On the Nature of Physical Constants

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Undoubtedly, the most important results of physical science are embodied in numerical values of fundamental constants, while the exact experimental determination of these constants is quite essential for checking of the physical theories and establishment of the firm frame for technological measurements, as well. In fact, the fundamental constants represent a rich blend of physical quantities of very different nature, such as conversion factors, characteristics of certain micro-physical objects or interaction coupling constants. Moreover, there are universal constants, such as c (speed of light) and $\hbar$ (Planck's constant), defining for the quantities of the same kind, the unsurmountable upper or lower bound, respectively. Obviously, the ensemble and numerical values of the fundamental constants are closely related to the system of units used. In addition, in modern physics has appeared a strong "objectivization" trend to construct a system of physical units which would be free of anthropic elements. As an example, Planck's system of *natural units* may serve, reputedly retaining its meaning for all times and civilizations. This program was later completed by, among theoreticians very popular, *non-dimensionalization*, i.e. by putting the fundamental constants to dimensionless unity, $\to 1$. In experimental science, this tendency was in 2019 crowned with the re-definition of International System of Units (SI), consisting of the substitution of all *base units*, depending on material realizations (*étalons*), by *defining constants*, i.e. selected fundamental constants with the fixed numerical values. Such epistemologically deep changes in the approach to the physical metrology have inevitably some unexpected aspects and weak points, the discussion of which is the subject of the present contribution.