Dear Chairmen & Organizing Committee of Biosignal'2015

We with my young team (http://molpit.com/?page=46) published a some papers (http://molpit.com/?page=55). Now we are developing a new approach to biosignals and biological measures with taking into account novel deep development of quantum units of Nature (see pages 2 - 4 below).

We are pleased to send you the thesis with A.A. Zimin where our basic ideas are formulated. However, the material presented here is still not in its final form, which will be developed after the 25th meeting of the CGPM at 18-20 November 2014, where the new SI unit system will be introduced. This meeting is crucial to our understanding of the problem. There is still a lot of ongoing work which would take us about a month to finish after that meeting.

Regards, Peter

Prof Dr Peter I Belobrov
MOLPIT, Siberian Federal University
Institute of Biophysics SB RAS
79 Svobodny Prospect, Krasnoyarsk 660041, Russia
tel: +7 906 910 3614
fax: +7 391 206 2166
email: peter.belobrov@gmail.com
Web URL: http://molpit.com/

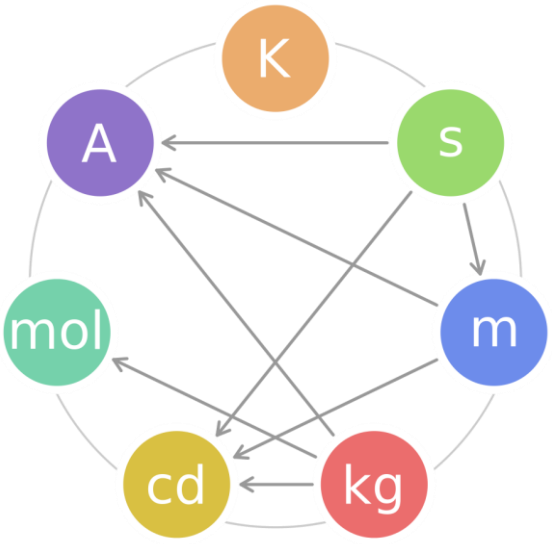
The 25th meeting of the CGPM (18-20 November 2014) will redefine SI base units

Table 1

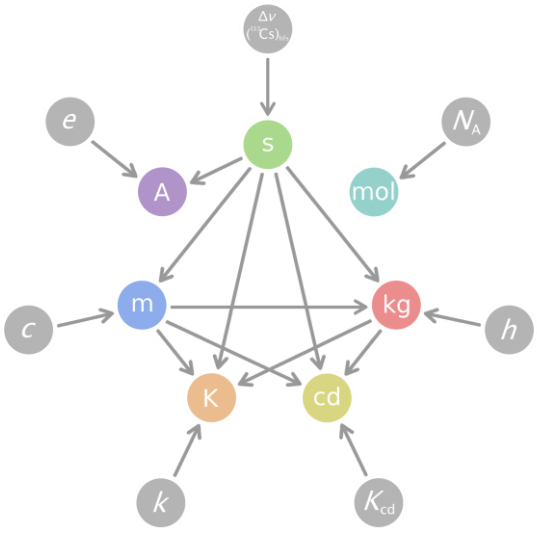
Relative uncertainty of various physical measurements and associated base units				
Unit	Constant used as reference	Symbol	Current definitions	Proposed definitions
kg	Mass of International prototype kilogram	m(K)	exact	4.4×10^{-8}
	Planck constant	h	4.4×10^{-8}	exact
A	magnetic constant	μ_0	exact	6.8×10^{-10}
	Elementary charge	e	2.2×10^{-8}	exact
K	Temperature of triple point of water	T_{TPW}	exact	9.1×10^{-7}
	Boltzmann constant	k	9.1×10^{-7}	exact
mol	Molar mass ^{12}C	$M(^{12}C)$	exact	4.4×10^{-8}
	Avogadro constant	N_A	4.4×10^{-8}	exact

Table 2

Relative uncertainty of various physical measurements				Relationship to basic constants of nature
Constant used as reference	Symbol	Current definitions	Proposed definitions	
electron mass unified atomic mass unit or dalton carbon 12 atomic mass	m_e m_u $m(^{12}C)$	5.0×10^{-8} 5.0×10^{-8} 5.0×10^{-8}	1.4×10^{-9} 1.4×10^{-9} 1.4×10^{-9}	N/A
magnetic constant vacuum permittivity impedance of free space	μ_0 ε_0 Z_0	exact exact exact	6.8×10^{-10} 6.8×10^{-10} 6.8×10^{-10}	N/A
fine-structure constant	α	6.8×10^{-10}	6.8×10^{-10}	N/A
von Klitzing constant	R_K	6.8×10^{-10}	exact	h/e^2
temperature of triple point of water	T_{TPW}	exact	1.7×10^{-6}	N/A
Molar gas constant	R	1.7×10^{-6}	exact	$N_A k$
Stefan–Boltzmann constant	σ	3.6×10^{-6}	exact	$2\pi^5 k^4/15h^3c^2$
Faraday constant Josephson constant	F K_J	2.2×10^{-8} 2.2×10^{-8}	exact exact	$N_A e$ $2e/h$



Current (2013) SI System: Dependence of base unitdefinitions on other base units (for example, the **metre**is defined in terms of the distance traveled by light in a specific fraction of a **second**)



Proposed SI System: Dependence of base unit definitions on physical constants with fixed numerical values and on other base units that are derived from the same set of constants.

Four further constants of nature should be defined to have exact values:

- The Planck constant ***h*** is exactly 6.62606X×10^{-34}joule second (J·s).
- The elementary charge ***e*** is exactly 1.60217X× 10^{-19}coulomb (C).
- The Boltzmann constant ***k*** is exactly 1.38065X×10^{-23}joule per kelvin (J·K^{-1}).
- The Avogadro constant N_A is exactly 6.02214X×10^{23}reciprocal mole (mol^{-1}).

These constants were described in the 2006 version of the SI manual; the latter three were defined as "constants to be obtained by experiment".
The CCU also proposed that the numerical values associated with the following constants of nature be retained unchanged:

- The speed of light ***c*** is exactly 299792458metres per second (m·s^{-1}).
- The ground state hyperfine splitting frequency of the caesium-133 atom $\Delta\nu(^{133}Cs)_{hfs}$ is exactly 9192631770 hertz (Hz).
- The luminous efficacy K_{cd} of monochromatic radiation of frequency 540×10^{12}Hz is exactly 683 lumen per watt (lm·W^{-1}).

The seven definitions above are rewritten below after converting the derived units (joule, coulomb, hertz, lumen and watt) into the seven base units (second, metre, kilogram, ampere, kelvin, mole and candela). In the list that follows, the symbol sr stands for the dimensionless unit steradian.

- $\Delta\nu(^{133}Cs)_{hfs} = 9192631770 s^{-1}$
- $c = 299792458 s^{-1}\cdot m$
- $h = 6.62606X\times10^{-34} s^{-1}\cdot m^2\cdot kg$
- $e = 1.60217X\times10^{-19} s\cdot A$
- $k = 1.38065X\times10^{-23} s^{-2}\cdot m^2\cdot kg\cdot K^{-1}$
- $N_A = 6.02214X\times10^{23} mol^{-1}$
- $K_{cd} = 683\ s^3\cdot m^{-2}\cdot kg^{-1}\cdot cd\cdot sr$

In addition the CCU proposed that

- the international prototype kilogram be retired and that the current definition of the kilogram be abrogated,
- the current definition of the ampere be abrogated,
- the current definition of the kelvin be abrogated and
- the current definition of the mole be revised.

These changes will have the effect of redefining the SI base units, though the definitions of the derived SI units will remain the same.

There are from http://en.wikipedia.org/wiki/Proposed_redefinition_of_SI_base_units

From the document "Convocation of the General Conference – 25th meeting" pp.30-31

On the future revision of the International System of Units, the SI

Draft Resolution A

The General Conference on Weights and Measures (CGPM), at its 25th meeting,

recalling

- Resolution 1 adopted by the CGPM at its 24th meeting (2011), which takes note of the intention of the International Committee for Weights and Measures (CIPM) to propose a revision of the SI that links the definitions of the kilogram, ampere, kelvin, and mole to exact numerical values of the Planck constant *h*, elementary charge *e*, Boltzmann constant *k*, and Avogadro constant N_A, respectively, and which revises the way the SI is defined including the wording of the definitions of the SI units for time, length, mass, electric current, thermodynamic temperature, amount of substance, and luminous intensity so that the reference constants on which the SI is based are clearly apparent,
- the many benefits summarized in Resolution 1 that will accrue to science, technology, industry, and commerce from such a revision, especially from linking the kilogram to an invariant of nature rather than to the mass of a material artefact, thereby ensuring its long-term stability,
- Resolution 7 adopted by the CGPM at its 21st meeting (1999), which encourages work at the National Metrology Institutes (NMIs) that can lead to such a redefinition of the kilogram,
- Resolution 12 adopted by the CGPM at its 23rd meeting (2007), which outlines the work that should be carried out by the NMIs, the International Bureau of Weights and Measures (BIPM), and the CIPM together with its Consultative Committees (CCs) that could enable the planned revision of the SI to be adopted by the CGPM,

considering that there has been significant progress in completing the necessary work, including

- the acquisition of relevant data and their analysis by the Committee on Data for Science and Technology (CODATA) to obtain the required values of *h*, *e*, *k*, and N_A,
- establishment by the BIPM of an ensemble of reference standards of mass to facilitate the dissemination of the unit of mass in the revised SI,
- the preparation of *mises-en-pratique* for the new definitions of the kilogram, ampere, kelvin, and mole,
- awareness campaigns to alert user communities as well as the general public to the proposed revision of the SI,
- the preparation of a new edition of the SI Brochure that presents the revised SI in a way that can be readily understood by a diverse readership, that despite this progress the data do not yet appear to be sufficiently robust for the CGPM to adopt the revised SI at its 25th meeting,

encourages

- continued effort in the NMIs, the BIPM, and academic institutions to obtain data relevant to the determination of *h*, *e*, *k*, and N_A with the requisite uncertainties,
- the NMIs to continue acting through the CCs to discuss and review this data,
- the CIPM to develop a plan to provide the path via the Consultative Committees and the Consultative Committee for Units (CCU) for implementing Resolution 1 adopted by the CGPM at its 24th meeting (2011), and
- continued effort by the CIPM, together with its Consultative Committees, the NMIs, the BIPM, and other organizations such as the International Organization of Legal Metrology (OIML), to complete all work necessary for the CGPM at its 26th meeting to adopt a resolution that would replace the current SI with the revised SI, provided the amount of data, their uncertainties, and level of consistency are deemed satisfactory.