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Paradoxes of cosmological physics in the beginning of 21-st century

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In the history of cosmology the paradoxes played important role for development of contemporary world models. Within the modern standard cosmological model there are both observational and conceptual cosmological paradoxes which stimulate to search their solution. Confrontation of theoretical predictions of the standard cosmological model with the latest astrophysical observational data is considered. A review of conceptual problems of the Friedmann's space expanding models, which are in the bases of modern cosmological model, is discussed. The main paradoxes, which are discussed in modern literature, are the Newtonian character of the exact Friedman equation, the violation of the energy conservation within any comoving local volume, violation of the limiting recession velocity of galaxies for the observed high redshifts. Possible observational tests of the nature of the cosmological redshift are discussed.

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