

LARGE HADRON COLLIDER

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Large Hadron Collider (LHC) - the most powerful particle accelerator in the world. It is located in the European centre of nuclear researches on depth of 100 meters underground. It represents a huge ring in diameter of 27 km: two bunches of protons will move on it in opposite directions, being dispersed till the speed close to a velocity of light, and facing with each other. Consequences of collisions also become a studying subject. The idea of project LHC was born in 1984 and has been officially approved by ten years later. The construction of LHC started in 2001 after the previous big accelerator CERN - the electron-positron collider LEP (Large Electron-Positron Collider). The purpose of the Large Hadron Collider is to increase our knowledge about the universe. In an attempt to understand our universe, including how it works and its actual structure, scientists proposed a theory called the standard model. This theory tries to define and explain the fundamental particles that make the universe what it is. It combines elements from Einstein's theory of relativity with quantum theory. It also deals with three of the four basic forces of the universe: strong nuclear force, weak nuclear force and electromagnetic force. It does not address the effects of gravity, the fourth fundamental force.

Constructing the Large Hadron Collider. The Standard Model makes several predictions about the universe, many of which seem to be true according to various experiments. But there are other aspects of the model that remain unproven. One of those is a theoretical particle called the Higgs boson particle. The Higgs boson particle may answer questions about mass. Why does matter have mass? Scientists have identified particles that have no mass, such as neutrinos. Why should one kind of particle have mass and another lack it? Scientists have proposed many ideas to explain the existence of mass. The simplest of these is the Higgs mechanism. This theory says that there may be a particle and a corresponding mediating force that would explain why some particles have mass. The theoretical particle has never been observed and may not even exist. Some scientists hope the events created by the LHC will also uncover evidence for the existence of the Higgs boson particle. Others hope that the events will provide hints of new information we haven't even considered yet.

Big Bang on a Small Scale. By smashing protons together hard and fast enough, the LHC will cause protons to break apart into smaller atomic subparticles. These tiny subparticles are very unstable and only exist for a fraction of a second before decaying or recombining with other subparticles. But according to the Big Bang theory, all matter in the early universe consisted of these tiny subparticles. As

the universe expanded and cooled, these particles combined to form larger particles like protons and neutrons.

Another question scientists have about matter deals with early conditions in the universe. During the earliest moments of the universe, matter and energy were coupled. Just after matter and energy separated, particles of matter and antimatter annihilated each other.

POLLUTION IN UKRAINE

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Pollution is the contamination of the environment air, water, and land. Such contamination originates from human activities that create waste products. An industrial and intensively farmed country, Ukraine contains some of the most polluted landscapes in Eastern Europe. Pollution became evident in Ukraine with industrial development in the 19th century.

Air pollution is especially severe in many cities and towns of southeastern Ukraine, notably in Kharkiv, Luhansk, Donetsk, Dnipropetrovsk and Zaporizhia. Metallurgical coke-chemical plants, steel mills, and thermal power plants are major sources of high levels of uncontrolled emissions of sulphur dioxide, dust, unburned hydrocarbons, and other harmful substances. Other Ukrainian cities with major chronic air pollution problems include Kyiv, Komunarsk, Makiivka and Odesa.

Over one-third of the emissions into the atmosphere originate, from automobile transport. That source is aggravated by the use of leaded gasoline and inefficient engines as well as a lack of catalytic converters.

Almost all surface waters of Ukraine belong to the Black Sea and the Sea of Azov basins. The high population density, heavy industrial development, the low governmental priority placed upon environmental protection until very recently, have given rise to chronic and serious levels of water pollution throughout Ukraine. The Dnister and the Danube are included among the most polluted bodies of water in the territory of the former Soviet Union.

Environmental pollution is one of the most burning problems of our time. Nowadays every student knows what acid rain and greenhouse effect mean. In Ukraine, like everywhere in the world, people have done things that have badly damaged the nature. As a result, it's dangerous to eat fish that was caught in the river or mushrooms that were picked in the woods because they may be contaminated. The Chernobyl disaster remains one of the most tragic "unnatural" catastrophes.