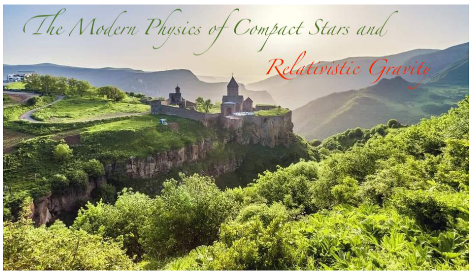

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On registration of a massless Bose particle - Hion with spin 1, whose Bose- Einstein condensation forms dark energy

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Recently, author theoretically proved the possibility of the existence of a massless spin 1 particle within the framework of the stochastic extension of Yang-Mills theory within the framework of the gauge symmetry group SU(2) x U(1) [1]. We have shown that these particles (vector bosons called hions), entangling in pairs, form Bose particles with spin-0, which in turn form a Bose-Einstein condensate. In order to be convinced of the reasonableness and accuracy of the developed theoretical concept, we decided to carry out the following quite illustrative and simple experiment, which can confirm the real existence of such massless particles.
As well-know, the quantum vacuum or dark energy fills all space without any special obstacles, including where the usual types of matter (mass particles and fields) are absent. The latter means that a certain number of non-entangled and free hions under the action of external fields can change their orientation, thereby polarizing and creating phase objects in certain regions of space, relative to which the scattering photons are very sensitive.

Not so long ago we set up an experiment, the purpose of which was to detect nonlocal interactions between two spatially divided light beams [2]. Note that this is practically impossible given the very small light-to-light scattering cross section, especially for the visible region of light (˜10-68cm2
).
Nevertheless, as the experiment showed, there is such a nonlocal interaction between light rays, which is quite measurable, and the reason for this phenomenon could be a material environment unusual in its properties. Figure 1 illustrates a modification of the experiment [2], when the light diffracted from the slit is affected by the laser beam of the second source, which circulates in cylindrical symmetry, and when all this equipment is in a vacuum. Measurements of the brightness of light in different zones showed that when the experiment is carried out in a high vacuum (˜10-5 Pa), then again a certain

redistribution of the light intensity in the zones is observed, and some distortion of the sizes of the zones themselves is also observed.
Thus, a simple experiment in the field of visible light (l˜ 510-530nm) indirectly shows the presence of matter with unusual properties, consisting of massless vector bosons. Further research into the properties of this matter, which can lay claim to the place of dark energy will require new experiments.
[1] A.S. Gevorkyan, Quantum Vacuum: The Structure of Empty Space–Time and Quintessence with Gauge Symmetry Group SU(2)xU(1), Particles, 2019, Vol. 2(2), pp. 281-308; doi:10.3390/particles2020019
[2] R. Sh. Sargsyan, et al., Nonlocal interactions between two spatially divided light fluxes, AIP Proc. of the International Conference on Advances in Quantum Theory, N1327, pp. 465-471, (2012).

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