Dark Energy and Dark Matter in Theories of Atoms

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Abstract: Here I present my comment to an article entitled “Do Dark Matter And Dark Energy Affect Ordinary Atoms?” by Chad Orzel posted on the website of Forbes. Applying the Scale-Symmetric Theory (SST), we justify that dark energy can be neglected while in the theories of atoms the dark matter plays a significant role and its omission causes that there appear infinities, free parameters, mathematical indeterminate forms - sometimes such messy theories, even though there are free parameters included, lead to results inconsistent with the experimental data, for example, it concerns the magnetic moment of muon calculated within QED.

Here I present my comment to an article entitled “Do Dark Matter And Dark Energy Affect Ordinary Atoms?” by Chad Orzel posted on the website of Forbes [1].

The Scale-Symmetric Theory (SST) [2], [3] is based on four stepwise phase transitions of the Higgs field and on the atom-like structure of baryons.

Why we are unable to answer the question of Chad Orzel within the mainstream theories? It is obvious that the leading mainstream theories, i.e. General Relativity and Quantum Physics, are not unique theories i.e. we obtain very different inconsistent solutions to the same problem. It causes that we cannot clearly define the properties of dark energy (DE) and dark matter (DM) on base of the initial conditions. We as well, for example, cannot calculate spin of proton from the initial conditions. There appears the absurd idea that the Universe accelerates its expansion without any reason. Theory of electron, i.e. the Quantum Electrodynamics (QED), is very important to answer the question of Orzel but within QED, contrary to SST, we cannot calculate the mass and charge of the electron from initial condition – just it is as well not unique theory. Dirac said that in QED we neglect infinities in an arbitrary way [4]. The QED mathematics based on the “quantity” $\infty - \infty$ is ill-defined. So the question is as follows: What are the physical reasons that in QED and other mainstream theories must appear free parameters to obtain results consistent or still inconsistent with experimental data?

On the other hand, the SST is the unique theory i.e. it is free from free parameters i.e. there appears only one solution to single problem or a set of different solutions to single problem that lead to the same results. Some of such solutions can be obtained within the not unique mainstream theories – see, for example, [5].

What is the basic problem unsolved within the mainstream theories which causes that we cannot answer the question of Orzel? We know that particles carrying mass can interact weakly. It means that dark matter and the charged leptons should interact weakly also. It means that in the bare fermions, besides the electromagnetic mass, there must be a weak mass. SST shows that it is the condensate of the Einstein-spacetime (ES) components (it is a ball) in centre of the electric-charge (it is a torus or loop) [2]. It leads to conclusion that we cannot neglect the size of bare fermions and that the mainstream theory of weak interactions is incorrect – it causes that there appear infinities so we must apply the ill-defined math.

On the other hand, for example, the non-perturbative electrodynamics described within SST leads to the relative anomalous magnetic moment equal to 0.0011596521735 [5], [2] which is very close to the experimental data – the difference is about 7 in the twelfth decimal place but the SST model gives much better result than QED for muons [2].

Now we can try to answer the question of Orzel.

According to SST, the properties of the ES and dark energy (DE) are the same but today the ratio of densities of DE and ES is about 1 part to 10^{55} parts [3]. It leads to conclusion that no one detector can measure changes in energy of atomic levels due to interactions of DE with atoms – just we can neglect such infinitesimal changes.

On the other hand, SST shows that the dark matter (DM) increases density of an electron-positron pair about 5.4 times – it follows from the fact that according to quantum physics, wave function of electron fills whole Universe. It leads to conclusion that DM increases the coupling constant of the weak interactions of electron about 10.8 times [2], [5]. We used this result to solve many problems in particle physics, atomic physics, nuclear physics and cosmology [7]. Obtained results are consistent or very close to experimental data. There do not appear infinities, mathematical indeterminate forms and free parameters.

References

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