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Dark Matter, Dark Energy and something else in 5D Theory

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Abstract: It is shown, that $(4+1)-$ and $(3+1+1)-$ reductions of the geodetic equations in 5D theory with scalar field $\varphi = \sqrt{-G_{55}}$ and out of the 5D optics inevitably lead to the new concept of the Lorentz-type relativistic mass $\hat{m}_0$ of the 5D test particle. Due to the imposition of the x^5- cylindricity condition, one can obtain an integral of the 5D particle's motion along x^5. It gives one an electric charge of it. Thus, one can obtain an exact expression for $\hat{m}_0$. It occurs, that $\hat{m}_0$ depends on the field φ through an electric charge, so probably there is no any need in a scalar charge in the Nature at all. Also, one can compactly express the $\hat{m}_0$ through the mass angle χ_n and additionally to hypothesize about the possible complex structure of $\hat{m}_0$. It soundly leads one to the deeper understanding of the quantum properties of the matter. All of these conceptions turns one also to the idea that this mass $\hat{m}_0$ may contribute to the recently discovered in the Universe dark matter and dark energy and also to be one of the possible reasons of the Universe's expansion.

The next suggestive result in the 5D theory is connected with the $(4+1)-$ reduction of the 5D Ricci identities. It leads one to the certain connections between the 4D physicogeometrical values and permits one to obtain the first pair of the Maxwell equations with the nonzero soliton-type r.h.s. and establishes the connection with the second pair of them. It subsequently leads one to the idea about the magnetic monopole's existence in the early Universe. It is shown, that this nonzero r.h.s. vanishes together with the imposition of the x^5- cylindricity condition. The peculiarity of this process permits one to hypothesize soundly about the existence of the topological second-order transition in the Universe, which leads one to the superfluid state and possibly accelerates its expansion.

Keywords: 5D relativistic mass concept; scalar gravitational field; 5D geodetic equations; cylindrical symmetry condition; 5D Ricci identities; Maxwell equations; magnetic monopole; topological second-order phase transition in cosmology