

Universal Constants

•	CONSTANT	VALUES
1	Speed of light (C)	2.99792458×10^8 m/sec
2	Mass of electron (m_e)	$9.1093897 \times 10^{-31}$ kg
3	Mass of proton (m_p)	$1.6726231 \times 10^{-27}$ kg
4	Mass of nutron (m_n)	$1.6749268 \times 10^{-27}$ kg
5	Charge of proton (+e)	$+1.60217733 \times 10^{-19}$ c
6	Charge of electron (-e)	$-1.60217733 \times 10^{-19}$ c
7	Charge of nutron	0
8	Gravitational Constant (G)	6.67259×10^{-11} N m ² / kg ²
9	Gas constant (R)	8.314510 J K ⁻¹ mol ⁻¹
10	Avogadro Constant (N_A)	6.0221367×10^{23} / mol
11	Bohr radius (a_0)	$5.29177249 \times 10^{-11}$ m
12	Rydberg constant (R)	1.0973731534×10^7 mol ⁻¹
13	Plank constant (h)	$6.62600755 \times 10^{-34}$ J sec
14	Faraday constant (F)	96485.3029 C/mol
15	Permittivity in vecuum (ϵ_0)	$8.854187817 \times 10^{-12}$ C ² N ⁻¹ ·m ⁻² , F/m
16	Permeability in vecuum (μ_0)	$4\pi \times 10^{-7}$ N/A ²
17	Ground state energy of H- Atom	13.6056 ev
18	Mass of earth	5.98×10^{24} kg
19	mean radius of earth	6.37×10^6 m

Universal Constants In Physics

O. P. Spiridonov



Universal Constants In Physics:

Universal Constants in Physics Gilles Cohen-Tannoudji,1993 *Universal Physical Constants* O. P. Spiridonov,1986

Theory of universal constants Khalid Jerrari,2022-09-07 The fundamental laws of physics include fixed numerical parameters called universal constants These quantities determined experimentally and supposed to vary neither in time nor in space remain one of the greatest mysteries of science Our current knowledge does not allow us to understand their origin nor to determine them in a theoretical way In this book the author is mainly interested in these elements His approach is to build a theoretical framework that could explain the source of these constants in our laws of physics and to propose a method that would not only predict them all but also define them To do this the author begins by introducing the assumptions on which he bases his theory Then in a first part he expresses the universal constants the Planck units and the thermodynamic quantities of the Universe in terms of its characteristic variables such as its mass and its radius In a second part he demonstrates the constancy of the Planck units as well as that of the universal constants and finally he proposes a general theoretical framework to determine them *Astrophysics, Clocks and Fundamental Constants* Savely G.

Karshenboim,Ekkehard Peik,2004-08-11 The question of a possible temporal variation of the fundamental constants was raised by Paul Dirac in his large number hypothesis in 1937 Today it appears in the context of the search for a unified theory of the fundamental interactions It touches both fundamental and applied physics as the postulate of the unalterability of the constants is the foundation for modern metrology The book presents reviews written by leading experts in the field Focussing on the question of variations of the fundamental constants in time or space the chapters cover the theoretical framework in which variations are expected and the search for variations of quantities like the fine structure constant the electron proton mass ratio g factors of proton and neutron etc in astrophysical and geophysical observations and in precision experiments with atomic clocks and frequency standards **Recent Advances in Metrology and Fundamental Constants** T.J.

Quinn,S. Leschiutta,2001-12-18 The exchange between physics and metrology is always fascinating and exciting Many are the open problems in physics that call for extremely precise standards many are the advances in metrology made possible by a deep and assiduous study of the underlying physics One has just to think of the enormous sophistication required in the measurements of some absolute quantities such as the Avogadro the gas or the gravitational constants It is also worth noticing that not only the units of a metrological system are interrelated through the fundamental constants but also the latter find their full significance when they are determined through the most exacting metrological experiments Over the past decade many improvements took place and these are discussed in this book from one side the old caesium SI second definition has found a new realisation with the fountain approach replacing the classical thermal atomic beam The use of cold atom techniques in which bunches of inert atoms are collected slowed down and cooled has opened a number of new and unexpected avenues for metrology and fundamental constants one of these possibilities being the atom interferometry

Another important quantum jump was the demonstration of the possibility of performing a direct frequency division in the visible using ultra short femtosecond pulses In addition the possibility of counting electrons or photons gave a fundamental support to the development of single electron capacitance standards and to new scenarios in the absolute calibration of photo detectors

Einheiten und Fundamentalkonstanten in Physik und Chemie H. Bachmair,1992-12-16 Subvolume b

The Fundamental Constants Harald Fritzsche,2009 The speed of light the fine structure constant and Newton's constant of gravity OCo these are just three among the many physical constants that define our picture of the world Where do they come from Are they constant in time and across space In this book physicist and author Harald Fritzsche invites the reader to explore the mystery of the fundamental constants of physics in the company of Isaac Newton Albert Einstein and a modern day physicist The conversation that the three scientists are imagined to have provides an entertaining introduction to the constants and covers topics ranging from atomic nuclear and particle physics to astrophysics and cosmology

Quantum Metrology and Fundamental Physical Constants A.A. Lucas,Paul H. Cutler,A. North,2013-12-01 The object of this NATO Advanced Study Institute was to present a tutorial introduction both to the basic physics of recent spectacular advances achieved in the field of metrology and to the determination of fundamental physical constants When humans began to qualify their description of natural phenomena metrology the science of measurement developed along side geometry and mathematics However from antiquity to modern times the role of metrology was mostly restricted to the need of commercial social or scientific transactions of local or at most national scope Beginning with the Renaissance and particularly in western Europe during the last century metrology rapidly developed an international character as a result of growing needs for more accurate measurements and common standards in the emerging industrial society Although the concerns of metrology are deeply rooted to fundamental sciences it was until recently perceived by much of the scientific community as mostly custodial in character

Foundations of Physics Mario Bunge,2013-03-13 This is not an introduction to physics but an analysis of its foundations Indeed the aims of this book are 1 to analyze the form and content of some of the key ideas of physics 2 to formulate several basic physical theories in an explicit and orderly i.e. axiomatic fashion 3 to exhibit their presuppositions and discuss some of their philosophical implications 4 to discuss some of the controversial issues and 5 to debunk certain dusty philosophical tenets that obscure the understanding of physics and hinder its progress To the extent to which these goals are attained the volume can serve as a companion to studies in theoretical physics aiming at deepening the understanding of the logical structure and the physical meaning of our science In order to keep the book slender whole fields of basic physical research had to be excluded chiefly many body physics quantum field theories and elementary particle theories A large coverage was believed to be less important than a comparatively detailed analysis and reconstruction of three representative monuments classical mechanics general relativity and quantum mechanics as well as their usually unrecognized presuppositions The reader is invited to join the project and supply some of the many missing chapters or to rewrite the

present ones entirely The Fundamental Physical Constants and the Frontier of Measurement, Brian William Petley,1988
Fundamental physical constants are used throughout the world by scientists and technologists in the course of every kind of theoretical and experimental research work The book examines the present state of the measurement arts and gives indications of likely future developments This comprehensive and stimulating volume will certainly become a standard reference work in the field of measurement science for physicists metrologists and workers in other physical science disciplines where a high accuracy of measurement is required Quantum Metrology and Fundamental Constants F. Piquemal,B. Jeckelmann,2009 Philosophical Magazine ,1929 *On the Origin of Natural Constants* Hans Peter Good,2018-10-22 Just as the circle number or the Euler constant e determines mathematics fundamental constants of nature define the scales of the natural sciences This book presents a new perspective by means of a few axioms and compares the resulting validity with experimental data By the axiomatic approach Sommerfeld s mysterious fine structure constant and Dirac s cosmic number are fixed as pure number constants Thanks to these number constants it is possible to calculate the value for the anomalous magnetic moment of the electron in a simple way compared to QED calculations With the same number constants it is also possible to calculate masses partial lifetimes magnetic moments or charge radii of fundamental particles The expressions used for the calculations with few exceptions yield values within the experimental error limits of the Particle Data Group The author shows that the introduced number constants give even better predictions than the complicated QED calculations of today s doctrine In the first part only experimental data from the literature for checking the postulates are used In the second part the author explains electrical transport measurements with emergent behaviour which were carried out in a professional environment Global Earth Physics Thomas J. Ahrens,1995 A standard reference that provides in accessible form selected critical data for professional and student solid Earth and planetary geophysicists It represents the third version of the popular Handbook of Physical Constants the first was published in 1942 the second in 1966 The present version reflects the enormous growth of scientific knowledge of the Earth and planets since 1966 spurred by the discovery and verification of plate tectonics and the systematic exploration of the solar system Annotation copyright by Book News Inc Portland OR **The Meaning of the Universal Gravitation Constant of Isaac Newton Evinces the Specific Existence of Gravitational Radiations Identified in the Electromagnetic Spectrum and Reveals Mathematical Solution of the Problem of the Unified Field on Fundamental Physics** Paulo Ferraz de Mesquita,1966
Report for the Year ... National Physical Laboratory (Great Britain),1929 Vol for 1905 include lists of papers published by the laboratory or communicated by members of the staff to scientific societies or to the technical journals *The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science* ,1925 **Congress of Arts and Science** Howard Jason Rogers,1906 **Industrial Arts Index** ,1921 The Encyclopædia Britannica James Louis Garvin,1926

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