Dark energy, dark matter, and now the dark scalar mode in $f(T)$ gravity?

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1 Abstract

Recent works concerning perturbation theory in $f(T)$ gravity highlight the absence of a propagating scalar mode in both linear and second order scalar perturbations around the FLRW metric. Hamiltonian analyses in $f(T)$ gravity identify extra degrees of freedom, none of which propagate into the perturbation equations. The issue of a missing degree of freedom is interpreted as the strong coupling problem. The boost scalar appears as a direct consequence of the antisymmetric field equations but due to its non-dynamical property at linear order, does not solve the issue of strong coupling. Without the boost scalar, the linear equations are overdetermined unless $f_{TT} = 0$. This talk aims to review the strong coupling problem associated with the missing scalar mode, showing how the boost scalar is necessary, but not sufficient. The talk asks whether perturbations in $f(T)$ gravity can be fully trusted.