To ICSU’s Committee on Scientific Planning and Review

September 30, 2016

A Global Approach to the Gender Gap in Mathematical and Natural Sciences: how to measure it, how to reduce it?

Please find below the application “A Global Approach to the Gender Gap in Mathematical and Natural Sciences: how to measure it, how to reduce it?” for which IMU is the lead applicant, and IUPAC, co-lead applicant.

Measuring and reducing gender gap is a recurrent and central theme in the whole scientific community. But, to our knowledge, it is the first time that different scientific communities join forces in addressing it. Thanks to the ICSU grant program, we had the opportunity to meet our colleagues from the other unions and measure how our expertise was complementary to them. Also, by joining forces, we get a multiplicative effect for reaching out to schools, teachers and parents.

The Committee for Women in Mathematics (CWM) of the IMU was created very recently in 2015. This committee is extremely dynamic and structured. This owes a lot to its Chair, Marie-Françoise Roy, who put both her immense energy and her vision in the project. Marie-Françoise Roy, a renowned mathematician, is a former president of the Société mathématique de France and of the European Women in Mathematics. Moreover, for years she is heavily involved in the development of mathematics in Africa, where she visits quite often. Marie-Françoise Roy will be both the global leader of this project, and the representative of IMU on the project. She has the energy, the organizational skills and the diplomacy to make it a success. We understand that her vis-à-vis, especially Mei-Hung Chiu and Irvy Gledhill have a high expertise in the matter. Moreover, the project builds on past successes: the Global Survey of Physicists of IUPAP and AIP, and the recent study of publication patterns in mathematics, thus guaranteeing the professionalism of the team responsible for the project.

Addressing the gender gap is a priority to IMU. Hence, if the proposal is successful IMU will provide help from the IMU office: administration of the budget, secretariat, help for website, etc. IMU will also contribute 20,000 EUR/year for the three years of the project.

IMU is grateful to ICSU for starting this new grant program, which has given us the opportunity to increase our collaborations with our sister unions.

Shigefumi Mori
President of IMU
GRANTS PROGRAMME 2017

APPLICATION FORM
(Valid for ICSU Union Members only)
(Applications must be submitted electronically to grants@icsu.org

Deadline for submission is 1 October 2016

Lead applicants*1 may submit no more than one application.

Project title: A Global Approach to the Gender Gap in Mathematical and Natural Sciences: How to Measure It, How to Reduce It?

Requested amount (€): 300,000

Lead Applicant 1 (Organization and contact details):
International Mathematical Union (IMU)
Committee for Women in Mathematics Chair, Prof. Marie-Francoise Roy,
Email: marie-francoise.roy@univ-rennes1.fr

Lead Applicant 2 (Organization and contact details):
International Union of Pure and Applied Chemistry (IUPAC)
Bureau Member, Prof. Mei-Hung Chiu,
Email: mhchiu@ntnu.edu.tw

Supporting Applicant (Organization and contact details):
International Union of Pure and Applied Physics (IUPAP)
Working Group 5 Chair, Prof. Irvy (Igle) Gledhill,
Email: igledhil@csir.co.za

Supporting Applicant (Organization and contact details):
International Astronomical Union (IAU)
Working Group “Women in Astronomy” Chair, Full Astronomer Francesca Primas,
Email: fprimas@eso.org

Supporting Applicant (Organization and contact details):
International Union of Biological Sciences (IUBS)
Executive Director, Dr. Nathalie Fomproix,
Email: nfomproix@iubs.org

*1 (ICSU Scientific Unions)
We received the support of ICSU Regional Offices in Africa and Latin American and the Caribbean. Other contacts we took include the International Union of Theoretical and Applied Mechanics (IUTAM) who are interested to follow the project as observer.

We wish to collaborate with more social scientists working on gender and science and try to identify potential partners. We are waiting for a reply from the Gender, Globalisation and Democratisation (GGD) Network that is sponsored by the International Social Science Council (ISSC).

How will this proposal address the thematic focus (science education, outreach and public engagement) and support ICSU’s strategic priorities as defined for the grants programme? (max. 10 lines):

The project addresses the Principle of Universality in Science (ICSU Statute 5) by facilitating and improving the participation of women in the sciences. We will create and disseminate material to encourage young women’s interest in science, in particular in the developing world, through science education and outreach. In science, the meaning and measurement of the gender gap is not established on a global scale, hence we will gather data, develop solid evaluation tools, provide comprehensive analyses, and produce actions to reduce the gap, with focus on public engagement activities. Our innovative and sustainable methodology will assure maintenance of data and programs in years to come, allowing trend analyses and extensions to other disciplines. The involvement of six scientific unions, UNESCO and GenderInSite, constitutes a large international and multidisciplinary collaboration.
Project plan (max 3 pages)
State clearly the objectives of the project and the beneficiaries. Elaborate on its relevance to the review criteria. If the activity targets young scientists, women scientists, and/or scientists from developing countries – please refer to it here.

• Objectives (1/3 page)

Mathematical and natural sciences have long traditions of women who have made significant contributions. However, female scientists in these fields remain few, especially in developing countries. Currently, our data on participation of women is local, out of date, and inconsistent across regions and fields. Therefore, the objectives of the project are to:

1. Provide evidence via both a joint global survey and a study of publication patterns to provide reliable data on which to orient future actions.
2. Collaborate with social scientists working in gender and science, obtaining contrasts and commonalities across regions and cultures, less and more highly developed countries, and across different disciplines.
3. Provide easy access to materials to encourage young women to work in our fields, including information about careers and salaries directed at parents, schools, and others who influence the careers of girls, in particular in the developing world.
4. Recommend practical policies and actions that will reduce the gender gap.

• Project description (2 pages)

The project consists of three tasks. Tasks 1 and 2 provide data on which to base conclusions, to direct actions to attract and retaining women in science, and to develop and evaluate practical recommendations. Task 3 collects information on effective practices.

Task 1: Joint global survey

In 2010, IUPAP and AIP\(^2\) conducted the Global Survey of Physicists comparing experiences of men and women physicists around the world. The survey (14,932 respondents from 130 out of 195 countries) highlighted contrasts between women and men, and between less and more highly developed countries (see Fig. 1). This survey was valuable in understanding gender issues such as differential access to resources, opportunities for men and women on a country-by-country basis\(^3\), or cultural expectations concerning child care. It aided decisions on where interventions are best targeted.

In this project, we will improve and extend the survey to chemistry, astronomy, biology and mathematics. We will both treble the number of respondents and increase the number of

\(^2\) American Institute of Physics, www.aip.org

\(^3\) https://www.aip.org/statistics/reports/there-land-equality-physicists
countries. In addition to the original eight languages, the questionnaires will be translated into two additional languages. We will extend the survey beyond the academic world, towards scientists in industry and science teachers in secondary schools. The survey will use special input from the three major regions of the ICSU Regional Offices. Inclusive gender concepts\(^4\) will be used. The understanding of gender issues in science communities will be acquired in collaboration with social scientists such as Ernesto Fernández-Polcuch from UNESCO; we will further explore links with ISSC through the GGD Network. Keeping the methodology as close as possible to the original survey will allow for detection of trends in physics, allowing to understand effects of recent political changes, the extent of limitations that have been placed on women’s education\(^5\), and the evaluation of additional obstacles to the employment of women. For the other disciplines, the survey will provide the first step towards longitudinal analyses.

**Task 2: Joint data-backed study on publication patterns**

A solid publication record is a key factor in a successful academic career. In mathematics, a recent study\(^6\) on publication patterns based on comprehensive metadata sources showed a systemic gender imbalance in the publication distribution of mathematician. Using four decades of data, it was shown that women mathematicians tripled their number since 1970, but publish less than men at the beginning of their careers, and leave academia at a higher rate. High-ranked journals publish fewer articles by women, some showing less than 5% authorships by women with no change over time (see Fig. 2). Women publish fewer single-authored papers, although their coauthor networks are similar in size to those of men.

![Figure 2: Authorships by women in three highly renowned mathematical journals](image)

Similar methodology will be used to study publication patterns in physics, chemistry, astronomy, if possible biology, and across countries and regions. This will allow us to understand common and discipline-specific issues that require interventions. We will develop some new items for the survey appropriate to different disciplines to determine specific areas of inequality at which to target recommendations.

A key objective is to create a sustainable and dynamic methodology to provide a continuous data processing flow, and hence allow for easy updates and longitudinal data analyses.

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\(^4\) See, e.g., http://www.genderdiversity.org/resources/terminology/

\(^5\) www.icsu.org/news-centre/news/icsu-expresses-concern-at-restrictions-on-higher-education-for-women-in-iran

\(^6\) H. Mihaljević-Brandt et al., “The Effect of Gender in the Publication Patterns in Mathematics”, to appear
**Task 3: Database of good practices for girls and young women, parents, and organizations**

An online database will be created, hosted by IMU in the first instance, and disseminated through each participating organization. It will contain information on existing initiatives for which evidence of effectiveness exists. It will include searches and categorizations that will make the material easy to use. Some information on initiatives will be gathered as part of Tasks 1 and 2, but mainly through existing networks of each participating organization. The database will include a facility for adding new items, and guidance and support for the development and evaluation of new initiatives.

Task 3 includes the translation and distribution of materials, not only to young women, but also to parents and organizations involved in guiding young women into careers. This is especially important in developing countries, where information is needed about the stability of a career in science, and the availability of jobs. We understand that efficiently reaching parents is a real challenge.

Recognizing that perceptions of science and scientists arise during school, we will ensure that the database includes material targeting girls and young women of school age.

- **Relevance to review criteria (1/3 page)**

This project addresses the issue of gender by producing data-based advice and actions for each of the three key areas of ICSU’s strategic plan (International Research Collaboration, Science for Policy and Universality of Science). The project supports UN Sustainable Development through Goal 5, “Gender Equality: Achieve gender equality and empower all women and girls” (Appendix A). Our actions will directly target science education, outreach and public engagement through material proven to be useful for encouraging girls’ engagement. The barriers for women in less developed countries will be a particular focus, targeting parents and teachers as major decision-makers for the career choices of girls.

This project is designed to bring scientists from many fields together with social scientists into international collaboration. We intend to learn from each other to develop an innovative and sustainable methodology. The study will provide the first trends of gender data measured on a global scale, the first comparative gender studies in science, the first automatic survey tools, and the first recommendations based on sound global data.

- **Targeting of priority groups (1/3 page)**

Women in science, both individually and in organizations, are at the center of this project. They are deeply involved in data gathering, analysis and evaluation, development of actions, and dissemination and implementation. The project will stimulate action by participation. Teachers, science educators and scientists in general are targeted in the data gathering and analysis phases, and again in the implementation of actions. Increasing their awareness of the nature and remedies of the gender gap is critical. Policy-makers are targeted since initiatives to remedy the gender gap need correct policy to support individual and organizational action. This project will provide ongoing data-based and best practice advice for policy makers in all science areas. The public, especially parents, are targeted through dissemination practices, policies and grass-roots actions that result from the results of the project. Others, including journal editors and media contacts, will be the focus of some specific recommendations emerging from the publication study and best practice database.

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[7](http://www.un.org/sustainabledevelopment/sustainable-development-goals/)
Work plan (max 1 page)
Specify time schedule, major events, methodologies to be used, leadership and management structure, and key milestones in the implementation process, etc.

Year 1: Project planning, preparation and conception

(1.1) **Initial workshop of partners:** To take place in France. Identify sources of good practices; specify methodology and define objectives, for both Tasks 1 & 2; elaborate further research questions; discuss gaps in research on gender; identify data sources for each discipline for Task 2; evaluate possibilities of including proprietary data sources. Discuss management, organization and communication between partners.

(1.2) **Regional workshops:** Conduct workshops and e-meetings in the three ICSU regions to include input from colleagues in developing countries.

(1.3) **Task 1 – questionnaire preparation:** Include new items, validate by experts, translation and back-translation, online hosting, and field-testing. Modify the questionnaire as needed.

(1.4) **Task 2 – conception and preparation:** Develop conceptual framework and research questions; specify data sources, collection techniques, storage, processing and analysis; clarify access to bibliographic databases.

Year 2: Implementation of data collection and analysis

(2.1) **Task 1:** Distribute and collect questionnaires through project partners. Initial analyses to take place later in the year.

(2.2) **Task 2:** Data collection and analyses, with particular attention to results from developing countries.

(2.3) **Task 3:** Setup database; include existing material, based on recommendations from partners and regional workshops; investigate additional information sources; translate particularly valuable data.

Year 3: Final analyses, integration of results, recommendations and final workshop

(3.1) **Task 1:** Data cleaning, translations, quantitative and qualitative analyses. Integrate relevant results into the initiatives suggested in the joint database of good practice (Task 3).

(3.2) **Task 2:** Finalize data analyses; establish hosting platforms and continuous data import and analysis; create dynamic tools and visualizations.

(3.3) **Reports and dissemination of results:** Prepare the major report and sub-reports for publication in journals and popular press. Distribute info graphics and workshop material. Disseminate materials to parents and teachers.

(3.4) **International conference:** Report internally on each task. Hold final international conference to evaluate each task, discuss new initiatives, and formulate recommendations.

Leadership and management structure. The project will be coordinated by an executive committee of at most 15 people chaired by Marie-Francoise Roy, with at least one member per active union and partner. A larger advisory board will contain also leaders from the involved unions and partners.
Task 1 will be led by IUPAC, assisted by IUPAP and AIP. Task 2 will be led by IMU assisted by ICIAM, under the responsibility of Helena Mihaljević-Brandt. Specialists of data analysis and students will implement this task. Task 3 will be led by IMU, under the responsibility Bill Barton, International Commission for Mathematical Instruction (ICMI) Officer. A student supervised by him will perform the work.

**Expected results (max 1/2 page)**

What outcomes are expected from the project: publications (including audience and dissemination plan), new programme initiatives, etc? Explain how an ICSU grant can strengthen your own overall programme of work, e.g., leveraging funds from other sources, enhancing visibility, enhancing impact or role of your organisation. Assess potential follow-on action that may result from the activity.

**Outputs**

- Major report for reference, recommendations and awareness on the joint global survey (Task 1) and the joint study on publication patterns (Task 2)
- Data to respondents for use in their own countries and scientific societies
- A set of scientific publications and popular articles containing the results and recommendations
- A sustainable set of tools for future use of the joint study on publication patterns
- A database of good practices for girls and young women
- Career materials directed at parents and teachers, especially in developing countries
- The methodology developed in this project will be available to all unions of ICSU

**Strengthening Union work**

Our unions have common interests but need to avoid duplication. We have discovered that our work is complementary and that we can enhance each other’s impact. Jointly, we can better access the resources of ICSU and ISSC.

**Follow-on action**

This material informs the choices and initiatives that we will undertake in future. The joint study on publication patterns is specifically designed to include automatic tools for future use. The database of good practices will be designed as a living and expanding resource.

**The Role of Supporting Applicants and Other collaborative partners (max 1/2 page per partner)**

The role of each supporting applicant (minimum one from the ICSU family) (and other partner organizations such as UN agencies, if relevant), should be clearly described.

- **Partner 1**: International Mathematical Union (IMU)

IMU will take the lead for the joint data-backed study on publication patterns (Task 2) and the joint database of good practice for girls and young women (Task 3). The expertise of the ICMI, which is a commission of IMU, will be particularly valuable for Task 3. The CWM has a world-wide network of women with whom the Committee maintains direct contact; this will be highly used for the effectiveness of the project.
There are several continental networks for women in mathematics (in the US, in Europe, in Africa, in India, etc.) and the CWM actively develops new ones (e.g. in Latino America). These networks have a close connection with CWM and will be involved in the project. IMU maintains an Electronic World Directory of Mathematicians and sends a regular IMU-NET newsletter that will be used to disseminate information on the project. The IMU Commission for Developing Countries and Committee on Electronic Information and Communication will be informed and consulted in the project. Progress report on the project will include a session at the International Congress of Mathematicians in 2018.

- **Partner 2**: International Union of Pure and Applied Chemistry (IUPAC)

  IUPAC will take the lead in managing and coordinating the joint global survey (Task 1) with the help of IUPAP and IUBS. Furthermore, IUPAC will help identify suitable sources of publication metadata in chemistry for the analyses of the joint data-backed study on publication patterns (Task 2).
  IUPAC will be represented by a Bureau Member on this project.
  IUPAC has a special role in reaching industry, through the Chemistry and Industry Committee, and very valuably through the IUPAC Company Associates.
  There has been considerable work on establishing a strong role for women in chemistry across the world. IUPAC is able to draw on the experience of the Committee on Chemical Research Applied to World Needs; the Committee on Chemistry Education of IUPAC National Adhering Organisations and Affiliated Nations will also be involved.

- **Partner 3**: International Union of Pure and Applied Physics (IUPAP)

  IUPAP will assist IUPAC in coordinating work related to the joint global survey (Task 1). The existing structures within IUPAP will be used. In particular, Working Group 5 has established country teams who are eligible to attend the International Conference on Women in Physics (ICWIP), a working conference held every 3 years. A team leader is responsible for coordination. Country teams form regional groups that meet at ICWIP. Dissemination of the results and recommendations will include a session at ICWIP in 2020.
  IUPAP has a particular interest in finding trends since the Global Survey of Physicists from 2010/2011, and wishes AIP to remain involved.

- **Partner 4**: International Astronomical Union (IAU)

  The IAU and its Working Group of Women in Astronomy (WGWiA) are strongly involved in gender equality debates and fully supportive of gender initiatives aimed at improving the balance, reducing biases and harassment, and sharing best practices.
  Coordination of IAU involvement in the project will rest on the WGWiA, in the person of its current Chair Francesca Primas, who reports directly to the IAU Executive Committee and who is in contact with several national associations for astronomy. IAU will contribute to the project by sharing available statistics and best practices related to female astronomers among its national members. Furthermore, it will assist IMU in coordinating the joint

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8 e.g. awards for distinguished women

9 [http://iupap.org/working-groups/wg5-women-in-physics/](http://iupap.org/working-groups/wg5-women-in-physics/)
database of good practice for girls and young women. Moreover, IAU wishes to include its astronomical community in the joint global survey and it will thus assist IUPAC and IUPAP in the definition and deployment of the survey (for the astronomy field), also taking advantage of the IAU Office for Astronomy Development and its nine regional nodes (scattered across South America, Asia and Africa).

- **Partner 5: International Union of Biological Sciences (IUBS)**

IUBS will support IUPAC and IUPAP in Task 1 of the project. The questionnaires will be sent to the 84 scientific members of IUBS who are international associations of biologists covering many disciplines such as marine biology, ecology, entomology or genetics. The IUBS National Committees and the IUBS scientific members will spread the information about the online database created and initiatives that will promote the participation of women in science (Task 3).

Through its education program, IUBS will help to develop materials for teachers in order to encourage girls to pursue a scientific career.

The gender inequality is a serious concern to IUBS; however, at the moment IUBS does not have a program of its own addressing this issue. Thus the interactions with other unions on this topic will be highly valuable. IUBS will use the opportunity of the collaboration with the commissions of women in science of the other unions to establish a working group on gender issue in IUBS.

- **Partner 6: International Council for Industrial and Applied Mathematics (ICIAM)**

ICIAM will collaborate with IMU in the study of publication patterns (Task 2) and in building a database of good practice for young students (Task 3). ICIAM member societies are not only engaged in mathematical education and mathematical research in universities, but also in the link between academia and companies, constituting a very important source of positions for math absolvents. ICIAM’s previous collaboration with ICMI gave rise to the publication of a report entitled "Educational Interfaces between Mathematics and Industry" that allowed to see how new educational practices could create new opportunities for math students in the job market. This is important for all students, and therefore for women also. Preparing success stories of women in this direction could help young women to understand their potential and to better prepare for a professional career.

- **Partner 7: United Nations Educational, Scientific and Cultural Organization (UNESCO)**

UNESCO’s Natural Sciences Sector and its Institute for Statistics will support the project by sharing certain research results and survey modules from their SAGA (STEM and Gender Advancement) project on the improved measurement of gender equality in science, technology, engineering and mathematics, a global UNESCO project supported by Sweden. SAGA in its second year is now undertaking country studies to measure national policies and identify the most useful indicators to measure gender equality in STEM, using its expert-vetted STI Gender Objectives List and the SAGA Toolkit, which includes a number of surveys with component modules on STI policies and instruments, barriers and drivers to gender equality in science and engineering (S&E) careers, etc. SAGA’s work at country level is complemented by the IAP’s science academy study, so the exchange of scientific union surveys and data would capture the full picture in order to best understand what promotes
and discourages women from pursuing S&E careers. SAGA will lead to a manual on best practices to measure gender equality in STEM, as well as identification of the best entry points for interventions to encourage more girls to study STEM and more women to reach the top levels of S&E careers. UNESCO is ready to explore jointly hosting this project’s website on career information for girls, given the wide access to schools and communities it enjoys. UNESCO will cover travel costs their participation in the first (French) workshop of the project. UNESCO, through SAGA, commits to exchange information and results with the project.

- Partner 8: Gender in Science, Innovation, Technology and Engineering (GenderInSITE)

GenderInSITE is an international initiative to promote the role of women in science, innovation, technology and engineering (SITE) and to demonstrate how applying a gender lens to SITE can provide deeper insights, more effective programs and more sustainable outcomes in the context of development. We advocate for women to be involved at all levels of scientific research design and implementation, as well as ensuring that women too are equal beneficiaries and users of new technologies. This project clearly converges to GenderInSITE’s central objectives and will certainly bring a solid knowledge base to address the issue. GenderInSITE will, as an external partner, be glad to support this project through participation in the discussions of the project planning, preparation, and conception, and in helping to find experts and specialists to implement the survey through its solid networks both international and regional, in Southern Africa and in Latin America and the Caribbean. It will also gladly help in the diffusion of the findings and recommendations through its website and listserv.

ICSU is active in reducing the gender gap and many resources exist that can assist this project, particularly the ICSU Committee of Freedom and Responsibility in Research. The three regional ICSU offices, Africa (established in 2005), Asia and the Pacific (2006), and Latin America and the Caribbean (2007), of ICSU will benefit from the regional workshops and the global final conference. The ICSU Regional Offices for Africa and Latin America and the Caribbean are supporting our project and willing to help to organize the regional workshop planned in their region. Being currently reorganized the Asia and Pacific Regional Office is interested in the project but cannot commit to help us for the organization of the workshop in its geographical zone. The International Union of Theoretical and Applied Mechanics (IUTAM) is interested in following our progress.

Each year we shall use the opportunity of the United Nations International Day of Women and Girls in Science (February 11, first held in 2016), whose goal is to bring awareness and parity for women in science, to disseminate the results of our studies and recommend good practices to close the gender gap.
### Project budget

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Please provide a brief layperson summary (200 words) of the project. This will be published on the ICSU website, should a grant be awarded.

- Project Summary

Mathematical and natural sciences have long and honorable traditions of participation by highly creative women contributors. However, the percentages of women scientists remain shockingly low and there is a significant gender gap at all levels between women and men. Barriers to achievement by women persist, especially in developing countries.

The project will produce sound data to support the choices of interventions that ICSU and member unions can feasibly undertake. It will provide evidence for informed decisions, including trends – since the situation for women continues to change around the world, with some negative developments – and will provide easy access to materials proven to be useful in encouraging girls and young women to study and work in these fields. Regional information about careers, jobs and salaries will be provided.

The Joint global survey is planned to reach 45,000 respondents in more than 130 countries using at least 10 languages, while the Joint study on publication patterns will analyze comprehensive metadata sources corresponding to publications of more than 500,000 scientists since 1970. Contrasts and common ground across regions and cultures, less developed and highly developed countries, men and women, mathematical and natural sciences, will be highlighted.
Moscow, 25 September 2016

ICSU
To whom it many concern.

With this letter I confirm that IUPAC is committed to join the project to assist in the global gender gap survey among female scientists. As a global body for world chemists and chemistry professionals, IUPAC will provide an annual funding of 10,000 euros for three years and the necessary human power to assist in the execution of the survey. IUPAC is interested in gauging the long existed gender gap problem in the scientific fields today and by supporting this survey, IUPAC wishes to address this problem head on so as to better serve its members and the chemistry community at large, especially female chemists and scientists. Through this survey, IUPAC would also like to find the basis for its future policies on women in chemistry, in order to foster female students and young girls towards a future career in the sciences, and to enhance women’s participation in the global chemistry community. As such, IUPAC will be glad to be part of this global joint effort and looks forward to collaborations with fellow scientific organizations to address the problem of gender gap in science.

Sincerely,
IUPAC President

Natalia Tarasova
RE: The IMU-IUPAC Application for an ICSU Grant titled
A Global Approach to the Gender Gap in Mathematical and Natural Sciences:
How to Measure It, How to Reduce It?

Dear Heide,

I write to confirm that IUPAP is an enthusiastic supporting applicant on the Grant “A Global Approach to the Gender Gap in Mathematical and Natural Sciences: How to Measure It, How to Reduce It?” The IUPAP working group on women in physics (WG5) were one of the partners in the discussions which generated this application, and have had significant input to the development of the concept and the proposal. IUPAP will support them in working on the project, which will form a key part of their work in the next few years.

We are all aware of the need to encourage and increase the participation of women in mathematics and natural sciences. In many countries women are not well represented in physics, and the reasons for this under-representation are both global and local. This project will help us to understand the diverse situation around the world, and will encourage different countries to learn from and teach others about ways to improve the participation of women in physics and other sciences. Results from the surveys will feed into the work of the WG5 country teams, and thus help improve participation of women at all levels.

The outcomes from this project will make important contributions to the work of IUPAP. Therefore IUPAP will contribute 15000 EUR to the project over its three year lifetime. The Chair of WG5, Prof. Irvy (Igle) Gledhill, igledhil@csir.co.za, will be the IUPAP contact person for this project.

Yours sincerely,

Bruce H J McKellar
President, International Union of Pure and Applied Physics (IUPAP)
Subject: Letter of support for ICSU 2016 grant proposal

Project title: A Global Approach to the Gender Gap in Mathematical and Natural Sciences: how to measure it, how to reduce it?
Lead applicants: IMU and IUPAC

Dear Heide Hackmann,

The International Astronomical Union, IAU, is an enthusiastic supporting partner of the IMU – IUPAC grant proposal on “A Global Approach to the Gender Gap in Mathematical and Natural Sciences: how to measure it, how to reduce it?” The gender gap is an issue in all our scientific disciplines and it is important to analyze this gender disparity and develop tools to encourage young women to pursue a career in science.

IAU looks forward to this opportunity to work together with IMU, IUPAC, IUPAP, IUBS and other partners on this common concern about gender gap in mathematical and natural sciences. This project will give numerous opportunities for effective and productive collaborations between IAU and other ICSU Unions. IAU will offer participation to the global survey through its constitutive network of 76 National Members distributed worldwide. Indeed, back in 2003, the IAU appointed the Working Group “Women in Astronomy” that reports directly to the IAU Executive Committee. Its mandate is to collect information, propose measures, and initiate actions in support of, or to advance equality of opportunity for achievement between women and men in astronomy, in the IAU and in the world at large. It acts as a federation of national Women in Astronomy organizations, creating links and facilitating information exchanges worldwide.
and Our national committees and scientific members will engage in the dissemination of the

We believe therefore that IAU can contribute effectively and enthusiastically to the implementation of the Proposal. Our strategic Project “Astronomy for Development” will also contribute to the programme, through its network of Regional Nodes (South Africa, Zambia, Ethiopia, Nigeria, Jordan, Armenia, Thailand, China, Portugal and Colombia). IAU will financially support the project in covering the cost of its representatives to attend the various meetings and logistics up to 5,000€/year.

IAU is pleased to support the IMU - IUPAC project proposal. We hope that this project proposal will receive a favorable consideration.

Best regards.

Piero Benvenuti
IAU General Secretary
Orsay, 20 September 2016,

Subject: Letter of support for ICSU 2016 grant proposal

Project title: A Global Approach to the Gender Gap in Mathematical and Natural Sciences: how to measure it, how to reduce it?

Lead applicants: IMU and IUPAC

Dear Heide Harkmann,

The International Union of Biological Sciences, IUBS, is an enthusiastic supporting partner of the IMU - IUPAC grant proposal on “A Global Approach to the Gender Gap in Mathematical and Natural Sciences: how to measure it, how to reduce it”. The gender gap is an issue in all our scientific disciplines and it is important to analyze this gender disparity and develop tools to encourage young women to pursue a career in science.

IUBS looks forward to this opportunity to work together with IMU, IUPAC, IUPAP, IAU and other partners on this common concern about gender gap in mathematical and natural sciences. This project will give numerous opportunities for effective and productive collaborations between IUBS and other ICSU Unions. IUBS will offer participation to the global survey through its constitutive network of scientific members that cover many disciplines in Biology. Our national committees and scientific members will engage in the dissemination of the materials developed. Our programme on education will also contribute to this project in the part dealing with teachers. Moreover, the commissions on women in science already established in various Unions will assist us to set up a working group on gender issue in IUBS. IUBS will financially support the project in covering the cost of its representatives to attend the various meetings and logistics up to 5 000€/year.

IUBS is pleased to support the IMU - IUPAC project proposal. We hope that this project proposal will receive a favorable consideration.

Best regards.

Hiroyuki Takeda
IUBS President
To the ICSU grant selection committee

The purpose of this letter is to affirm the support of ICIAM (the International Council on Industrial and Applied Mathematics) for the project

**A Global Approach to the Gender Gap in Mathematical and Natural Sciences: How to measure it, how to reduce it**

that the IMU is submitting to ICSU, jointly with several other organizations, for support.

ICIAM has historically been a strong supporter of the participation of women in mathematics, and many women are currently serving in the leadership of ICIAM. Barbara Keyfitz (Past-President and current Officer of ICIAM) will serve as contact person. Meanwhile we will look for enthusiastic volunteers in our contacts. Furthermore, as the world’s leading organization in applied mathematics, ICIAM maintains continual communication with most of the applied mathematics societies in the world, and we count among our ranks many experts in data management whose assistance would be valuable to the project. Also, our experience in developing links with industry both for researchers and students, could help to estimate and build alternative opportunities for young women in directions other than purely academic, which we think important.

In addition, ICIAM runs a program of **ICIAM Fellowships**, intended to help applied mathematicians, professionals and students, from developing countries to attend workshops. If this project is funded by ICSU, the organizers of the project workshops would be strongly encouraged to apply for one of our fellowship awards, in the amount of $3,500 US, in support of this project. One of the reasons that ICIAM has become a member of ICSU is to increase collaborations between mathematics and other scientific disciplines.

The officers of ICIAM (who do not have budgetary authority) and the ICIAM-ICSU committee are very enthusiastic about the project, and we intend to present a proposal to the ICIAM Board at its next meeting to provide financial support to the project in the amount of 5,000 Euros per year for the three years’ life of the project.

Please accept our best wishes for the success of this ambitious and deserving project.

Maria J. Esteban, President ICIAM
Professor Marie-Françoise Roy  
Committee for Women in Mathematics  
International Mathematical Union  
c/o Université Rennes 1  
Campus de Beaulieu  
35042 Rennes Cedex  

26 September 2016  

Ref.: SC/PCB/SPP/093  

Dear Professor Roy,  

On behalf of UNESCO, I am pleased to express the Organisation’s support to your ICSU Grants Programme proposal, “A Global Approach to the Gender Gap in Mathematical and Natural Sciences: how to measure it, how to reduce it?”. We agree that having the scientific unions address this issue is significant and timely. It is an excellent match to UNESCO’s own work on gender equality in STEM fields at the country level, and that done recently by the Interacademy Panel for the global science academies.  

UNESCO’s Natural Sciences Sector and its Institute for Statistics will support the project through in-kind support by sharing certain research results and survey modules from our SAGA (STEM and Gender Advancement) project on the improved measurement of gender equality in science, technology, engineering and mathematics, a global UNESCO project supported by Sweden. In addition, we are ready to explore jointly hosting your project’s website on career information for girls, given the wide access to schools and communities UNESCO affords. My colleagues in the SAGA project and I look forward to exchanging surveys, data and information between our projects, and keeping abreast of the progress of your project.  

Yours sincerely,  

[Signature]  
Ernesto Fernández-Polcuch  
Chief  
Section on Science Policy and Partnerships  
Division of Science Policy & Capacity Building  
Natural Sciences Sector
Trieste, September 26th 2016

Professor Marie-Françoise Roy  
Chair of the IMU Committee for Women in Mathematics  
International Mathematical Union

Dear Marie Françoise,

Thank you so much for contacting GenderInSITE about the joint IMU, IUPAC, IAUPAP and IAU project for an ICSU grant aiming to address the Gender Gap in Mathematical and Natural Sciences. What you propose is crucial to support any change in policies that might lead to a change in the reality of the participation of women in these areas and GenderInSITE is more than willing to be an external partner. As you may have seen in our webpage (www.genderinsite.net), your proposal fits well with our goals and our mission. As I understand, this support will have no financial obligation attached, for unfortunately we have no availability of funds.

As you suggest, however, GenderInSITE will be honored to be part of "reference group / advisory committee", and we will be more than willing to suggest names in the regions you mention to participate in the proposed workshops. It will be a pleasure to follow the important work you are proposing.

I am, therefore, hereby confirming our official support as an external partner for the project A Global Approach to the Gender Gap in Mathematical and Natural Sciences: How to Measure It? How to Reduce it?

With kind regards

Alice Abreu  
Director  
GenderInSITE
29 September 2016

Prof Mei-Hung Chiu  
Bureau Member, International Union of Pure and Applied Chemistry (IUPAC)  
National Taiwan Normal University  
Taiwan  

Subject: Support for ICSU Grant Application by the International Mathematical Union, the International Union of Pure and Applied Chemistry, and International Union of Pure and Applied Physics  

Dear Prof. Mei-Hung Chiu,

By means of this letter, the ICSU Regional Office for Africa (ICSU ROA) hereby lends its support to the project proposal entitled "A Global Approach to the Gender Gap in Mathematical and Natural Sciences: How to Measure It, How to Reduce It?" This proposal is being submitted as a collaborative effort between the International Mathematical Union (IMU), the International Union of Pure and Applied Chemistry (IUPAC), and International Union of Pure and Applied Physics (IUPAP).

This proposal seeks to facilitate and improve the participation of women in the sciences as well as create and disseminate material that will encourage young women’s interest in science, particularly in the developing regions of the globe. It will seek to provide a comprehensive analysis, develop solid measurement tools, gather data, and produce actions to reduce the gender gap, with special focus on public engagement activities. The implementation will involve a number of Scientific Unions, an act that will promote international and multidisciplinary collaborative research.

ICSU ROA will be happy to be a partner in this project where it will play a pivotal role in facilitating the organisation of the planned international conference. The Regional Office will also provide guidance in identifying experts from the region to partner in the implementation of this project. It will also facilitate and foster links between the IMU, IUPAC and IUPAP with the currently existing African science networks as well as providing guidelines for action agendas and rendering administrative support in organising the implementation of the project.

The involvement of ICSU ROA in this initiative would also fulfil its role of promoting activities of the ICSU family in Africa as well as strengthening linkages between the African scientific communities through international collaborative research.

Sincerely,

Daniel Nyanganyura, PhD  
Ag. Regional Director, ICSU Regional Office for Africa

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Website: http://www.icsu.org/africa
San Salvador, September 29, 2016

To:
ICSU’s Committee on Scientific Planning and Review
Ref: ICSU grant proposal

Dear all

This letter is to inform you that our LAC Region is endorsing this proposal entitled: A Global Approach to the Gender Gap in Mathematical and Natural Sciences: How to Measure It, How to Reduce It?. Presented by: Six ICSU unions (IMU, IUPAC, IUPAP, IAU, IUBS, ICIAM) as well as UNESCO and GenderInSite.

We ICSU ROLAC consider this project as a real import contribution to the field of Mathematic application and teaching, we agree to collaborate with it, particularly for the organization of this workshop in Latin America, and the dissemination of information about this project in our geographical zone.

We are completely sure that the outcomes of this project will bring benefit the region greatly and we ICSU would like to participate in this endeavor in the terms established above.

Kind regards,

Prof. Manuel Limonta
Director, ICSU Regional Office for Latin America and the Caribbean

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