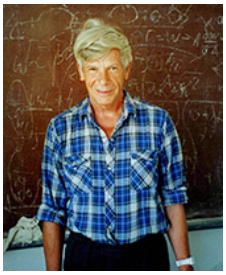

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The possibility of constructing stable solutions in Horndeski theory avoiding the no-go theorem

Tuesday, 11 October 2022 15:20 (25 minutes)

Horndeski theories [1]
\begin{align}
&S=\int\mathrm{d}^4x\sqrt{-g}\left(\mathcal{L}*2 + \mathcal{L}_3 + \mathcal{L}_4 + \mathcal{L}_5 + \mathcal{L}*{BH}\right),\\
&\mathcal{L}*2=F(\pi,X),\\
&\mathcal{L}_3=K(\pi,X)\Box\pi,\\
&\mathcal{L}_4=-G_4(\pi,X)R+2G*{4X}(\pi,X)\left[\left(\Box\pi\right)^2-\pi_{;\mu\nu}\pi^{;\mu\nu}\right],\\
&\mathcal{L}*5=G_5(\pi,X)G^{\mu\nu}\pi*{;\mu\nu}+\frac{1}{3}G_{5X}\left[\left(\Box\pi\right)^3-3\Box\pi\pi_{;\mu\nu}\pi^{;\mu\nu}+2\pi_{;
&\mathcal{L_{BH}}=F_4(\pi,X)\epsilon^{\mu\nu\rho}*{\quad\;\sigma}\epsilon^{\mu'\nu'\rho'\sigma}\pi*{,\mu}\pi_{,\mu'}\pi_{;\nu\nu'}\pi_{;r
\\\nonumber&\qquad+F_5(\pi,X)\epsilon^{\mu\nu\rho\sigma}\epsilon^{\mu'\nu'\rho'\sigma'}\pi_{,\mu}\pi_{,\mu'}\pi_{;\nu\nu'}\pi_{;\rho\r
\end{align}
are the most general scalar-tensor theories of gravity, which has second-order equations of motion and thus erasing the Ostrogradsky instability. In addition, it was found that in this theory the null energy conditions (NEC) are not related to the stability of cosmological solutions. This fact allows one to construct healthy NEC-violating genesis and bounce solutions, as well as new models of dark energy and inflation with interesting phenomenology [2].
However, the construction of non-singular cosmological solutions is prevented by the so-called no-go theorem [3]. In our talk we present a classification of solutions that avoid the no-go theorem.

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[2]V.A. Rubakov, "The Null Energy Condition and its violation," Phys. Usp. **57** (2014), 128-142. doi:10.3367/UFNe.0184.201402b.0137. [arXiv:1401.4024 [hep-th]].
[3] S. Mironov, V. Rubakov and V. Volkova, "Bounce beyond Horndeski with GR asymptotics and γ-crossing," JCAP **10** (2018), 050. doi:10.1088/1475-7516/2018/10/050. [arXiv:1807.08361 [hep-th]].

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