

A Glossary of Particle Physics Terms

Term	Definition
ALICE	A Large Ion Collider Experiment. An experiment at the LHC.
ATLAS	A Toroidal LHC Apparatus. One of the detectors at the LHC.
Baryon	A particle made of three quarks. Examples include the proton and neutron.
Bosons	Any particle or composite particle that has integer spin (0, ± 1 , ± 2 , etc.) and do not obey the Pauli exclusion principle. Examples include the photons, gluons, the W and Z bosons, the Higgs, mesons, and certain atoms (H-2, He-4).
Bremsstrahlung	Bremsstrahlung or "braking radiation" is electromagnetic radiation that is produced by the acceleration of a charged particle.
Calorimeter	A calorimeter is an apparatus that measures the energy of particles. Particles enter the calorimeter and initiate a particle shower and the resulting particles' energy is deposited in the calorimeter, collected, and measured.
Color Charge	Unrelated to visual colors, color charge is a property of quarks and gluons that is related to the particles' strong interactions.
CMS	C ompact M uon S olenoid. One of the detectors at the LHC.
Drell–Yan process	In collisions when a quark of one hadron and an antiquark of another hadron annihilate creating a virtual photon or Z boson which then decays.
Electroweak	A theory that combines electromagnetism and the weak force as two different aspects of a single electroweak interaction.
Fermion	Any particle or composite particle that has an odd half-integer spin ($\pm 1/2$, $\pm 3/2$, etc.) and must obey the Pauli exclusion principle. Examples include the electron, the proton, the neutron, and baryons.
Gluon	Gluons are elementary particles that act as the exchange particles (or gauge bosons) for the strong force between quarks.
Graviton	The graviton is a hypothetical elementary particle that act as the exchange particles (or gauge bosons) for the gravitation.
Hadron	A hadron is a composite particle made of two or more quarks.
Higgs Boson	A particle that is a vibration or excitation of the Higgs field that permeates the entire Universe and provides mass to the particles that interact with the field.
ILC	The I nternational L inear C ollider is a proposed electron/positron linear particle accelerator and collider. It is planned to have a collision energy of 500 GeV.
Invariant Mass	The rest mass of a particle (m_0).
Jets	A jet is a narrow cone of hadrons and other particles produced when an object containing color charge fragments and produce other colored objects around them to form colorless (color-neutral) objects.
Lepton	A lepton is an elementary, half-integer spin (spin $\frac{1}{2}$) particle that does not interact with gluons. There are six leptons: electron, muon, tau, electron neutrino, muon neutrino, and tau neutrino.
LHC	The L arge H adron C ollider, buried under the landscape in Switzerland and France, that collide beams of protons moving near the speed of light.
LHCb	The L arge H adron C ollider b eauty experiment. One of the detectors at the LHC
Meson	A particle made of a quark and an anti-quark. (e.g. pion, kaon, etc.)
Photon	A photon is the massless exchange particle (or gauge boson) for the electromagnetic force between charged particles.
Quark	A quark is an elementary particle. Quarks combine to form composite particles called hadrons, the most stable of which are protons and neutrons. There are six quarks: <i>up</i> , <i>down</i> , <i>charm</i> , <i>strange</i> , <i>top</i> , and <i>bottom</i> .
Standard Model	The Standard Model of particle physics is a theory concerning the electromagnetic, weak, and strong nuclear interactions, as well as classifying all the subatomic particles known.
Strong Force	The force, mediated by gluons, which hold quarks and nuclei together.
Synchrotron	A particle accelerator in which the accelerating particle beam travels around a fixed closed-loop path.
W ⁺ , W ⁻ , Z ⁰ Bosons	W ⁺ , W ⁻ , and Z ⁰ bosons are elementary particles that act as the exchange particles (or gauge bosons) for the weak force between quarks and leptons.
Weak Force	The weak interaction or force is caused by the emission or absorption of W and Z bosons. Examples include particle decay and nuclear fission.