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Relativistic astrophysics based on Feynman's approach to gravitational interaction

Physical properties of the relativistic compact objects stellar mass, supermassive objects in active galactic nuclei, and relativistic cosmological models essentially depend on the physics of the gravitational interaction. We compare the initial principles, main equations, and astrophysical consequences of Einstein's geometrical approach (General Relativity) with Feynman's field approach (Field Gravity) to the theory of gravitation. It is shown that all classical relativistic effects have the same values in Post-Newtonian approximation. The main difference of the Feynman's field approach from GR is that in FG there is energy-momentum tensor of the gravitational field with positive energy density and that the trace of the symmetric second rank tensor potential is an essential internal scalar part which corresponds to the repulsive force. Astrophysical tests of the nature of the gravitational interaction, including solar system, pulsars in binary systems, supernova explosions, relativistic compact objects, gravitational waves, active galactic nuclei and cosmology are discussed.

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