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Lifetime of Bosons

Based on the concept used in all previous papers on this platform, employing only three fundamental constants – the fine-structure constant ***α***, Planck's constant ***h***, and the speed of light ***c*** – we obtain the following expressions for the lifetimes of the ***W***, ***Z***, and ***H***iggs bosons:

W boson:

$$\tau_W = \frac{h}{2\pi c^2 m_W} * \frac{\log_2(\pi)}{2\pi\alpha} * \left(\frac{m_Z}{m_W}\right)^{1/2} * \left[1+1/(2\pi)^3\right] = 3.1541935*10^{-25} s \qquad (1)$$

The ***W*** boson contains, under the logarithm, the constant ***π***, which provides the spatial aspect and precedes full bosonic realization, while it is complemented by the presence of electric charge.

***Z* boson:**

$$\tau_Z = \frac{h}{2\pi c^2 m_Z} * \frac{\log_2(3)}{2\pi\alpha} * \left(\frac{m_Z}{m_W}\right)^{1/2} * \left[1-1/(2\pi)^3\right]^2 = 2.6362583*10^{-25} s \qquad (2)$$

For the ***Z*** boson, the bosonic formation is complete. It is neutral. The presence of the number ***3*** in the logarithm reflects this completeness with respect to its bosonic nature – this number is not accidental; it appears naturally in the SU(2) structure.

***Higgs* boson:**

$$\tau_H = \frac{h}{2\pi c^2 m_H} * \frac{\log_2(3)}{\alpha^2} * \left[1-1/(2\pi)^3\right] = 1.5601335*10^{-22} s \qquad (3)$$

The Higgs boson is a scalar and is entirely **bit-oriented** (informationally defined) with respect to mass. The factors α^{-2} ***i*** $\log_2(3)$ describe the transition from pure information into mass, thereby completing the scaling of bosonic particles.

In all three formulas, the first factor involving Planck's constant and the mass is known as the Compton time. The measured and theoretically obtained values, together with the input constants, are given in the table below.

	2π	**6.28318530718**	α^{-1}	**137.035999084**
	h	**6.62607E-34**	***c***	**2.99792458E+08**

mass [kg]	τ	τ–measured	τ–teory	Rg%
2.2294972650E-25	τ_H	1.5600E-22	1.560133E-22	0.0086
1.6255664053E-25	τ_Z	2.6380E-25	2.636258E-25	-0.0660
1.4329101694E-25	τ_W	3.1570E-25	3.154193E-25	-0.0889