

Physics Notes For Class 12 Chapter 12

Atoms

The Feynman Lectures on Physics

and which was not supposed to be provable.” Chapters Atoms in motion Basic Physics The relation of physics to other sciences Conservation of energy Time

The Feynman Lectures on Physics is a physics textbook based on a great number of lectures by Richard Feynman, a Nobel laureate who has sometimes been called "The Great Explainer". The lectures were presented before undergraduate students at the California Institute of Technology (Caltech), during 1961–1964. The book's co-authors are Feynman, Robert B. Leighton, and Matthew Sands.

A 2013 review in Nature described the book as having "simplicity, beauty, unity ... presented with enthusiasm and insight".

Physics

Atomic physics studies the electron shells of atoms. Current research focuses on activities in quantum control, cooling and trapping of atoms and ions

Physics is the scientific study of matter, its fundamental constituents, its motion and behavior through space and time, and the related entities of energy and force. It is one of the most fundamental scientific disciplines. A scientist who specializes in the field of physics is called a physicist.

Physics is one of the oldest academic disciplines. Over much of the past two millennia, physics, chemistry, biology, and certain branches of mathematics were a part of natural philosophy, but during the Scientific Revolution in the 17th century, these natural sciences branched into separate research endeavors. Physics intersects with many interdisciplinary areas of research, such as biophysics and quantum chemistry, and the boundaries of physics are not rigidly defined. New ideas in physics often...

Condensed matter physics

mechanics, and other physics theories to develop mathematical models and predict the properties of extremely large groups of atoms. The diversity of systems

Condensed matter physics is the field of physics that deals with the macroscopic and microscopic physical properties of matter, especially the solid and liquid phases, that arise from electromagnetic forces between atoms and electrons. More generally, the subject deals with condensed phases of matter: systems of many constituents with strong interactions among them. More exotic condensed phases include the superconducting phase exhibited by certain materials at extremely low cryogenic temperatures, the ferromagnetic and antiferromagnetic phases of spins on crystal lattices of atoms, the Bose–Einstein condensates found in ultracold atomic systems, and liquid crystals. Condensed matter physicists seek to understand the behavior of these phases by experiments to measure various material properties...

Kaṇāda

Every object of creation is made of atoms (paramāṇu) which in turn connect with each other to form molecules (aṇu). Atoms are eternal, and their combinations

Kaṇāda (Sanskrit: कणाद, IAST: Kaṇāda), also known as Ulūka, Kashyapa, Kaṇabhaksha, Kaṇabhuj was an ancient Indian natural scientist and philosopher who founded the Vaisheshika

school of Indian philosophy that also represents the earliest Indian physics.

Estimated to have lived sometime between 6th century to 2nd century BCE, little is known about his life. His traditional name "Kaṇāda" means "atom eater", and he is known for developing the foundations of an atomistic approach to physics and philosophy in the Sanskrit text Vaiśeṣika Sūtra. His text is also known as Kaṇāda Sūtras, or "Aphorisms of Kaṇāda".

The school founded by Kaṇāda explains the creation and existence of the universe by proposing an atomistic theory, applying logic and realism, and is one of the earliest known systematic realist...

Group 12 element

points. Gold has atoms with one less 6s electron than mercury. Those electrons are more easily removed and are shared between the gold atoms forming relatively

Group 12, by modern IUPAC numbering, is a group of chemical elements in the periodic table. It includes zinc (Zn), cadmium (Cd), mercury (Hg), and copernicium (Cn). Formerly this group was named IIB (pronounced as "group two B", as the "II" is a Roman numeral) by CAS and old IUPAC system.

The three group 12 elements that occur naturally are zinc, cadmium and mercury. They are all widely used in electric and electronic applications, as well as in various alloys. The first two members of the group share similar properties as they are solid metals under standard conditions. Mercury is the only metal that is known to be a liquid at room temperature – as copernicium's boiling point has not yet been measured accurately enough, it is not yet known whether it is a liquid or a gas under standard conditions...

Bose-Einstein condensate

of Colorado Boulder using rubidium atoms. Later that year, Wolfgang Ketterle of MIT produced a BEC using sodium atoms. In 2001 Cornell, Wieman, and Ketterle

In condensed matter physics, a Bose-Einstein condensate (BEC) is a state of matter that is typically formed when a gas of bosons at very low densities is cooled to temperatures very close to absolute zero, i.e. 0 K (−273.15 °C; −459.67 °F). Under such conditions, a large fraction of bosons occupy the lowest quantum state, at which microscopic quantum-mechanical phenomena, particularly wavefunction interference, become apparent macroscopically.

More generally, condensation refers to the appearance of macroscopic occupation of one or several states: for example, in BCS theory, a superconductor is a condensate of Cooper pairs. As such, condensation can be associated with phase transition, and the macroscopic occupation of the state is the order parameter.

Bose-Einstein condensate was first predicted...

Cubic crystal system

It works the same way for the NaCl structure described in the next section. If you take out the Cl atoms, the leftover Na atoms still form an FCC structure

In crystallography, the cubic (or isometric) crystal system is a crystal system where the unit cell is in the shape of a cube. This is one of the most common and simplest shapes found in crystals and minerals.

There are three main varieties of these crystals:

Primitive cubic (abbreviated cP and alternatively called simple cubic)

Body-centered cubic (abbreviated cI or bcc)

Face-centered cubic (abbreviated cF or fcc)

Note: the term fcc is often used in synonym for the cubic close-packed or ccp structure occurring in metals. However, fcc stands for a face-centered cubic Bravais lattice, which is not necessarily close-packed when a motif is set onto the lattice points. E.g. the diamond and the zincblende lattices are fcc but not close-packed.

Each is subdivided into other variants listed below...

Carbon

particularly with other carbon atoms, and is capable of forming multiple stable covalent bonds with suitable multivalent atoms. Carbon is a component element

Carbon (from Latin carbo 'coal') is a chemical element; it has symbol C and atomic number 6. It is nonmetallic and tetravalent—meaning that its atoms are able to form up to four covalent bonds due to its valence shell exhibiting 4 electrons. It belongs to group 14 of the periodic table. Carbon makes up about 0.025 percent of Earth's crust. Three isotopes occur naturally, ^{12}C and ^{13}C being stable, while ^{14}C is a radionuclide, decaying with a half-life of 5,700 years. Carbon is one of the few elements known since antiquity.

Carbon is the 15th most abundant element in the Earth's crust, and the fourth most abundant element in the universe by mass after hydrogen, helium, and oxygen. Carbon's abundance, its unique diversity of organic compounds, and its unusual ability to form polymers at the...

Energy

energy that has been stored in heavy atoms since the collapse of long-destroyed supernova stars (which created these atoms). Early in a planet's history, the

Energy (from Ancient Greek ἐνέργεια (enérgeia) 'activity') is the quantitative property that is transferred to a body or to a physical system, recognizable in the performance of work and in the form of heat and light. Energy is a conserved quantity—the law of conservation of energy states that energy can be converted in form, but not created or destroyed. The unit of measurement for energy in the International System of Units (SI) is the joule (J).

Forms of energy include the kinetic energy of a moving object, the potential energy stored by an object (for instance due to its position in a field), the elastic energy stored in a solid object, chemical energy associated with chemical reactions, the radiant energy carried by electromagnetic radiation, the internal energy contained within a thermodynamic...

Pauli exclusion principle

of atoms and the way atoms share electrons, explaining the variety of chemical elements and their chemical combinations. An electrically neutral atom contains

In quantum mechanics, the Pauli exclusion principle (German: Pauli-Ausschlussprinzip) states that two or more identical particles with half-integer spins (i.e. fermions) cannot simultaneously occupy the same quantum state within a system that obeys the laws of quantum mechanics. This principle was formulated by Austrian physicist Wolfgang Pauli in 1925 for electrons, and later extended to all fermions with his spin-statistics theorem of 1940.

In the case of electrons in atoms, the exclusion principle can be stated as follows: in a poly-electron atom it is impossible for any two electrons to have the same two values of all four of their quantum numbers, which are: n , the principal quantum number; l , the azimuthal quantum number; m_l , the magnetic quantum number; and m_s , the spin quantum number...

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