

Editorial on: Series Session on the Physics

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Introduction

Classical and Modern physics

Classical physics is concerned with matter and energy on a regular scale of observation, whereas current physics is concerned with matter and energy behaviour under severe conditions or on a very large or very small scale. Time and space are absolute and independent in classical physics; therefore, they can be considered separately. Time and space, on the other hand, are relative and dependent in current physics. We can distinguish acoustics, optics, or mechanics in the most fundamental area, and cosmology, quantum mechanics, or relativity in the most current applications, between the branches of classical and modern physics.

- Classical mechanics. Newton's laws of motion
- Classical electrodynamics
- Classical thermodynamics
- Special relativity and general relativity
- Classical chaos theory and nonlinear dynamics

Condensed Matter Physics

Material that has been compressed Physics is an area of material science concerned with the physical properties of matter's condensate phase, in which particles adhere to one another. The laws of quantum mechanics and electromagnetism are two examples. It has a strong connection to atomic physics and biology. The creation of the semiconductor transistor, laser technology, and various phenomena explored in the context of nanotechnology are all examples of condensed matter physics research.

- Anderson impurity model
- Colloid vibration current
- Degenerate semiconductor
- Dynamic electrophoretic mobility
- Electric-field screening

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Astro-Particle Physics and Cosmology

Astro-particle physics is a branch of particle physics that examines fundamental particles with astronomical origins. It is located at the crossroads of particle physics and astronomy. Cosmology, on the other hand, is the study of the Universe's birth and evolution. Particle physics, astronomy, astrophysics, relativity, solid state physics, and cosmology have all collaborated to form this relatively new subject. The invention of neutrino oscillation played a part in this. High-energy cosmic-ray physics, particle cosmology, VHE and UHE gamma-ray astronomy, and high- and low-energy neutrino astronomy are all areas of research in the discipline of astro-particle physics. Cosmology is primarily concerned with stellar dynamics and evolution, galaxy formation and evolution, magnetohydrodynamics, large-scale structure of matter in the cosmos, cosmic ray origins, general relativity, and physical cosmology, including string cosmology and Astro particle physics.

- Dark Matter
- Charged Cosmic Radiation
- Gamma-Ray Astronomy
- High-Energy Neutrino Astrophysics
- Low-Energy Neutrino Astrophysics

Material Physics

The field of physics that deals with the physical properties of materials is known as material physics. It is a subclass of condensed matter physics that applies fundamental condensed matter concepts to complicated multiphase fluids, including technologically important materials. It lays the groundwork for the creation of novel materials with previously unattainable functions for future critical technologies like nanotechnology and biomaterials. Materials physics has applications in a variety of sectors, including materials engineering and medicine, as well as climate protection through resource efficiency.

- Classical mechanics.
- Thermodynamics and statistical mechanics.
- Electromagnetism and photonics.
- Relativistic mechanics.
- Quantum mechanics, atomic physics, and molecular physics.

High Energy Nuclear Physics

Understanding the properties and behaviour of elementary particles through the study of collisions or decays involving energy of hundreds of mega-electron-volts is a branch of physics. The exploration of nuclear matter under severe conditions, as well as the Quark-Gluon Plasma, which existed for roughly a microsecond after the Big Bang, is part of high-energy nuclear research. It now includes exotic mesons, multi-GeV reaction investigations, and the quark-gluon plasma, which were formerly considered particle physics issues.

- Nuclear decay
- Nuclear fusion
- Nuclear fission

- Production of "heavy" elements
- Nuclear matter

Atomic, Molecular and Optical Physics

Atomic physics examines atoms as a separate system of electrons and an atomic nucleus, whereas molecular physics examines the physical features of molecules. Optical physics makes use of and develops light sources that range from microwaves to X-rays across the electromagnetic spectrum. The generation and detection of light, linear and nonlinear optical processes, spectroscopy, lasers, and laser spectroscopy are all covered by optical physics. The three branches are inextricably linked. These areas naturally include the theory and applications of emission, absorption, and scattering of electromagnetic radiation from atoms and molecules, spectroscopic analysis, laser and maser creation, and optical characteristics of matter.