

## 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 characteristically a variant/variable quantity, and the additional quantity is characteristically an invariant quantity:

Variant length (of rigid rods) <sup>1</sup>

Invariant length (of linear elements in space-time)

Variant-rate time (time-asymmetric magnitude of time-intervals) <sup>2</sup>

Invariant-rate time (time-symmetric magnitude of time-intervals)

Variant mass (inertial mass of particles)

Invariant mass (gravitational mass of particles) <sup>3</sup>

Variable charge (of participants in internal interactions) <sup>4</sup>

Invariant charge (of particles) <sup>5</sup>

The transformation of a particle to its antiparticle inverses the signs of the additional quantities and does not alter the signs of the true quantities. <sup>6</sup>

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<sup>1</sup> The length of a rigid rod depends on the reference frame.

<sup>2</sup> The variant-rate time, its corresponding postulate, Principle of Time, and its corresponding process, the Hydrogen Cycle, are not known to Modern Physics.

<sup>3</sup> 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.

<sup>4</sup> The variable charge and its corresponding postulate, Principle of Internal Mode, are not known to Modern Physics; the variable 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).

<sup>5</sup> The invariant charge of a particle is its electric charge.

<sup>6</sup> 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.