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The expansion vs. atoms

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***Abstract**: The cosmological expansion has some observational support. However, it has not experimental evidence and it contradicts to the local observations. This philosophical point of view is also unpractical for the human society, and thus it should not be supported.*

***Keywords**: cosmological expansion, creation, time, gravity, modified theory, electromagnetic interaction*

The expansion of space is assumed by cosmologists due to the observed redshift of atomic spectra. The gravitational potential energy tends to zero between distant objects by this expansion, and thus a dark energy (or a dark mass) is needed to be generated to obey the energy conservation. The kinetic energy of visible matter, however, exceeds the corresponding gravitational potential energy in bound systems such as galaxies, and thus there is excess of speeds at larger distances from their centers using estimations by the virial theorem (the galaxy rotation problem). The expansion of space is also present "locally" for gravitation-based effects [1], although it seems to be negligible in bound systems such as the Solar System. It looks like a success of the Big Bang theory. However, cosmologists neglect existence of the rest of interactions. The space also expands locally within atoms. Atoms cannot expand because after that, the redshift will not be observed. Electromagnetically bound electrons in atoms relax to their resonances. However, there is an excess of the kinetic energy due to the space expansion as well as in gravitationally bound galaxies. Thus, we can clearly see a large discrepancy on the Earth and in the Solar System. Its age is evaluated to be approximately one third of the estimated age of expansion (and thus also the relative size of expansion and the energy excess is larger). The excess of kinetic energy (redistributed between particles due to their mutual interactions) due to the electromagnetic interaction ("neglecting" nuclear interactions) will be very large (enough to ionize many atoms) and the current existence of the Earth is strongly in disagreement with the (local) space expansion (only a negligible fraction of the dark matter is possible on the Earth due to the experiments measuring the gravitational constant). Thus, we can clearly see that local experiments are in disagreement with the observed cosmological expansion. Generally, experiments are stronger arguments than observations. Thus, the observed cosmological redshift (and related problems) should have an explanation (interpretation) that is "simpler" than the space expansion with the Big Bang and other improbable phenomena (that cannot be experimentally proved).
The gravitational interaction is crucial for the perception of an arrow of time. The gravitation is asymmetric on the Earth because it is attractive and the fraction of observed antimatter is negligible. The gravitation powers the Sun (generates pressure for nuclear reactions) that powers the life and experiments on the Earth. However, the electromagnetic interaction is time-symmetric and neutral as a whole. The human timekeeping was originally based on a gravitational "keeping" (driving) of the Solar System periods (that cannot be reversed by a human power). The modern timekeeping is based on time-symmetric electromagnetic resonances referencing periods driven by the gravitation-based power (flow). The cosmological redshift is caused by the gravitational "losses" ("modified Newtonian dynamics") or by the arrow of the time ("space expansion"). That is, the gravity is emergent

(from microscopic point of view referencing current units of measurements) or the time is emergent (from the point of view based on the “general” theory of relativity), respectively. That is, the quantum vs. the relativistic approach is (philosophically) present. However, the science (and the society) now generally more prefers that the time is not emergent, and thus the “creationistic” Big Bang (and the space expansion/generation) should be abandoned. The “space expansion” is connected with the gravitational interaction only. However, it is in disagreement with the rest of interactions. Thus, a modification of the gravitation theory will solve it [2]. The inverse-square law is not valid for the gravitation. There is a contribution that is small for small distances (cannot be measured in laboratory). Thus, orbits are unstable according to Bertrand's theorem and bodies move from each other (“space expansion”, “negative pressure”, or “dark matter” attracting from outside). The excess of energy (e.g. in the Sun or the Galactic centre) is manifested as an outward flux that recycles energy at the cosmological scale (beyond human power).

[1] Y. V. Dumin: Local Hubble expansion: Current state of the problem, 2016, https://arxiv.org/pdf/1609.01793.pdf
[2] P. Křen: Interactions and laws, 2018-2019, https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/7652