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Decay of false vacuum and solar system test of f(R) gravity[1] JUN-QI GUO, ANDREI V. FROLOV, Simon Fraser University — The scenario of false vacuum decay can describe the nucleation processes of statistical physics. Historically it was also used to build the early theory of inflation. In this talk, we will discuss another application: solar system test of f(R) gravity. f(R) gravity is to interpret the current accelerating expansion of the universe. In solar system, f(R) gravity is required to reduce to general relativity so as to meet the observations. In the "Chameleon mechanism," the scalar field, f'=df/dR, might couple to the matter density both inside and outside of the Sun. Therefore, the field, f', can be regarded to decay from the false vacuum of an effective potential to the true one. We find that, 1) the thin-wall approximation condition derived in the scenario of false vacuum decay can be written in a more intuitive way; 2) compared to the thin-shell condition obtained in Chameleon mechanism, the thin-wall approximation condition is the more proper one for an f(R) model to meet the solar system test. The numerical solutions to the equation of motion of f' for RlnR and Hu-Sawicki models verify the thin-wall approximation condition, and also explain the difficulties that the RlnR model faces in the solar system test.

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