

Unifying inflation with dark energy: the case of modified gravity

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I give the introduction to modified gravity. Mainly, $F(R)$ gravity is considered but also other theories, like modified Gauss-Bonnet gravity are mentioned. It is shown the basic properties of such theory and how one can construct viable models from $F(R)$ gravity. The possibility to unify the early-time inflation with late-time acceleration is described in detail following the line developed in the series of our works. Special attention is paid to construction of realistic inflation. Not only slow-roll inflation but also constant-roll inflation is discussed in $F(R)$ gravity. The account of quantum gravity R^2 -like contribution is done. The possibility to describe in realistic way the constant-roll $F(R)$ epoch with exponential dark energy era is presented in detail. The correct autonomous dynamical system approach to $F(R)$ gravity which gives stable and unstable de Sitter vacuum is developed. The possibility of bounce cosmology in $F(R)$ is briefly discussed. The lecture is based significantly on recent review: S.Nojiri, S.D.Odintsov and V.K.Oikonomou, "Modified Gravity Theories on a Nutshell: Inflation, Bounce and Late-time Evolution," [arXiv:1705.11098 [gr-qc]].