List of important publications in physics

This is a list of **important publications** in physics, organized by field.

Some reasons why a particular publication might be regarded as important:

- **Topic creator** – A publication that created a new topic
- **Breakthrough** – A publication that changed scientific knowledge significantly
- **Introduction** – A publication that is a good introduction or survey of a topic
- **Influence** – A publication which has significantly influenced the world
- **Latest and greatest** – The current most advanced result in a topic

Optics

Book of Optics

- Ibn al-Haytham (Alhacen)

Description: The ***Book of Optics*** (Arabic: ***Kitab al-Manazir***, Latin: ***De Aspectibus***) is a seven volume treatise on optics and physics, written by the Iraqi Arab Muslim scientist Ibn al-Haytham (Latinized as *Alhacen* or *Alhazen* in Europe), and published in 1021, when he was under house arrest in Cairo, Egypt. The book had an important influence on the development of optics, and science in general, as it drastically transformed the understanding of light and vision, and introduced the experimental scientific method. As a result, Ibn al-Haytham has been described as the "father of optics", the "pioneer of the modern scientific method", and the "first scientist".[1] The *Book of Optics* has been ranked alongside Isaac Newton's *Philosophiae Naturalis Principia Mathematica* as one of the most influential books ever written in the history of physics.[2]

- Christiaan Huygens - A Treatise on Light

Huygens' treatise on light was not appreciated in its time until much later due to the mistaken zeal with which formerly everything that conflicted with the cherished ideas of Newton was denounced by his followers. Despite that, Huygens attained a remarkably clear understanding of the principles of wave-propagation; and his exposition of the subject marks an epoch in the treatment of Optical problems.

- Augustin-Jean Fresnel - Papers on optical phenomena

Work by Thomas Young and Fresnel provided a comprehensive picture of the propagation of light.

The Frequency comb papers

- " Accurate Measurement of Large Optical Frequency Differences with a Mode-Locked Laser [3]" Th.Udem, J.Reichert, R.Holzwarth, and T.W.H"ansch, Opt.

Lett., 24, 881 (1999).

- "Measuring the Frequency of Light with Mode-Locked Lasers [4]" J.Reichert,

R.Holzwarth, Th.Udem, and T.W.H"ansch, Opt. Commun. 172, 59 (1999).

- "Optical Frequency Metrology", Th.Udem, R.Holzwarth, and T.W.H"ansch,

Nature 416, 233 (2002).

Description: The Frequency comb technique was presented in few papers. The earlier presented the main idea but last is the one often cited. **Importance:**

Classical mechanics

Philosophiae Naturalis Principia Mathematica

- Isaac Newton

Description: The ***Philosophiae Naturalis Principia Mathematica*** (Latin: "mathematical principles of natural philosophy", often *Principia* or *Principia Mathematica* for short) is a three-volume work by Isaac Newton published on July 5, 1687. One of the most influential scientific books ever published, it contains the statement of Newton's laws of motion forming the foundation of classical mechanics as well as his law of universal gravitation. He derives Kepler's laws for the motion of the planets (which were first obtained empirically).

In formulating his physical theories, Newton had developed a field of mathematics known as calculus.

Importance: Topic creator, Breakthrough, Influence

Méchanique Analytique

- Joseph Louis Lagrange (1788)

Description: Lagrange's masterpiece on mechanics and hydrodynamics. Based largely on the calculus of variations, this work introduced Lagrangian mechanics including the notion of virtual work, generalized coordinates, and the Lagrangian. Lagrange also further developed the principle of least action and introduced the Lagrangian reference frame for fluid flow.

Classical Mechanics

- Herbert Goldstein

Description: A standard undergraduate textbook on classical mechanics, considered a good book on the subject.

Importance: Introduction

Special theory of relativity

On the Electrodynamics of Moving Bodies

- Albert Einstein
- Annalen der Physik. June 30, 1905
- On the Electrodynamics of Moving Bodies [5], Zur Elektrodynamik bewegter Körper [6] (German original)

Description: Special relativity, developed in 1905, only considers observers in inertial reference frames which are in uniform motion with respect to each other. Einstein's paper that year was called "*On the Electrodynamics of Moving Bodies*". While developing this theory, Einstein wrote to Mileva (his wife) about "our work on relative motion". This paper introduced the special theory of relativity, a theory of time, distance, mass and energy. The theory postulates that the speed of light in vacuum will be the same for these observers. Special relativity solved the puzzle that had been apparent since the Michelson-Morley experiment, which had failed to show that light waves were travelling through any medium (other known waves travelled through media - such as water or air). It had been suggested that light waves actually did not travel through any medium: the speed of light was thus fixed, and not relative to the movement of the observer. This was impossible under Newtonian classical mechanics however, and Einstein provided a new system which allowed for this.

Importance: Topic creator, Breakthrough, Influence

The Theory of Relativity

- Ludwik Silberstein
- Cambridge University Press, 1914

Description: This pioneering textbook drew together the now well-known developments of H.A.Lorentz, A. Einstein, and H. Minkowski. It uses concepts developed in the then- current textbooks (e.g. Vector Analysis (Gibbs/Wilson) and Bonola: Non-Euclidean Geometry) to provide entry into mathematical physics including a vector-based introduction to quaternions and a primer on matrix notation for linear transformations of 4-vectors. The ten chapters are composed of 4 on kinematics, 3 on quaternion methods, and 3 on electromagnetism. The second edition published in 1924 extended relativity into gravitation theory with tensor methods, but was superseded by Eddington's text. The book has a conversational style and embellished with appropriate footnotes. While the mathematics is generally well adapted to the text, there is an erroneous expression given for the quaternionic representation of Lorentz transformations. The expression should have the form of an inner automorphism but Silberstein inexplicably uses the expression Q[]Q , failing to supply one of the Q's with a -1 exponent. The actual technique in geometric arithmetic comes about with inversive ring geometry applied to biquaternions.

Importance: Influence

Spacetime Physics

- Edwin F. Taylor, John Archibald Wheeler
- W. H. Freeman (2nd edition 1992) ISBN 0716723271

Description: A modern introduction to special relativity, that explains well how the choice to divide spacetime into a time part and a space part is no different than two choices about how to assign coordinates to the surface of the earth. Suitable for self-study.

Importance: Introduction

General theory of relativity

The Foundation of the General Theory of Relativity

- Albert Einstein
- Annalen der Physik. , 1916
- The Foundation of the General Theory of Relativity [7], Die Grundlage der allgemeinen Relativitätstheorie [8] (German original)

Importance: Topic creator, Breakthrough, Influence

The Mathematical Theory of Relativity

- Arthur Stanley Eddington
- Cambridge University Press, 1923, 1924

Description: This textbook is a tour-de-force of tensor calculus, developed in Chapter II. By page 83 he has deduced the Schwarzschild metric for the domain of events around an isolated massive particle. By page 92 he has explained the advance of the perihelion of the planets, the deflection of light, and displacement of Fraunhofer lines. Electromagnetism is relegated to Chapter VI (pp. 170–195), and later (p. 223) The bifurcation of geometry and electrodynamics. This text, with its ambitious development of pseudo-Riemannian geometry for gravitational theory, set an austere standard with relativity enthusiasts. Gone is any mention of quaternions or hyperbolic geometry since tensor calculus subsumes them. Thus for learning the mechanics of modern relativity this text still serves, but for motivation and context of the special theory, Silberstein is better.

Importance: Influence

Gravitation

- Charles W. Misner, Kip S. Thorne, and John Archibald Wheeler
- W. H. Freeman, 1973

Description: A book on gravitation (often considered the "Bible" by researchers for its prominence) by Misner, Thorne, and Wheeler. Published by W.H. Freeman and Company in 1973. A massive tome of over 1200 pages, the book covers all aspects of the General Theory of Relativity and also considers some extensions and experimental confirmation. The book is divided into two "tracks", the second of which covers more advanced topics.

Importance: Introduction, Influence

A First Course in General Relativity

- Bernard F. Schutz
- Cambridge University Press, 1985

Description: A book on the Theory of General Relativity that is suitable for a year-long undergraduate course on the subject that can also stand as a semester-long course for graduate students.

Importance: Introduction

Quantum theory

On the Law of Distribution of Energy in the Normal Spectrum

- Max Planck
- Annalen der Physik, vol. 4, p. 553 ff (1901).
- On the Law of Distribution of Energy in the Normal Spectrum [9]

Description: In physics, the intensity spectrum of electromagnetic radiation from a black body at temperature T is given by the **Planck's law of black body radiation**:

$$I(\nu)d\nu d\Omega = \frac{2h\nu^3}{c^2}\frac{1}{\exp\left(\frac{h\nu}{kT}\right)-1}d\nu d\Omega$$

where:

ν is the frequency

$I(\nu)$ is the amount of energy per unit time per unit surface per unit solid angle emitted in the frequency range between ν and $\nu+\delta\nu$ [W m^{-2} Hz^{-1} sr^{-1}];

h is Planck's constant,:

c is the speed of light and

k is Boltzmann's constant.

Max Planck originally produced this law in 1900 (published in 1901) in an attempt to interpolate between the Rayleigh-Jeans law (which worked at long wavelengths) and Wien's law (which worked at short wavelengths). He found that the above function fit the data for all wavelengths remarkably well.

This paper is considered to be the beginning of quantum theory.

Importance: Topic creator, Breakthrough, Influence

The Principles of Quantum Mechanics

- P. A. M. Dirac

Description: Quantum mechanics as explained by one of the founders of the field, Paul Dirac. First edition published on 29 May 1930.

Importance: Introduction, Influence, Historical importance. The second to the last chapter is particularly interesting because of its prediction of the positron.

Table of contents:

1. The Principle of Superposition
2. Dynamical Variables and Observables
3. Representations

4. The Quantum Conditions
5. The Equations of Motion
6. Elementary Applications
7. Perturbation Theory
8. Collision Problems
9. Systems containing several similar particles
10. Theory of Radiation
11. Relativistic Theory of the electron
12. Quantum Electrodynamics

Introduction to Quantum Mechanics

- David J. Griffiths
- Prentice Hall (2nd edition 2004) ISBN 0-13-111892-7

Description: A how-to for Quantum Mechanics aimed at the physics undergraduate.

Importance: Introduction

Thermodynamics

An Experimental Enquiry Concerning the Source of the Heat which is Excited by Friction

- Benjamin Thompson, Count Rumford (1798). "An Experimental Enquiry Concerning the Source of the Heat which is Excited by Friction". *Philosophical Transaction of the Royal Society*: 102.

Description: Observations of the generation of heat during the boring of cannons led Rumford to reject the caloric theory and to contend that heat was a form of motion.

Importance: Influence

On the Equilibrium of Heterogeneous Substances

- Gibbs, J. Willard (1875-1878). *On the Equilibrium of Heterogeneous Substances*. Connecticut Acad. Sci.. Reprinted in
  - Gibbs, J. Willard (October 1993). *The Scientific Papers of J. Willard Gibbs (Vol. 1)*. Ox Bow Press. ISBN 0-918024-77-3.
  - Gibbs, J. Willard (February 1994). *The Scientific Papers of J. Willard Gibbs (Vol. 2)*. Ox Bow Press. ISBN 1-881987-06-X.

Description: Between 1876 and 1878 Gibbs wrote a series of papers collectively entitled "*On the Equilibrium of Heterogeneous Substances*", considered one of the greatest achievements in physical science in the 19th century and the foundation of the science of physical chemistry. In these papers Gibbs applied thermodynamics to the interpretation of physicochemical phenomena and showed the explanation and interrelationship of what had been known only as isolated, inexplicable facts. Gibbs' papers on heterogeneous equilibria included:

- Some chemical potential concepts
- Some free energy concepts
- A Gibbsian ensemble ideal (basis of the statistical mechanics field)
- A *phase rule*

Importance:

Classical and Statistical Thermodynamics

- Ashley H. Carter
- Benjamin Cummings (2000) ISBN 0137792085

Description: Covers the phenomenological basis of classical thermodynamics itself and also the statistical theory, without assuming the reader already knows statistics or quantum mechanics. Truly an introductory text, you can pick it up after taking advanced calculus and first year general physics and a semester later know about Bose-Einstein condensation, population inversions, and even information theory.

Importance: Introduction

Statistical mechanics

See also **list of notable textbooks in statistical mechanics.**

On the Motion—Required by the Molecular Kinetic Theory of Heat—of Small Particles Suspended in a Stationary Liquid

- Einstein, Albert (1905). "Über die von der molekularkinetischen Theorie der Wärme geforderte Bewegung von in ruhenden Flüssigkeiten suspendierten Teilchen (On the Motion—Required by the Molecular Kinetic Theory of Heat—of Small Particles Suspended in a Stationary Liquid)" (– Scholar search [10]). *Ann. Phys.* **17** (549).

Description: In this publication Einstein covered his study of Brownian motion, and provided empirical evidence for the existence of atoms.

Importance:

Scaling laws for Ising models near T_c

- Leo P. Kadanoff
- Physica 2, p. 263 (1966).

Description: Introduces the real space view on the renormalization group, and explains using this concept some relations between the scaling exponents of the Ising model.

Importance: Topic creator, breakthrough, influence

The renormalization group: critical phenomena and the Kondo problem

- Kenneth Wilson
- Rev. Mod. Phys. 47, 4, p. 773-840 [11] (1974)

Description: Application of the renormalization group to the solution of the Kondo problem. The author was awarded the Nobel Prize in 1982 because of this work.

Importance: Breakthrough, influence

Equation of State Calculations by Fast Computing Machines

- Nicholas Metropolis, Arianna W. Rosenbluth, Marshall N. Rosenbluth, Augusta H. Teller, and Edward Teller
- N. Metropolis, A.W. Rosenbluth, M.N. Rosenbluth, A.H. Teller, and E. Teller (1953). "Equation of State Calculations by Fast Computing Machines". *Journal of Chemical Physics* **21** (6): 1087–1092. doi:10.1063/1.1699114 [12].

Description: Introduces the Metropolis Monte Carlo method with periodic boundary conditions and applies it to the numerical simulation of a fluid. **Importance:** Topic creator

Electromagnetism

Experimental Researches in Electricity

- Michael Faraday
- Experimental Researches in Electricity, vols. i. and ii., Richard and John Edward Taylor, vols. i. and ii. (1844 and 1847); vol. iii. (1844); vol. iii. Richard Taylor and William Francis (1855);
- "Experimental Researches in Electricity" by Michael Faraday [13] Original text with Biographical Introduction by Professor John Tyndall, 1914, Everyman edition.

Description: Faraday's law of induction and research in electromagnetism

Importance:

A Dynamical Theory of the Electromagnetic Field

- James Clerk Maxwell
- Maxwell, James Clerk, "A Dynamical Theory of the Electromagnetic Field". 1865.

Description: "A Dynamical Theory of the Electromagnetic Field" was the third of James Clerk Maxwell's papers concerned with electromagnetism. The concept of displacement current was introduced, so that it became possible to derive equations of electromagnetic wave. It was the first paper in which Maxwell's equations appeared.

Importance: Topic creator, breakthrough, influence

Classical Electrodynamics

- John David Jackson
- Wiley (3rd edition 1998) ISBN 047130932X

Description: The defining graduate-level introductory text.

Importance: Influence, Introduction

Introduction to Electrodynamics

- David Griffiths
- Prentice Hall. (3rd edition 1998) ISBN 0-13-805326-X.

Description: A standard undergraduate introductory text.

Importance: Introduction

Fluid dynamics

An experimental investigation of the circumstances which determine whether the motion of water shall be direct or sinuous, and of the law of resistance in parallel channels

- Osbourne Reynolds
- Philosophical Transactions, vol. 174, (1883).

Description: Introduces the dimensionless Reynolds number, investigating the critical Reynolds number for transition from laminar to turbulent flow.

The local structure of turbulence in incompressible viscous fluid for very large Reynolds numbers

- A.N. Kolmogorov
- Dokl. Akad. Nauk. SSSR 30, p. 4 (1941). Reprinted in Proc. Roy. Soc. A 434, p. 9 (1991).

Description: Introduces the only quantitative theory on turbulence which has survived the test of time.

Importance: Breakthrough, Influence

Statistical fluid mechanics

- A.S. Monin, A.M. Yaglom
- The MIT press (1971). First edition in Russian by Nauka (1965).

Description: The most important review text on turbulence.

Importance: Relevant textbook.

Nonlinear dynamics and chaos

Deterministic nonperiodic flow

- Edward Lorenz
- Journal of Atmospheric Sciences, vol. 20, p. 130-148 (1963).

Description: A finite system of deterministic nonlinear ordinary differential equations is introduced to represent forced dissipative hydrodynamic flow, simulating simple phenomena in the real atmosphere. All of the solutions are found to be unstable, and most of them nonperiodic, thus forcing to reevaluate the feasibility of long-term weather prediction. In this paper the Lorenz attractor is presented for the first time, and gave the first hint of what is now known as butterfly effect.

Importance: Topic creator, Breakthrough

Period Three Implies Chaos

- T.Y. Li, J.A. Yorke.
- American Mathematical Monthly 82, pp. 985–992, (1975).

Quantum field theory

Space-Time approach to Quantum Electrodynamics

- Richard P. Feynman
- Physical Review, vol. 76, 6, p. 769 [14] (1949).

Description: Introduction of the Feynman diagrams approach to quantum electrodynamics.

Importance: Topic creator, Breakthrough, Influence

An Introduction to Quantum Field Theory

- Michael E. Peskin and Daniel V. Schroeder
- Addison-Wesley Advanced Book Program (1995).

Description: Standard graduate textbook in quantum field theory.

Importance: Introduction

Cosmology

The Early Universe

- E.W. Kolb, M.S. Turner
- Addison-Wesley, 1990.

Description: Reference textbook on cosmology, discussing both observational and theoretical issues.

Importance: Relevant textbook.

A preliminary measurement of the cosmic microwave background spectrum by the Cosmic Background Explorer (COBE) satellite

- J.C. Mather, et al.
- ApJ, v.354, p.L37, (1990)
- Online version [15]

Description: This paper was part of the COBE project. The COBE satellite was developed by NASA's Goddard Space Flight Center to measure the diffuse infrared and microwave radiation from the early universe to the limits set by our astrophysical environment. It was launched November 18, 1989 and carried three instruments, a Far Infrared Absolute Spectrophotometer (FIRAS) to compare the spectrum of the cosmic microwave background radiation to a precise blackbody, a Differential Microwave Radiometer (DMR) to map the cosmic radiation and search for brightness variants, and a Diffuse Infrared Background Experiment (DIRBE) to search for the cosmic infrared background radiation produced by the first galaxies.

FIRAS - The cosmic microwave background (CMB) spectrum is that of a nearly perfect blackbody with a temperature of 2.725 +/- 0.002 K. This observation matches the

predictions of the hot Big Bang theory extraordinarily well, and indicates that nearly all of the radiant energy of the Universe was released within the first year after the Big Bang. Initial results from FIRAS were presented in this paper. Final results from FIRAS were presented at: J.C. Mather, et al., " Calibrator Design for the COBE Far-Infrared Absolute Spectrophotometer (FIRAS) [16]", ApJ, v.512, p.511 (1999)

Importance:

Structure in the COBE differential microwave radiometer first-year maps

- G.F. Smoot et al.
- ApJ, v.396, p.L1 (1992)
- Online version [17]

Description: This paper was part of the COBE project. The COBE satellite was developed by NASA's Goddard Space Flight Center to measure the diffuse infrared and microwave radiation from the early universe to the limits set by our astrophysical environment. It was launched November 18, 1989 and carried three instruments, a Far Infrared Absolute Spectrophotometer (FIRAS) to compare the spectrum of the cosmic microwave background radiation to a precise blackbody, a Differential Microwave Radiometer (DMR) to map the cosmic radiation and search for Brightness variants, and a Diffuse Infrared Background Experiment (DIRBE) to search for the cosmic infrared background radiation produced by the first galaxies.

DMR - The CMB was found to have intrinsic "anisotropy" for the first time, at a level of a part in 100,000. These tiny variations in the intensity of the CMB over the sky show how matter and energy was distributed when the Universe was still very young. Later, through a process still poorly understood, the early structures seen by DMR developed into galaxies, galaxy clusters, and the large scale structure that we see in the Universe today. Initial results from FIRAS were presented in this paper. Final results from FIRAS were presented at: C.L. Bennett, et al., " Four-Year COBE DMR Cosmic Microwave Background Observations: Maps and Basic Results [18]", ApJ, v.464, p.L1 (1996)

Importance:

The COBE Diffuse Infrared Background Experiment Search for the Cosmic Infrared Background. I. Limits and Detections

- M.G. Hauser, et al.
- ApJ, v.508, p.25 (1998)
- Online version [19]

Description: This paper was part of the COBE project. The COBE satellite was developed by NASA's Goddard Space Flight Center to measure the diffuse infrared and microwave radiation from the early universe to the limits set by our astrophysical environment. It was launched November 18, 1989 and carried three instruments, a Far Infrared Absolute Spectrophotometer (FIRAS) to compare the spectrum of the cosmic microwave background radiation to a precise blackbody, a Differential Microwave Radiometer (DMR) to map the cosmic radiation and search for brightness variants, and a Diffuse Infrared Background Experiment (DIRBE) to search for the cosmic infrared background radiation produced by the first galaxies.

DIRBE - Infrared absolute sky brightness maps in the wavelength range 1.25 to 240 micrometres were obtained to carry out a search for the cosmic infrared background (CIB). The CIB was originally detected in the two longest DIRBE wavelength bands, 140 and 240 micrometres, and in the short-wavelength end of the FIRAS spectrum. Subsequent analyses have yielded detections of the CIB in the near-infrared DIRBE sky maps. The CIB represents a "core sample" of the Universe; it contains the cumulative emissions of stars and galaxies dating back to the epoch when these objects first began to form.

Importance:

Condensed matter physics

Theory of superconductivity

- J. Bardeen, L. N. Cooper, and J. R. Schrieffer
- Phys. Rev. 108 (5), 1175-1204 [20] (1957).

Description: The BCS theory of usual (not high T_c) superconductivity, relating the interaction of electrons and the phonons of a lattice. The authors were awarded with the Nobel prize.

Importance: Breakthrough, Influence

Solid State Physics

- Neil W. Ashcroft, N. David Mermin
- Brooks Cole, 1976, ISBN 0030839939

Description: It is so old that it still calls condensed matter physics by the out of fashion name of solid state physics, but yet it is still a good introduction to the topic.

Importance: Introduction

Simulating physics with computers

- Richard Feynman
- International Journal of Theoretical Physics, 21(6/7): pp. 467–488, (1982).
- Online version [21]

Description: A digital computer as an efficient universal computing device; the simulation of quantum mechanics and the use of quantum computers

Importance: influence

Polymer physics

Statistical Mechanics of Chain Molecules

- Paul J. Flory
- Interscience Publishers (1969)

Principles of Polymer Chemistry

- Paul J. Flory
- Cornell University Press (1953)

Scaling Concepts in Polymer Physics

- Pierre-Gilles de Gennes
- Cornell University Press, (1979)

Path Integrals in Quantum Mechanics, Statistics, Polymer Physics, and Financial Markets

- Kleinert, Hagen
- 4th edition, World Scientific (Singapore, 2004); Paperback ISBN 981-238-107-4 *(also available online: PDF-files* [22]*)*

The Theory of Polymer Dynamics

- M. Doi, S. F. Edwards, (International Series of Monographs on Physics. 73)
- Oxford Science Publications, 1986.

On Intramolecular Statistics, Particularly for Chain Molecules

- Eugene Guth and Herman Mark,
- *Monatschefte für Chemie*, 65, 93 (1934).

Description: This paper contains, among other contributions, the first theoretical description of statistical mechanics of polymers with application to viscosity and rubber elasticity, and an expression for the entropy gain during the coiling of linear flexible molecules.

Importance: Contains the foundation of the *kinetic theory of rubber elasticity.*

Elastic and Thermodynamic Properties of Rubberlike Materials: A Statistical Theory

- Eugene Guth and Hubert M. James
- *Industrial Engineering Chemistry,* 33, 624 (1941)

Description: This work was presented earlier by Guth at the American Chemical Society meeting of 1939. The article contains the first outline of the *network* theory of rubber elasticity. The resulting Guth-James equation of state is analogous to van der Waal's equation.

Importance: Pioneering contribution to polymer physics.

Theory of Elastic Properties of Rubber

- Eugene Guth and Hubert M. James
- *Journal of Chemical Physics,* 15, 2941 (1943).

Description: This article presents a more detailed version of the network theory of rubber elasticity. The paper used average forces to some extent instead of thermodynamical functions. In statistical thermodynamics, these two procedures are equivalent.

Importance: Pioneering contribution. After some controversy within the literature, the James-Guth network theory is now generally accepted for larger extensions. See, e.g., Paul Flory's comments in *Proc. Royal Soc. A.* 351, 351 (1976).

Plasma physics

The Collected Works of Irving Langmuir (1961)

- Irving Langmuir
- Vol.3: Thermonic Phenomenon: papers from 1916-1937
- Vol.4: Electrical Discharges: papers from 1923-1931

These two volumes from Nobel Prize winning scientist Irving Langmuir, include his early published papers resulting from his experiments with ionized gases (i.e. plasma). The books summarise many of the basic properties of plasmas. Langmuir coined the word *plasma* in about 1928.

Importance: Influence

Cosmical Electrodynamics, 2nd ed. (1963)

- Hannes Alfvén & Carl-Gunne Fälthammar

Hannes Alfvén won the Nobel Prize for his development of magnetohydrodynamics (MHD) the science that models plasma as fluids. This book lays down the ground work, but also shows that MHD may be inadequate for low-density plasmas such as space plasmas.

Importance: Topic creator, Breakthrough, Influence

Vehicle dynamics

The Automotive Chassis Engineering Principles

- J. Reimpell H. Stoll J. W. Betzler.
- ISBN 978-0-7680-0657-5

Description: Vehicle dynamics and chassis design from a production car perspective.

Importance: Latest and greatest.

Race Car Vehicle Dynamics

- William F. Milliken and Douglas L. Milliken.

Description: Vehicle dynamics and chassis design from a race car perspective.

Importance: Latest and greatest, also the standard reference for automotive suspension engineers.

Fundamentals of Vehicle Dynamics

- Thomas Gillespie.

Description: Mathematically oriented derivation of standard vehicle dynamics equations, and definitions of standard terms.

Importance: Introduction to modern vehicle dynamics theory.

Chassis Design - Principles and Analysis

- William F. Milliken and Douglas L. Milliken.

Description: Vehicle dynamics as developed by Maurice Olley from the 1930s onwards. First comprehensive analytical synthesis of vehicle dynamics.

Importance: Topic creator.

Tyre modelling for use in vehicle dynamics studies

- Bakker, E. ; Nyborg, L. ; Hans B. Pacejka

Description: A new way of representing tyre data obtained from measurements in pure cornering and pure braking conditions.

Importance: A standard reference in vehicle dynamics.

Geophysics

Seismic Data Processing

- Ozdogan Yilmaz
- Society of Exploration Geophysicists, 1987, (ISBN 0-931830-40-0).

Description: Up to date account of seismic data processing in the petroleum geophysics industry.

Importance:

Underground Blasting, Seismic Surveys

- James Jameson Snodgrass:

Description:A biography and publication list for a geophysical researcher for the United States Geological Survey
Importance: Common reference in blasting and seismology.

Mathematical physics

Invariante Variationsprobleme

- Emmy Noether (1918)

Description: Contained a proof of Noether's Theorem (expressed as two theorems), showing that any symmetry of the Lagrangian corresponds to a conserved quantity. This result had a profound influence on 20th century theoretical physics.

Ising's Thesis

- Ising's 1924 thesis proving the non-existence of phase transitions in the 1-dimensional Ising model.[23] [24]

Contour Argument

- Peierls' 1936 contour argument proving the existence of phase transitions in higher dimensional Ising models.[25]

Infrared bounds, phase transitions and continuous symmetry breaking

- Jürg Fröhlich, Tom Spencer, and Barry Simon
- Infrared bounds, phase transitions and continuous symmetry breaking

Description: Proved the existence of phase transitions of continuous symmetry models in at least 3 dimensions. Communications in Mathematical Physics 50 (1) p79-95 [26] 1976[27]

Importance:

Mathematical Physics (1961)

- Donald H. Menzel, Harvard University
- Dover Publications, 1961

Description: Thorough introduction to the mathematical methods of classical mechanics, electromagnetic theory, quantum theory and general relativity. Possibly more accessible than Morse and Feshbach. First published 1961. Available in Dover Editions.

Importance: Introduction.

Physics of computation

Lloyd, S., 2000, Ultimate physical limits of computation, *Nature*, 406:1047-1054.

- Online [28]

Standard Model

Title:The God Particle: If the Universe Is the Answer, What Is the Question?

Author: Leon M. Lederman, with Dick Teresi

printed in the United States

Language: English

Publisher: Dell Publishing

Publication date: 1993

Media type print (hardback & paperback)

ISBN ISBN 0-385-31211-3 (Original hardcover)

Importance: Introduction to the Standard Model. The reader receives a working knowledge of the Standard Model without the math.

Computational physics

Accelerator physics

Acoustics

Astrophysics

Cryogenics

Materials physics

Nuclear physics

Particle physics

Introduction to Elementary Particles

- David J. Griffiths
- Wiley, (New Ed Edition 1987) ISBN 0471603864

Description: Standard undergraduate particle physics textbook.

Importance: Introduction

Astronomy

Biophysics

Cycles

Medical physics

Magnetic Resonance Imaging: Physical Principles and Sequence Design

- E. Mark Haacke, Robert W. Brown, Michael R. Thompson, Ramesh Venkatesan
- Wiley-Liss (1st edition 1999) ISBN 0471351288

Description: An influential graduate textbook in MRI by some of the principal advancers of the field.

Importance: Influence

Chemical physics

See also

- Category:Important publication in physics
- List of publications in science

References

[1] Bradley Steffens (2006), *Ibn al-Haytham: First Scientist*, Morgan Reynolds Publishing, ISBN 1599350246. (cf. Reviews of *Ibn al-Haytham: First Scientist* (http://www.ibnalhaytham.net/custom.em?pid=571860), *The Critics*, Barnes & Noble.)

[2] H. Salih, M. Al-Amri, M. El Gomati (2005). "The Miracle of Light", *A World of Science* **3** (3). UNESCO.

[3] http://www.mpq.mpg.de/~haensch/comb/people/thomas/OL99.pdf

[4] http://adsabs.harvard.edu/abs/2001fmce.conf..275U

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