

# CLASSIFICATION OF PHYSICS TERMS

Kilichova Ezoza

Navoi Innovations University

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**Abstract.** *Physics, as a fundamental science, encompasses a vast array of concepts and terminologies that describe the natural world. This article aims to classify physics terms into distinct categories based on their context and application. By organizing these terms, we can enhance understanding and communication within the scientific community.*

**Keywords:** *subfields, context, application, systematic classification, mechanics, electromagnetism, thermodynamics, condensed matter physics, quantum mechanics, Statistical Mechanics.*

## Introduction

Physics is often described as the study of matter, energy, and the interactions between them. The terminology used in physics can be complex and varied, reflecting the diversity of its subfields. A systematic classification of these terms is essential for students, educators, and researchers to navigate the discipline effectively. Physics terms are typically classified into several key fields, including: classical mechanics, electromagnetism, thermodynamics, quantum mechanics, relativity, optics, nuclear physics, particle physics, astrophysics, condensed matter physics.

Mechanics is a fundamental branch of physics that deals with the behavior of physical bodies under the influence of forces. It encompasses the study of motion, the forces that cause motion, and the interactions between objects. Mechanics can be broadly classified into two main categories: classical mechanics and quantum mechanics. T.M.Sobirjonov published a handbook "Mechanics (explanatory dictionary of scientific terms)" (2023).[1]. This explanatory dictionary of mechanical science terms can be widely used in the education of undergraduate students of higher educational institutions studying mechanical engineering, transport, construction, chemical and food industry technologies, light industrial machines and other areas of technology. The information in the annotated dictionary is based on undergraduate requirements, and the terms of the science of "Mechanics" are presented in a short, simple and understandable way. The dictionary can be used by master's students, doctoral students and young teachers

Electromagnetism is a crucial field of physics that not only explains a wide range of natural phenomena but also underpins many modern technologies. Its principles are integral to our understanding of the universe and have profound implications across various scientific and engineering disciplines. This field studies electric and magnetic forces.

On electromagnetism Alexander T. Filippov (1999) is known for his work on the terminology and historical development of electromagnetism in scientific literature, focusing on early electromagnetic concepts [2]. Richard P. Feynman (1964), while not specifically a linguist, his seminal work, "The Feynman Lectures on Physics", provided clear and structured terminology in electromagnetism, influencing how the subject is taught and communicated. [3]

Thermodynamics is a fundamental field of physics that provides essential insights into how energy interacts within systems. Its principles are pivotal in various scientific and engineering applications, influencing everything from industrial processes to everyday technologies. Understanding thermodynamics is crucial for advancements in energy efficiency,

sustainability, and innovation across multiple disciplines. Thermodynamics focuses on heat and energy transfer.

Pierre Duhem (1906) is a philosopher of science and physicist who made significant contributions to the foundations of thermodynamics. He also studied the development of scientific terminology, especially in classical thermodynamics.[4]

Furthermore, Rudolf Clausius (1865) and Lord Kelvin (1848) are primarily known for their foundational contributions to the science of thermodynamics, their work also heavily influenced the terminology in the field, introducing terms like "entropy" (Clausius) and "absolute temperature" (Kelvin). [5][6]

Optics is a vital field in physics that enhances our understanding of light and its interactions with matter. Its principles are foundational for numerous technologies and scientific research, impacting various industries and everyday life. As technology advances, optics continues to play a crucial role in innovations ranging from medical instruments to communication systems. Optics is the study of light behavior. Important terms include:

On optics there are many researchers such as, Isaac Newton's (1704) groundbreaking work in optics, particularly the study of light and color, introduced terms like "spectrum" and solidified much of the foundational terminology used in modern optics.[7]. His "Opticks" is one of the most influential works on the subject. Abu Ali al-Hasan Ibn al-Haytham (Alhazen) (1089) is a pioneer in the field of optics, Ibn al-Haytham made significant contributions to the understanding of vision, reflection, and refraction. His "Book of Optics" introduced and refined many Arabic terms that later influenced European optical terminology.[8] Furthermore, Christiaan Huygens (1690) is known for his wave theory of light, Huygens contributed significantly to the understanding of light propagation and optical phenomena, shaping the language and concepts used in the study of wave optics.[9]

Quantum mechanics revolutionized our understanding of the physical world, providing insights into the behavior of matter and energy at microscopic scales. Its principles challenge classical intuitions and have led to groundbreaking technologies that shape modern life. As research continues, quantum mechanics remains a vibrant field with profound implications for science and technology.

Quantum mechanics is being investigated by many researcher. Some of them are David Bohm, Karin Knorr-Cetina, John Stewart Bell etc. in details, David Bohm (1980) is known for his contributions to quantum mechanics and the development of Bohm mechanics, Bohm's work also touches on the conceptual and linguistic aspects of quantum mechanics [10]. Moreover, Karin Knorr-Cetina (1999): A sociologist of science, she has explored the epistemic cultures in different sciences, including how quantum mechanics develops its specialized terminology.[11]

Relativity is a fundamental theory in physics that describes the relationship between space, time, and gravity. Developed primarily by Albert Einstein in the early 20th century, it consists of two main theories: Special Relativity and General Relativity.

There are many researchers who investigated relativity. Some of them are Max Jammer, Peter G. Bergmann, John Stachel, Roberto Torretti, Thomas F. Glick and others. Considering Max Jammer (1954), he is a prominent historian and philosopher of science, he wrote extensively on the conceptual development of physics terms. His book "Concepts of Space: The History of Theories of Space in Physics" (1954) traces the evolution of spatial concepts, including how relativity altered the understanding and terminology of space and time.[12.] Moreover, a collaborator of Einstein, Peter G. Bergmann (1942) worked on general relativity and

quantum mechanics. He also contributed to the clarification of key relativity terms and worked on the translation of relativity into understandable language for broader audiences.[13]

Astrophysics is a dynamic and evolving field that combines theoretical insights with observational data to deepen our understanding of the universe. It addresses fundamental questions about existence, the nature of matter and energy, and the cosmos's structure and evolution. As technology advances, astrophysics continues to expand our knowledge and inspire curiosity about the universe we inhabit.

Astrophysics has been being investigated by many researchers. Owen Gingerich (1993) is an astrophysicist and historian of science, Gingerich has explored the development of astronomical and astrophysical concepts, including their terminology [14]. His work on the history of cosmology and the influence of figures like Copernicus and Kepler includes discussions on how key terms like "planetary motion" and "galaxy" evolved. Moreover, A French astronomer and astrophysicist, Jean-Claude Pecker (1995) focused on the theoretical aspects of astrophysics and contributed to the development of astrophysical language, particularly terms related to stellar structure, radiation, and the interstellar medium.[15]

Nuclear physics is a vital field that bridges fundamental science with practical applications. It enhances our understanding of matter at its most basic level while providing technologies that impact energy production, medicine, and national security. As research advances, it continues to reveal new insights into both the microcosm of atomic nuclei and the macrocosm of the universe.

Nuclear physics is always grabs the attention of many researchers. A philosopher and physician, Ludwik Fleck's (1935) work on the "thought styles" of scientific communities indirectly addresses how terminology in fields like nuclear physics evolves and is understood within expert communities[16]. Additionally, a theoretical physicist Robert Serber (1992) worked on the Manhattan Project, was known for creating terminology still in use today, such as terms for bomb designs and processes.[17]

The field of condensed matter physics explores the macroscopic and microscopic properties of matter. Condensed Matter physicists study how matter arises from a large number of interacting atoms and electrons, and what physical properties it has as a result of these interactions.

Condensed matter physics is widely investigated physics field as it is significant in today's world. The researcher in this field, Philip W. Anderson (1984) is a Nobel Prize-winning physicist and he made significant contributions to condensed matter physics and has written about how new concepts and terminology arise in the field, particularly regarding localization, symmetry breaking, and emergent properties.[18]

Acoustics is a branch of physics that deals with the study of mechanical waves in gases, liquids, and solids including topics such as vibration, sound, ultrasound and infrasound. A scientist who works in the field of acoustics is an acoustician while someone working in the field of acoustics technology may be called an acoustical engineer. The application of acoustics is present in almost all aspects of modern society with the most obvious being the audio and noise control industries. Many researchers have been investigating in acoustics field for a long time and announcing valuable information. For instance, Richard R. Stein(1999 ) is an expert in acoustics, particularly in the areas of musical acoustics and psychoacoustics. His work often involves clarifying and defining terms used in these subfields. [19] Moreover, David T. Blackstock (2000) is known for his contributions to theoretical acoustics, including the study of

sound propagation and absorption. Blackstock's research includes discussions on the terminology used to describe acoustic phenomena. [20]

In physics, physical chemistry and engineering, fluid dynamics is a subdiscipline of fluid mechanics that describes the flow of fluids — liquids and gases. It has several subdisciplines, including aerodynamics (the study of air and other gases in motion) and hydrodynamics (the study of liquids in motion). The researchers who are investigating are numerous. For instance, Claude-Louis Navier (1822) is known for the Navier-Stokes equations, which are fundamental to fluid dynamics. His work laid much of the groundwork for the terminology used in describing fluid behavior and equation [21] Moreover, George Gabriel Stokes (1851) formulated the Stokes equations and is renowned for his contributions to fluid dynamics. His work also contributed significantly to the terminology used in the field.[22]

In conclusion, the classification of physics terms into distinct categories is crucial for fostering a deeper understanding of this multifaceted discipline. By organizing terminology according to subfields such as classical mechanics, electromagnetism, thermodynamics, and quantum mechanics, we facilitate clearer communication and comprehension among students, educators, and researchers alike. This systematic approach not only aids in the learning process but also promotes interdisciplinary collaboration and innovation within the scientific community. As physics continues to evolve, maintaining a structured framework for its terminology will be essential in addressing new challenges and discoveries, ultimately enriching our grasp of the natural world.

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