofficial* goal is to make a contribution to general international understanding."⁶⁸ The unofficial, political goal underlined by Kerwin is not discussed in detail in the article, but the increasing self-perception of officers that IUPAP was also an agent in diplomatic relations was intimately related to the issue of the free circulation of scientists, in which Kerwin himself was particularly involved.⁶⁹ The free circulation of scientists also evolved as a concept, including the issues of obtaining exit visas from the scientists' own nation up to the limitations imposed to scientists who wanted to migrate.⁷⁰

Starting from the late 1960s, the topic of the free circulation of scientists became so central that in 1972 Canadian physicist Robert. E. Bell defined it "the most important aim of IUPAP."⁷¹ Bell proposed a range of actions to negotiate with hosting countries and ensure that "bona fide" scientists were not excluded from IUPAP-sponsored international meetings based on nationality. While countries had the right to reject individual visa applications, Bell suggested that hosting countries should allow substitutes of the same nationality. Failure to achieve this would show that the exclusion was based solely on political discrimination, and this should lead IUPAP to withdraw sponsorship of conferences in such cases. The pursuit of the free circulation of scientists became increasingly relevant, shaping the organization of conferences and the relations between IUPAP committees and hosting countries. In 1981, IUPAP even withdrew sponsorship of a conference, highlighting the significance of this matter.⁷²

When the IUPAP statutes underwent major changes in 1981, the very first article defining the aims of the Union was also modified. The aims of IUPAP were now summoned in six chapters rather than the four of the previous version. The new two goals were: "to foster free circulation of scientists" and "to encourage research and education."⁷³ With this modification stressing the central role of the pursuit of the free circulation of science and education, IUPAP members officialized the shifted range of activities that had been characterizing the science diplomacy function of the Union during the Cold War.

⁶⁷ See, e.g., Lalli, *Building the General Relativity and Gravitation Community During the Cold War*.

⁶⁸ Larkin Kerwin, "The International Union of Pure and Applied Physics," *Physics Today* 22, no. 5 (1969): 53–5, emphasis mine.

⁶⁹ See, e.g., series E8 "Correspondence Concerning Visa Problems," vol. 1, IUPAP Gothenburg.

⁷⁰ *Universality of Science: Handbook of ICSU's Standing Committee on the Free Circulations of Scientists*, 1990, series E8, vol. 1, folder 28 "ICSU Statements," IUPAP Gothenburg.

⁷¹ R. E. Bell, "Memorandum," September 23, 1972, *IUPAP, Report of the 14th General Assembly, Washington DC 1972*, 92, series B2aa, vol. 2, IUPAP Gothenburg.

⁷² It was the conference on defects in insulating materials held in Riga, Estonia, USSR, in May 1981, where Israeli physicists could not take part. See, series E8 "Correspondence concerning visa problems," vol. 1, folder 14 "1981 Riga USSR," IUPAP Gothenburg.

⁷³ *IUPAP, General Report, 1982*, 8, series B2aa, vol. 2, IUPAP Gothenburg, emphasis mine.

The strict adherence to the principle of the free circulation of scientists sometimes conflicted with other principles implemented by international scientific organizations. A major contention arose in 1987/8 when Japanese authorities followed the UN ban on South Africa due to apartheid. In compliance with the UN policy, Japanese authorities asked South African scientists seeking visas for an IUPAP-sponsored conference to sign a declaration disavowing racial prejudice and membership in discriminatory organizations.⁷⁴ This request was considered a repudiation clause by ICSU, contradicting the principle of the free circulation of scientists, which should apply regardless of political views. Japanese physicists argued instead that ICSU's position was untenable in this case, highlighting the conflict of principles that required specific actions rather than rigid adherence to the free circulation principle.⁷⁵

In Search of a New Identity in the Post-Cold War Period

The significant role played by the pursuit of the free circulation of scientists indicates that IUPAP gained popularity among physicists primarily because it allowed for, or at least facilitated, exchanges among scientists, overcoming geopolitical barriers. Most of these barriers were associated with the Cold War. IUPAP officers had consciously transformed IUPAP into an organization that enabled scientific exchanges that would have been otherwise difficult if not impossible. During the Cold War, IUPAP was far from being a truly global organization, as its membership included only a few countries from the Global South, with insufficient representation from Africa, Asia, and Latin America. Nonetheless, the active participation of Eastern European countries established its status as a privileged platform for scientific exchange among physicists.

After 1989, this was no longer the case. The privileged position of physics began also to fade away, for it lost the place it had as the most relevant natural science for military developments during the Cold War and the nuclear arms race. With the conclusion of the Cold War rivalry, state support for physics research significantly diminished, leading to a decline in the primacy of physics as *the* science fundamental to national security.⁷⁶ Furthermore, in addition to physicists' reduced influence on state affairs after the Cold War, IUPAP also lost one of its major objectives that had defined its actions during that era. IUPAP's role in facilitating international exchanges and cooperation between scientists working on opposite sides of the Iron Curtain was no longer deemed necessary. The changing context led physicists to question the necessity of IUPAP, similar to what happened in the post-World War II period. At the 22nd General Assembly in Uppsala in 1996, the IUPAP President, the Japanese

⁷⁴ Michiji Konuma to Jan S. Nilsson, April 11, 1988, series E8 "Correspondence Concerning Visa Problems," vol. 1, folder 24 "Japan 1987/88 Problems," IUPAP Gothenburg.

⁷⁵ Jiri Kondo to Jan S. Nilsson, April 15, 1988, series E8 "Correspondence Concerning Visa Problems," vol. 1, folder 24 "Japan 1987/88 Problems," IUPAP Gothenburg.

⁷⁶ Michael Riordan, "The Demise of the Superconducting Super Collider," *Physics in Perspective* 2, no. 4 (2000): 411–25.

physicist Yoshio Yamaguchi, acknowledged that IUPAP had gained popularity during the Cold War primarily because it allowed for East-West encounters.⁷⁷ Consequently, it became imperative for IUPAP officers to reinvent the organization, with some critics highlighting its inadequate response to the challenges of the post-Cold War era, particularly its inactivity in supporting scientists from the former Eastern Bloc.⁷⁸

The reconfiguration of IUPAP activities by its officers was driven by major social and scientific concerns. Efforts were made to expand membership in the Global South and address the issue of sustainable development, consequently shifting the focus towards applications rather than basic research. Another significant issue that was specifically addressed was the gender imbalance in physics, which led to the creation of a special Working Group on Women in Physics in 2002. The participation of women in physics had traditionally been little visible, and this was amplified in IUPAP General Assemblies, where female scientists were scarce if not absent (see Figures 3.2, 3.3, and 3.4). IUPAP officers decided to address this issue by promoting greater enrollment of women in physics departments and encouraging their participation in the organization's activities, committees, Executive Councils, and General Assemblies.

Lastly, IUPAP directly confronted the decline of physics, which its officers attributed to a reduction in funding. At the General Assembly in Berlin in 2002, President Burton Richter advocated for a reductionist perspective, mirroring the linear model of innovation. In Richter's view, IUPAP should promote the argument that advances in sciences deemed more useful by the public and lawmakers, with biotechnology being highlighted as the most relevant example, were dependent on "long-term research in the physical sciences."⁷⁹ These viewpoints encapsulated the most significant changes in the role of IUPAP at the turn of the millennium, ultimately leading to a substantial increase in the membership of countries from the Global South in 2008 (Figure 3.7).

The post-Cold War era presented mounting challenges to an organization that had shaped itself in response to Cold War imperatives, where physicists had attained influential positions in state decision-making processes, thereby assuming greater political responsibilities. To address the declining social and political standing of physics, IUPAP officers expanded the social scope of the institution and used the linear model to emphasize the foundational role of physics in technological progress in public and political arenas. Alongside a heightened focus on gender balance and an increase in membership from the Global South, the primary message IUPAP officers sought to convey was the primacy of physics research in technological and economic development.

⁷⁷ Yoshio Yamaguchi, "IUPAP—Present and Future," in *IUPAP, General Report 1997*, 37, series B2aa, vol. 3, IUPAP Gothenburg.

⁷⁸ Frank Pobell, "Comments on the Future Role and Future Structure of IUPAP," in *IUPAP, General Report 1994*, 50, series B2aa, vol. 3, IUPAP Gothenburg.

⁷⁹ Burton Richter "President's Address to the IUPAP General Assembly," Berlin 2002, available at <https://archive2.iupap.org/general-assembly/24th-general-assembly/minutes/appendix-b/>, for the concept of linear model of innovation, see, e.g., Benoît Godin, "The Linear Model of Innovation: The Historical Construction of an Analytical Framework," *Science, Technology, & Human Values* 31, no. 6 (2006): 639–67.



Figure 3.7 Map of IUPAP national members in 2008

Source: Members listed in *IUPAP, Minutes of the 26th General Assembly, Japan, October 2008*, 2, available at https://archive2.iupap.org/wp-content/uploads/2013/12/file_50089.pdf [last accessed on September 8, 2023]. Created by the author with <https://historicalmapchart.net/>.

Conclusion

This chapter has provided an overview of the evolving roles of IUPAP from the aftermath of World War II to the present day. The analysis was based on the view that IUPAP's history can be divided in the four major phases listed in the "Introduction" of this chapter. This periodization has allowed to highlight significant shifts in the goals, actions, and priorities of IUPAP between each phase. In most cases IUPAP officials recognized the need for substantial transformations in the organization's regulatory role to support an international community of physicists, which was in principle global, but in practice heavily limited by political conditions in the different periods. This is particularly true for the reconfigurations of activities and public images occurring after the end of World War II and the Cold War. The passage between the second and third phase, from a Western-led organization to a venue for East-West negotiations, was perhaps more implicit. Still, IUPAP officers had a clear perception that deep changes in the role and structure of the organization were needed to face the eastward enlargement of membership.

These phases aligned to broader transformations in global political orders, driving the need for renovation and adaptation within the organization. IUPAP's transformations were primarily influenced by the political context rather than by major reconstructions of physics knowledge. Even the establishment of topical scientific commissions was often motivated by internal negotiations within IUPAP and national committees, with their work also shaped by political concerns and constraints.

However, it is important to note that IUPAP did have a crucial scientific role. The organization played a central part in setting internationally agreed standards,⁸⁰

⁸⁰ See the chapter by Doran in this volume.

resolving scientific disputes,⁸¹ and supporting the development of sub-disciplines or research areas.⁸² Nevertheless, the conditions and priorities set by IUPAP officials were primarily determined by the political context, emphasizing the diplomatic aspect alongside scientific endeavors. This was expressed publicly by IUPAP officials, emphasizing the organization's need to remain free from governmental interference or acknowledging its "unofficial" goal of improving political relations within the UNESCO framework, fully in line with the present-day understanding of science diplomacy.⁸³

The chapter prompts a reflection on how to categorize IUPAP as an international scientific institution. The first period, between the two World Wars, was dominated by political aspects, illustrating the limitations of an idealistic view of international scientific cooperation. The second period witnessed an attempt to reestablish IUPAP based on different principles and a focus on promoting physics internationally, albeit within a limited section of the world due to the organization's predominantly Western nature.

With the entrance of the Soviet Union, the aspiration for IUPAP to remain free from governmental pressures became unrealistic. Negotiations between IUPAP officials, commissions, and governments became more prevalent, with some officials being closely tied to their respective nation's agendas and foreign policies. While IUPAP was undeniably an NGO after 1946, it is harder to argue that it was entirely "spontaneous" or "autoletic" starting from 1957.⁸⁴ The nature of IUPAP's operations demonstrates that relations among scientists, national institutions, and state governments were more intricate than suggested by its non-governmental organization label. Governmental influence was evident in the centralized structure of Soviet Bloc participation and in US scientists engaging in discussions with the Department of State on politically significant matters. This third phase witnessed a renewed focus on diplomacy as a key priority for the organization, as seen through the increasing emphasis on the pursuit of the free circulation of scientists. Characterizing the post-Cold War period is more challenging, given the ongoing processes that are still unfolding. However, it is clear that there has been an effort to refocus the organization on physics itself, acknowledging that physics had lost its primacy among the natural sciences, which had prevailed during the Cold War.

In conclusion, understanding IUPAP's modes of operation over its entire existence proves difficult when relying on fixed taxonomies of scientific institutions. Instead, the case discussed here shows that it is more useful to consider IUPAP as a hybrid science-diplomacy organization, whose mode of operation depended

⁸¹ Ann E. Robinson, "Attempting Neutrality: Disciplinary and National Politics in a Cold War Scientific Controversy," *Centaurus* 63, no. 1 (2021): 84–102.

⁸² One major example is the change of status of general relativity from a mathematical exercise to a building block of theoretical physics, as shown by the history of the second affiliated commission of IUPAP, the International Society on General Relativity and Gravitation. Lalli, *Building the General Relativity and Gravitation Community During the Cold War*.

⁸³ Ruffini, *Science and Diplomacy*.

⁸⁴ Crawford, Shinn, and Sörlin, "The Nationalization and Denationalization of the Sciences;" Elzinga, "Modes of Internationalism."

on broader historical processes and underwent continuous renegotiation, especially during periods of foundational transformations.

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