

C2 - COMMISSION REPORT 2016

Report to IUPAP Council

Symbols and Fundamental Constants are fundamental elements for modern science and technology. C2 commission is working to guarantee the correct use and to supply motivation and investments in areas that needs to be consolidated and to improve.

Member's composition: Chair: **Vanderlei Salvador Bagnato** (Instituto de Fisica de São Carlos -Universidade de São Paulo), **ViceChair: William Phillips** (National Institute of Standards and Technology), **Secretary: Feng-Lei Hong** (Department of Physics -College of Engineering Science Yokohama National University), Members: **Ramesh Chandra Budhani** (, National Physical Laboratory- New Delhi), **Michael de Podesta** (National Physical Laboratory-Teddington), **Gerald Gwinner** (Department of Physics and Astronomy-University of Manitoba), **Marc Himbert** (LNE-INM), **Jinhee Kim** (Korea Research Institute of Standards and Science), **Michael Krystek** (Physikalisch-Technische Bundesanstalt), **Andre Luiten** (University of Adelaide), **Antti Manninen** (Centre for Metrology and Accreditation (MIKES), **Dr Martin Milton** (BIPM), **Alexander Potekhin** (Department of Theoretical Astrophysics-Ioffe Physico-Technical Institute), **Xing Zhu** (School of Physics-Peking University)

Meetings : There was no meeting of the whole commission for the period of this report. Limited resources makes difficult to hold a regular annual meeting for this Commission. There was , however many information exchanges between commissions members as well as between commissions. The proposal is to use regular meeting taking place within the Atomic, Molecular and Optics Community, often with the presence of many of the members of C2, to hold small meeting to debate relevant topics for the C2 commission. Members will send to the chair of the commission their planned participation in meetings in order to be organized a schedule of partial meetings.

Awards:

IUPAP Young Scientist Prize in Fundamental Metrology. Prizes in Fundamental Metrology to the below recipients in recognition of their outstanding contribution to the areas of physics within the remit of the Commission. **Dr. Samuel Lara-**

Avila, Chalmers University of Technology, Sweden; and **Dr. Stefan Ulmer**, RIKEN/CERN

Proposal classify the radian as a base unit in the SI - Conducted by P. Mohr and W. D. Phillips, the proposition is that SI be modified so that the radian is a base unit. It is proposed that angles be considered to have "dimension" and therefore be reclassified as a base unit. That shall promote standardization of angles and phases in many quantities.

Planning for a diffusion activity : The importance of units, fundamental constants and symbols is well recognized in all levels of education. Pre-university students and undergraduates have little information about the wonderful science behind fundamental constants, symbols and units. We shall start to put together a booklet and a movie to be available internet with the title " The Science behind fundamental constants and the unit system" .The text and movie shall have contribution to all members and will be presented in three different languages. The plan is to present such activity on the General meeting of 2017. The first material shall be delivered in November 2016.

Discussion on the determination of Gravitational G constant (Stephan Schlamming)- The current state of high precision results on G is unsatisfying. The data points are statistically inconsistent with each other. An expansion factor of 6.3 would need to be applied to each experiment to make the data set statistically consistent. This is an unacceptable situation for the experimenters, who work hard to obtain the smallest reasonable uncertainty. However, there is a silver lining. The IUPAP working group on G is helping to solve the inconsistency problem. As a first step, one G experiment has been shipped across the Atlantic for a second measurement campaign. The NSF is encouraging new researchers to get into the field. And completely different methods, like atom interferometry, are recently coming online for G measurements. In addition, the International Committee for Weights and Measures has established a framework for National Metrology Institutes to provide traceability to the SI at the highest level for laboratories engaged upon determinations of G .

Literature in revision: The “Red Book” and recommended sources of information SYMBOLS, UNITS, NOMENCLATURE AND FUNDAMENTAL CONSTANTS IN PHYSICS (Edition of 2010) is now under revision for a new edition. Comments shall be done during the October meeting in Taipei