

Fundamental Quantities

Each of the quantities: length, time, mass, and charge, is a complementary pair of two different fundamental quantities, a true quantity and an additional quantity. The true quantity is a variant/variable quantity, and the additional quantity is an invariant quantity:

True length (of rigid rods and of space intervals between two events) ¹

Additional length (of linear elements in space-time)

True time (its rate with respect to oscillations undergoes a directionally periodic evolution) ²

Additional time (flows in step with oscillations)

True mass (inertial mass of physical substance)

Additional mass (gravitational mass of physical substance) ³

True charge (of participants in internal interactions) ⁴

Additional charge (electric charge of physical substance)

The transformation of a particle to its antiparticle inverts the signs of the additional quantities and does not alter the signs of the true quantities. ⁵

¹ The true length depends on the reference frame.

² The true time, its corresponding postulate, Principle of Time, and its corresponding process, the Hydrogen Cycle, are not known to Modern Physics.

³ Whether gravitational mass is a variant quantity or an invariant quantity is a question that has not yet been experimentally answered; experiments with photons prove that the gravitational potential energy of a photon is proportional to its kinetic energy, but since gravitation is not a force, this does not prove that photons possess gravitational mass.

⁴ The true charge and its corresponding postulate, Principle of Internal Mode, are not known to Modern Physics; the true charge is the independent variable on which interactions at the internal mode depend (the variable charge of baryons and of antibaryons is positive; the variable charge of leptons and of antileptons is negative).

⁵ Consequently, length dependent gravitation between matter and antimatter is repulsive, and antimatter's wave-functions are kind of "play-back" of matter's wave-functions (Feynman diagram).