CPT Symmetry is a symmetry that combines three inversions: charge, parity, and time.

**C (charge) symmetry** is the result of taking the conjugate of each complex number. This has the physical result of exchanging each particle with its corresponding antiparticle.

**P (parity) symmetry** is the result of reflecting a symmetry through space, accomplished by replacing the spatial components of each vector with its opposite. It also involves raising the index or each spinor, because the Levi-Civita symbol contains a parity inversion.

**T (time) symmetry** is the result of evolving a system backward through time. This is accomplished by interchanging the zeroth component of each vector with its opposite.

These symmetries can be applied together; for example, TP symmetry is a total inversion of space-time in which each vector is replaced by its opposite.

Gravity and electromagnetism obey each of C, P, and T separately. However, it was discovered that neutrinos violate parity: they are only left-handed. This property was first suggested by C.N. Yang and T.D. Lee and was detected in 1956 by Chien-Shiung Wu. The antineutrino violates C symmetry by spinning in the opposite direction. The CP combined symmetry is also violated by the weak force.

Much like the weak force, the strong force does not theoretically require CP symmetry; however, it does include this symmetry. There is a theory that an additional field, the Axion field, exists, which causes approximate CP symmetry in the strong force at low energies.

Kobayashi and Masakawa used CP violation in 1973 to predict the existence of the third generation of quarks, which were found within the ensuing 25 years.

The existence of CPT symmetry is deeply tied to quantum field theory. For example, a violation in CPT symmetry necessitates a similar violation in Lorentz symmetry.