

# What is elementary particle physics?

**Physics** has demonstrated that the everyday phenomena we experience are governed by universal principles applying at time and distance scales far beyond normal human experience. Elementary particle physics is one avenue of scientific inquiry into these principles. What rules govern energy, matter, space, and time at the most elementary levels? How are phenomena at the smallest and largest scales of time and distance connected?

To address these questions, particle physicists seek to isolate, create, and identify elementary interactions of the most basic constituents of the universe. One approach is to create a beam of elementary particles in an accelerator and to study the behavior of those particles—for instance, when they impinge upon a piece of material or when they collide with another beam of particles. Other experiments exploit naturally occurring particles, including those created in the sun or resulting from cosmic rays striking the earth's atmosphere. Some experiments involve studying ordinary materials in large quantities to discern rare phenomena or search for as-yet-unseen phenomena. All of these experiments rely on sophisticated detectors that employ a range of advanced technologies to measure and record particle properties.

Particle physicists also use results from ground- and space-based telescopes to study the elementary particles and the forces that govern their interactions. This latter category of experiments highlights the increasing importance of the intersection of particle physics, astronomy, astrophysics, and cosmology.

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