

Hypothesis

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Possible Modification of Standard Model Classification of Particles and Fields

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Hypothesis

Comments on Standard Model Classification of Particles and Fields

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Abstract: Paper presents proposition of possible extension of The Standard Model Classification of Particles and Fields in way to include gravitation into it.

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The Standard Model of Particle Physics has been developed in the mid of 1970s as a theoretical model describing and classifying known elementary particles and for attempt to unify the fundamental forces in the Universe. The SM successively predicted many results of experiments in the field of particle physics but it falls in the unification of four fundamental interactions. It was unable to unify the gravitation with the remaining three, ie, with electromagnetic, weak and strong interactions.

Tables 1 shows Standard Model classifications of all six known quarks - "up", "charm", "top", "down", "strange", and "bottom" and six leptons - electron, muon, tau, and electron neutrino, muon neutrino and tau neutrino. As presented in table all these fundamental particles (fermions) can be grouped into three generations [1]. The last column in Table 1 show assigned appropriate bosons (force carriers).

Table 1

quarks generations			bosons
I	II	III	
u	c	d	γ
d	s	b	g
leptons generations			
e	μ	τ	W^\pm
ν_e	ν_μ	ν_τ	Z^0

Excluding gravitation the remaining fundamental interactions also can be grouped in three "families". Table 2 present such classification of three fundamental interactions and theirs force carrying bosons.

Table 2

interactions			boson
I	II	III	
$strong$	$weak$	$elektromagnetic$	g, W, Z, γ

What we can immediately see is fact that all families of fundamental particles and fundamental interactions (excluding gravity) are groped in triplets! Standard Model is unable to explain this fact so far.

The gravitation does not fit into this schema. It is highly possible that gravitation is something completely different than the other three interactions. Einstein introduced to physics two very important things: fundamental relation between mass and energy $E = mc^2$ and concept of spacetime

into which the whole Universe is immersed. The Einstein spacetime is purely mathematical object and has no physical attributes but if it is possible to generate gravitational waves inside it and if they can propagate through spacetime it means that spacetime is a kind of material "fabric" or material "medium" which has elasticity! Gravitation is the distortion of the spacetime fabric due to the presence of mass. It is highly possible that spacetime is the third "state of matter" together with the energy and mass and with the Higgs as force carrying boson.

This illustrates Table 3. We have to notice that the proposed here "states of matter" also form triplet! Higgs boson creating mass immediately creates gravitation (curvature of spacetime fabric around it). Mass and gravitation are inseparably linked with each other. If it is so we see that the Standard Model classification can be extended to the Cosmology.

Table 3

"states of matter"			boson
I	II	III	
<i>Energy</i>	<i>mass</i>	<i>"spacetime fabric"</i>	<i>H</i>

References

1. M E Peskin *Concepts of Elementary Particle Physics*, Clarendon Press, Oxford U.K. (2017), 277.

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