

Abstract

The manuscript has intention to show that the decay of elementary particles may be derived by the elementary equation of probability. The obtained result indicates that the ages of the particles do not have influence to their future. It means that two particles of the same kind with different ages have the same chance to decay in the same time interval. The oldness of the particles cannot be determined by the particles observation only. The group of particles manifests the memory effect, e.g. its state depends on the previous one and its age can be measured.

THEORETICAL DERIVATION OF FORMULA FOR DECAY OF ELEMENTARY PARTICLES

The probability of particle to decay is given by the following formula:

$$\Delta p = \lambda \cdot \Delta t \quad (1)$$

The not to decay probability of particle is given by the formula below:

$$\Delta \bar{p} = 1 - dp = 1 - \lambda \cdot \Delta t \quad (2)$$

Probability of the particle not to decay on time interval t is given with:

$$\bar{p} = \lim_{n \rightarrow \infty} \prod_{k=1}^n \Delta \bar{p} = \lim_{n \rightarrow \infty} \prod_{k=1}^n \left(1 - \lambda \cdot \frac{t}{n} \right) = \lim_{n \rightarrow \infty} \left(1 - \lambda \cdot \frac{t}{n} \right)^n = e^{-\lambda \cdot t} \quad (3)$$

The formula above contains the well-known limes of the exponential function. Regarding the formula for probability of independent events this is valid. Finally:

$$\boxed{p = 1 - \bar{p} = 1 - e^{-\lambda \cdot t}} \quad (4)$$

This is the formula for decay of particle without the memory, i.e. formula of the decay that is not altered by previous state. The formula is obtained experimentally, too. The formula is in excellence accordance with the experimental result.

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