

PARTICLE PHYSICS: FUNDAMENTAL LAWS

Baryon Number Conservation

The total number of baryons (quarks minus antiquarks divided by 3) remains constant in all interactions.

Lepton Number Conservation

The total lepton number for each generation (Electron, Muon, Tau) is conserved in Standard Model processes.

Color Charge Conservation

Gluon interactions must result in a net color neutral state; quarks are never found in isolation (Confinement).

CPT Invariance

Laws of physics remain the same if Charge, Parity, and Time reversal are applied simultaneously.

Interaction	Mediator	Conserves Parity?	Range
Strong Force	Gluon	Yes	10^{-16} to 10^{-15} m
Electromagnetic	Photon	Yes	Infinite
Weak Force	W & Z Bosons	No	10^{-16} to 10^{-17} m
Gravitation	Graviton (hyp.)	Yes	Infinite

Reference Chart: Standard Model Principles & Symmetry Laws