

Smallest to Largest Elementary Particles and the Universe

The very smallest particles are part of our universe which is 91 light years across and 14 billion years old. Technology innovations stem from advancements in basic science including a better understanding of the universe at its largest and its smallest. For example atomic theory produced nuclear medicine (internal imaging, cancer radiation treatments), power, weapons, semiconductor developments, etc.

Our universe is composed of a set of elementary particles that are the components of the protons and neutrons that make up atoms which form our universe. Some of these elementary particles exist for an instant (for example, when generated, the Higgs boson particle decays in less than a sextillionth of a second) and are so small they can be detected only indirectly with tools such as at the Large Hadron Collider at CERN (Conseil Européen pour la Recherche Nucléaire) in Switzerland.

The current understanding, of elementary particles is that they are disturbance of energy fields, fields that also control the particles interactions. The elementary particles are described by the so-called Standard Model.

This model has been developed with theory and subsequently confirmed to a significant degree through experimentation. However, the elementary particle theory evolution and experimentation continue to reveal new questions and answers.

Also, current particle physics explains only about 5% of the composition of our universe. The remainder consists of what is referred to as dark matter and dark energy. Dark matter and energy have not yet been observed directly but is implied by effects that cannot be explained without their existence. Much is left to be learned.

If you are interested in understanding the leading edge of physics and its impact on emerging technologies, monitoring activity such as results of the Large Hadron Collider experiments is useful. As we learn more, this basic science will result in advancements that are as unimaginable as today's technology was only a hundred years ago.