

THE NEGATIVE RESULT OF GRAVITATIONAL
TESTS FOR MULTIDIMENSIONAL
KALUZA–KLEIN MODELS

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S u m m a r y

In the Kaluza–Klein model with toroidal extra dimensions, we obtain the metric coefficients in the weak-field approximation for delta-shaped matter sources. These metric coefficients are used to calculate the formulas for the frequency shift, perihelion shift, and deflection of light. In the leading order of approximation, the formula for the frequency shift coincides with the well-known expression from general relativity. However, for the perihelion shift and the light deflection, we obtain formulas $D\pi r_g/[(D-2)a(1-e^2)]$ and $(D-1)r_g/[(D-2)\rho]$, respectively, where D is a total number of spatial dimensions. These expressions demonstrate good agreement with experimental data only in the case of the ordinary three-dimensional ($D=3$) space. This result does not depend on the size of the extra dimensions. We also obtain the exact 5-D soliton solution with correct non-relativistic Newtonian limit. The energy momentum tensor for this solution has clear physical interpretation. However, the classical tests for this metric do not satisfy the experimental data. Therefore, the considered multidimensional Kaluza–Klein models face a severe problem.