Particle physics (also high energy physics) is the branch of physics that studies the nature of the particles that constitute matter and radiation. Although the word "particle" can refer to various types of very small objects (e.g. protons, gas particles, or even household dust), "particle physics" usually investigates the irreducibly smallest detectable particles and the fundamental interactions necessary to explain their behavior. By our current understanding, these elementary particles are excitations of the quantum fields that also govern their interactions. This text discusses nuclear and particle physics on a somewhat phenomenological level. The mathematical sophistication shall be rather limited, with an emphasis on the physics and on symmetry aspects.
1: A History of Particle Physics

- 2: Experimental Tools

- 3: Nuclear Masses

- 4: Nuclear Models
5: Basic Concepts of Theoretical Particle Physics

6: The Four Fundamental Forces

7: Symmetries and Particle Physics

8: Symmetries of the theory of strong interactions
9: Relativistic Kinematics

Thumbnail: A Feynman diagram showing the radiation of a gluon when an electron and positron are annihilated. (CC BY-SA 3.0; Joel Holdsworth).