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## Indirect Detection of Massless Particles (Hions) Through Light Difractions Experiments

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Recently, within the framework of the stochastic Yang-Mills equations for the gauge symmetry group SU(2)xU(1), the possibility of the evidenc of massless Bose particles with spin-1-Hions has been proved [1]. Theoretically, the formation of a vector field from Hions in the form of a spin glass and, accordingly, a scalar field as a result of Bose condensation of entangled pairs of Hions with a total spin-0 was justified. The goal of our experiment was the demonstration of the feasibility of manipulating the refractive indices of empty space (vacuum) by exerting of an external influence on the vector field.

As is well known, light passing through one slit forms a diffraction pattern. We modified this experiment by placing a cylinder behind the diffraction slit, on which a light guide is wound. When two independent low-power laser sources of the visible range of light are switched on, one of which falls on the slit and the other propagates along the light guide, a redistribution of light intensity is observed in individual diffraction zones. This effect is so significant that it cannot be explained within the framework of classical or quantum electrodynamics. Latter indicates the formation of a phase object of a complex structure on the path of propagation of a diffracting light beam and, accordingly, a new, still unknown type of polarization of the quantum vacuum. As multilateral analysis and numerical estimates show, such polarization can arise as a result of reorientation of Hions spins under the action of an external electromagnetic field.

In other words, this experiment indirectly proves the existence of massless and uncharged particles that fill space or, more precisely, shape space itself. The latter can fundamentally change our understanding of the physical world and its properties.

[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

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