

Report of the IAU to the 24th meeting of the CCU

1) Activities of the International Astronomical Union since the 23rd meeting of the CCU

- The IAU had its 30th General Assembly in Vienna, August 20-31 2018, with, in particular:
 - . six 5-day Symposia on various astronomical topics, fifteen 2-day Focus meetings on topical issues, one-day scientific meeting of each of the nine scientific Divisions, and a large number of meetings of scientific commissions and working groups.
 - . a special symposium on the history of astronomy and astrophysics over the last 100 years was held to celebrate the first century of the International Astronomical Union (IAU) and mark the beginning of a worldwide celebration - *the IAU100* - of the past century of astronomical discoveries with the central theme *Under One Sky*, and many activities and events to be taken place throughout 2019.
- The official kick-off of the celebration of the IAU centenary, was a special symposium, which was organized on 11-13 April 2019 at the Palace of the Academies in Brussels, location where the IAU was founded in 1919 together with the International Research Council (IRC) and four other international Unions (IUGG, IUPAC, IUBS, URSI).
- The IAU, represented by its general Secretary Teresa Lago, was recognized as a partner organization of the IUGG at the ceremony at the UNESCO Headquarters in Paris to celebrate the 100th anniversary of the IUGG.

2) Adoption of IAU 2018 Resolutions on reference systems and frames

At its 30th General Assembly (2018), the IAU adopted the following Resolutions :

- Resolution B1 on “Geocentric and International Terrestrial Reference Systems (ITRS) and Frame”, which recommended a definition of the ITRF in the framework of GR in order to improve consistency between definitions of celestial and terrestrial reference systems and ensure the best consistency with the definitions adopted by the IUGG.
- Resolution B2 adopting “The Third Realization of the International Celestial Reference Frame” as the fundamental realization of the International Celestial Reference System.

3) Discussions of Commissions and Working Groups relevant to the CCU matters

Discussions on matters concerned with units, fundamental constants, time, timescales, etc. took place during IAU 2018 GA meetings of the following IAU scientific bodies:

- Division A Commission on *Fundamental standards*
- Division A Commission on *Earth Rotation*
- Division A Commission on *Solar System Ephemerides*
- Division A WG *Numerical Standards in Fundamental Astronomy*
- Division A WG *Standards of Fundamental Astronomy*
- Division A WG on *Metrology standards*

4) Official position of the IAU concerning the definition of the term unit

This issue was one of the items in the agenda of the meeting of the IAU Commission on "Fundamental standards" that took place on Tuesday 28 August, during the 2018 IAU General Assembly. This was discussed during the meeting and then through various e-mail exchanges (between IAU members); This resulted in a draft position that was submitted to the IAU General Secretary, Piero Benvenuti, who gave his agreement. This official position is provided in Annex 1. In conclusion, *the IAU recommendation on that question was to revert to the wording of the 8th edition of the SI brochure with encouraging a further CCU discussion before adopting the final definition.*

Nicole Capitaine
IAU Representative to the CCU

Annex 1

Official position of the International Astronomical Union (IAU) in answer to the request from the CCU President, concerning the definition of the term unit in the draft 9th Edition of the SI Brochure

Astronomers are not professional metrologists, but they are largely using the SI units and have always used, defined, and also realized, units at high accuracy level. They have therefore a practical approach of the issue, which is reflected in our comments.

We acknowledge the improvements of the wording of the 9th edition w.r.t the previous one, such as introducing notations that are useful for quantity calculus, or removing the term "generally". In contrast, for the majority of IAU members who gave their opinion, the expression "a value of the unit" is not supported and even not really understood. The formulation "value of the unit" is considered as unnecessarily complicating the issue and recursively defining what a unit is. We are afraid that this may result in creating a confusion between the concept of a "physical quantity" and the concept of the "value of quantity".

We tried to apply the definition to the astronomical units (i.e. the astronomical unit of length and the astronomical unit of mass: mass of the Sun) and thought that using the expression "value of the unit" does not help, nor improve the definition. As for the second, the definition is for us a recipe of how to reproduce a particular quantity; it has the value 1 only if it is expressed in SI second.

In conclusion, the IAU recommendation is to revert to the wording of the 8th edition of the SI brochure with encouraging a further CCU discussion before adopting the final definition.

Nicole Capitaine
IAU Representative to the CCU
30 August 2018